doi: 10.48095/cccg2024459

Pap smear and colposcopy findings in female inmates of a prison unit in the state of São Paulo, Brazil

Pap stěr a kolposkopické nálezy u vězeňkyň ve vězeňské jednotce ve státě São Paulo, Brazílie

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Summary: **Objective:** The objective of this study was to evaluate the Pap smear and colposcopy findings in female inmates in a prison unit in the state of São Paulo, Brazil. **Methods:** A retrospective cross-sectional study was carried out by analyzing the Pap smear and colposcopy examinations of female inmates in a prison unit. The following socio-demographic data were assessed: age, nationality, level of education, marital status, height, weight, ethnicity, occupation, religion, sexual orientation, and presence of tattoos. **Results:** The sample consisted of 894 women who had a Pap smear, the majority of whom were Brazilian (93.6%), 41.1% had an incomplete primary education, 58.5% were single, 50.1% were white, 60.7% had tattoos, and the predominant religion was Catholicism at 42.8%. Regarding sexual orientation, 124 (13.9%) women identified as bisexual, 640 (71.6%) as heterosexual, and 127 (14.2%) as homosexual. Most Pap smears showed benign findings (86.5%). Of the female inmates who had a Pap smear, 121 (13.5%) were referred for colposcopy. Altered colposcopy findings occurred in 95 (10.6%), with the most common findings being high-grade squamous intraepithelial lesions 36 (4.0%) and low-grade squamous intraepithelial lesions 27 (3.0%). The majority of women (96.0%) had no clinical signs of human papillomavirus – HPV (anogenital verrucous lesions) and only 36 (4.0%) had lesions suggestive of HPV on Pap smears. There were more HIV cases in the group with HPV verrucous lesions (P = 0.013). **Conclusion:** We observed 13.5% and 78.5% of abnormal findings in Pap smears and colposcopy, resp.), in female inmates in a prison unit in the state of São Paulo, Brazil.

Key words: prison – female inmates – Pap smear – colposcopy – HPV

Souhrn: **Cíl:** Cílem této studie bylo vyhodnotit nálezy v Pap stěru a kolposkopii u vězeňkyň ve vězeňské jednotce ve státě São Paulo, Brazílie. **Metody:** Retrospektivní průřezová studie byla provedena analýzou Pap stěru a kolposkopického vyšetření vězeňkyň ve vězeňské jednotce. Byly hodnoceny následující sociodemografické údaje: věk, národnost, úroveň vzdělání, rodinný stav, výška, hmotnost, etnický původ, povolání, náboženství, sexuální orientace a přítomnost tetování. **Výsledky:** Vzorek tvořilo 894 žen, které měly Pap stěr, z nichž většina byly Brazilky (93,6 %), 41,1 % mělo neúplné základní vzdělání, 58,5 % bylo svobodných, 50,1 % byly bělošky, 60,7 % mělo tetování a převládajícím náboženstvím bylo katolické 42,8 %. Pokud jde o sexuální orientaci, označilo se 124 žen (13,9 %) za bisexuální, 640 (71,6 %) za heterosexuální a 127 (14,2 %) za homosexuální. Většina Pap stěrů vykazovala benigní nálezy (86,5 %). Z vězeňkyň, které měly Pap stěr, bylo 121 (13,5 %) odesláno na kolposkopii. Změněný nález kolposkopie se vyskytl u 95 žen (10,6 %), přičemž nejčastější byl nález high-grade skvamózní intraepiteliální léze vysokého stupně u 36 žen (4,0 %) a low-grade skvamózní intraepiteliální léze nízkého stupně u 27 žen (3,0 %). Většina žen (96,0 %) neměla žádné klinické známky lidského papilomaviru – HPV (anogenitální verukózní léze) a pouze 36 (4,0 %) mělo na Pap stěrech léze připomínající HPV. Více případů HIV bylo ve skupině s HPV verukózními lézemi (p = 0,013). **Závěr:** Pozorovali jsme 13,5 %, resp. 78,5 % abnormálních nálezů v Pap stěru a kolposkopii u vězeňkyň ve vězeňské jednotce ve státě São Paulo v Brazílii.

Klíčová slova: věznice – vězeňkyně – Pap stěr – kolposkopie – HPV

Introduction

In mid-2023, the world's prison population was approximately 11.7 million, and Brazil's share was 644,305 inmates, of which 27,375 (4.25%) were women, making it the third largest in the world, behind the United States and China, which are first and second, respectively [1]. Brazil has 1,384 prison units with an official capacity of 481,835 places, an occupancy rate of 133.7%, and 27.9% of inmates are in pre-trial detention. In mid-2023, the prison population in the State of São Paulo was 195,787 (30.1%), of which 8,520 were women, representing 4.34% of the State's prisoners and 31.12% of all women prisoners in Brazil [2].

The confinement experienced by female inmates and the consequent deprivation of contact with family members promote expectations that can result in a continuous process of physical and emotional stress, which can lead to a greater risk of physical and mental illness [3–5]. This risk can also be increased by an unbalanced diet and a sedentary lifestyle, leading to the occurrence of certain diseases, such as cardiovascular, metabolic and oncological diseases, among others [6–8]. It should also be considered that female inmates in Brazil are part of a younger population with some characteristics, such as unprotected sex and relationships with multiple partners, which may be associated with a higher risk of sexually transmitted diseases, such as human papillomavirus (HPV), which in turn is associated with a higher risk of cervical cancer [9,10].

In terms of oncologic impact, female inmates have few tests available for early detection, the most available being preventive cytology for cervical cancer (Pap smear or oncologic colpocytology) [11,12]. The conventional Pap smear is a low-cost, easy-to-use method and the gold standard for cervical cancer screening [13], which is particularly important in the prison system. Colposcopy is a procedure performed by a specialist in pathologies of the lower genital tract, usually after an abnormal Pap smear result, which can provide targeted biopsies [14]. However, the colposcope device and experienced examiners to perform the examination are usually not available in the majority of unit prisons [15].

The objective of this study was to evaluate the Pap smear and colposcopy findings in female inmates in a prison unit in the State of São Paulo, Brazil.

Materials and methods

A retrospective cross-sectional study was carried out between January 2015 and December 2020 by analyzing the Pap smear and colposcopy examinations of female inmates in a prison unit (Centro de Detenção Provisória – CPP do Butantan) located in the city of São Paulo, Brazil.

The study included the following socio-demographic data: age, nationality, level of education, marital status, height, weight, ethnicity, occupation, religion, sexual orientation, and presence of tattoos. We described the time interval between the last Pap smear and the time of the new one, and whether the inmates had previously had a Pap smear. In addition, the time interval between the negative Pap smear and the subsequent Pap smear, colposcopy, and clinical signs such as the presence of verrucous lesions in the anogenital region. The outcome of colposcopy and the treatment given were also included, and the co-infections present in the Pap smears.

For the conventional Pap smear examination, female inmates were referred to the outpatient medical center (Centro Assistencial Cruz de Malta) and underwent a gynecological examination in which secretions were collected from the vaginal sac with a spatula and from the cervical region of the uterus with a brush. All Pap smears were collected by a single experienced examiner (FMA). Pregnant women were excluded, as well as those who did not want to undergo the Pap smear. We used the following classification for the Pap smear:

- class I: absence of abnormal or atypical cells ("normal");
- class II: cellular atypia, but no evidence of malignancy;
- class III: cytology suggestive, but not conclusive of malignancy;
- class IV: cytology strongly suggestive of malignancy;
- class V: cytology conclusive for malignancy [16].

The colposcopy examinations were performed in two services (Maternidade Escola de Vila Nova Cachoeirinha e Santa Casa de Misericórdia de São Paulo) by a single experienced examiner (ABC) using the DF Vasconcelos device (Valença, Brazil). We used the following classification for the Colposcopy findings:

Squamous cell abnormalities:

1. atypical squamous cells of undetermined significance – ASC-US;
2. atypical squamous cells which cannot exclude a high-grade lesion – ASC-H;
3. low-grade squamous intraepithelial lesion – LSIL;
4. high-grade squamous intraepithelial lesion – HSIL;
5. squamous cell carcinoma.

Abnormalities of glandular cells:

1. atypical glandular cells;
2. adenocarcinoma *in situ*;
3. adenocarcinoma (endocervical, endometrial, extrauterine) [17].

Data were transferred to an Excel spreadsheet (Microsoft Corp., Redmond, WA, USA) and statistical analyses were performed using IBM SPSS Statistics version 24 (IBM Corp., Armonk, NY, USA) and R software version 3.6.3. Statistical analysis was performed using summary measurements such as mean, median, Min. and Max. values, standard deviation, absolute and relative frequencies (percentages), as well as pie charts, bar graphs, box plots, and one-dimensional scatter plots. The inferential analyses used to confirm or refute the evidence found in the descriptive analysis were

Mann-Whitney, Pearson's chi-square, and Fisher's exact or its extension. A 5% alpha significance level was used for all inferential conclusions.

Results

The sample selected for this study consisted of 894 female inmates who had a Pap smear, the majority of whom were Brazilian (93.6%), followed by South Africans (0.9%) and Bolivians (0.9%). The mean age of these women was 34.9 years, ranging from 19 to 73 years. The mean body mass index (BMI) was 25.1 kg/m^2, ranging from 15.1 to 49.6 kg/m^2.

Tab. 1 shows the socio-demographic characteristics: 367 (41.1%) of women had an incomplete primary education, 523 (58.5%) were single, 448 (50.1%) were white, 543 (60.7%) had tattoos, and the predominant religion was Catholicism (42.8%) and Evangelical (42.1%). Regarding sexual orientation, 124 (13.9%) women identified as bisexual, 640 (71.6%) as heterosexual, and 127 (14.2%) as homosexual. In terms of occupation, the majority were housewives (24.3%), followed by domestic workers (11.2%), shopkeepers (3.4%), and hairdressers (3.1%).

Regarding Pap smears, 285 (31.9%) had them less than 3 years ago, 467 (52.2%) had them 3 years ago or more, and 58 (6.5%) reported never having them. Most Pap smears showed benign findings (86.5%). Altered colposcopy findings occurred in 95 (10.6%) women, with the most common findings being HSIL (36, 4.0%) and LSIL (27, 3.0%). The majority of women (96.0%) had no clinical signs of HPV (presence of anogenital verrucous lesions) and only 36 (4.0%) women had lesions suggestive of HPV on Pap smears. Regarding the outcomes, the majority had clinical follow-up (81,2 90.8%), followed by extended biopsy (43, 4.8%) (Tab. 2). We observed co-infections in 181 (20.2%) Pap smear results, with the main agents being *Gardnerella vaginalis/Mobiluncus sp*. (65.2%), *Trichomonas vaginalis* (28.7%), and *Candida sp.* (6.1%).

Tab. 1. Socio-demographic characteristics of the female inmates.
Tab. 1. Sociodemografické charakteristiky vězeňkyň.

Socio-demographic characteristic		N	%
Level of education	illiterate	14	1.6
	incomplete primary education	367	41.1
	complete primary education	262	29.3
	completed high school	236	26.4
	completed university degree	15	1.7
	total	894	100.0
Marital status	common-law marriage	205	22.9
	married	94	10.5
	divorced	27	3.0
	separated	20	2.2
	single	523	58.5
	widow	25	2.8
	total	894	100.0
Ethnicity	Asian	1	0.1
	white	448	50.1
	mixed	331	37.0
	black	114	12.8
	total	894	100.0
Tattoo	no	351	39.3
	yes	543	60.7
	total	894	100.0
Religion	catholic	383	42.8
	christian	67	7.5
	spiritist	61	6.8
	evangelical	376	42.1
	muslim	6	0.7
	none	1	0.1
	total	894	100.0
Sexual orientation	bisexual	124	13.9
	heterosexual	640	71.6
	homosexual	127	14.2
	no response	3	0.3
	total	894	100.0

N – number

Tab. 3 shows the distribution of alterations in the Pap smear according to socio-demographic characteristics of female inmates. We observed a higher number of homosexuals in the LSIL group ($P < 0.001$), a shorter time until colposcopy in the ASC-US group ($P = 0.025$), a higher number of HPV verrucous lesions in the LSIL group ($P < 0.001$), and a higher number of HIV in the LSIL group ($P < 0.001$).

Of the female inmates who had a Pap smear, 121 (13.5%) were referred for colposcopy. Tab. 4 shows the distribution of

Tab. 2. Pap smear and colposcopy findings and outcomes of female inmates.
Tab. 2. Pap stěr a kolposkopické nálezy a výsledky vězeňkyň.

Examinations and outcomes		N	%
When was your last Pap smear?	< 3 years	285	31.9
	≥ 3 years	467	52.2
	never did	58	6.5
	don't know	84	9.4
	total	894	100.0
Pap smear findings	ASC-H	6	0.7
	ASC-US	59	6.6
	benign findings	773	86.5
	HSIL	27	3.0
	LSIL	29	3.2
	total	894	100.0
HPV verrucous lesions	absent	858	96.0
	present	36	4.0
	total	894	100.0
Time until colposcopy	< 3 months	84	9.4
	≥ 3 months	38	4.3
	no response	772	86.4
	total	894	100.0
Colposcopy	abnormal	95	10.6
	normal	26	2.9
	no response	773	86.5
	total	894	100.0
Pathology results	permit	1	0.1
	cancer	17	1.9
	chronic cervicitis	15	1.7
	HSIL	36	4.0
	LSIL	27	3.0
	normal	26	2.9
	no response	772	86.4
	total	894	100.0
Outcome	clinical follow-up	812	90.8
	permit	2	0.2
	extended biopsy	43	4.8
	total abdominal hysterectomy	17	1.9
	death	1	0.1
	clinical treatment (TCA)	19	2.1
	total	894	100.0
HIV	no	881	98.5
	yes	13	1.5
	total	894	100.0

ASC-H – atypical squamous cells which cannot exclude a high-grade lesion, ASC-US – atypical squamous cells of undetermined significance, HPV – human papillomavirus, HSIL – high-grade squamous intraepithelial lesion, LSIL – low-grade squamous intraepithelial lesion, N – number, TCA – trichloroacetic acid

alterations in colposcopy according to socio-demographic characteristics of female inmates. The HSIL group was older (P = 0.033), the cancer group had more bisexuals (P = 0.005), and a longer time until colposcopy (P < 0.001).

Tab. 5 shows the relationships between HPV verrucous lesions and socio-demographic characteristics of female inmates. There were more benign findings in the group without HPV verrucous lesions and LSIL group with HPV verrucous lesions (P < 0.001). There was more clinical follow-up in the group without HPV verrucous lesions and extended biopsy in the group with HPV verrucous lesions (P < 0.001). There were more HIV cases in the group with HPV verrucous lesions (P = 0.013).

Discussion

In terms of sociodemographic characteristics, the majority of all samples were Brazilian, with incomplete primary education, single, white, and Catholic. In a study developed by Silva et al. [18] with 352 women in prisons of Mato Grosso do Sul, Midwest of Brazil, the majority was Brazilian, with incomplete primary education and mixed race. The differences between the ethnicities of both studies are probably a consequence of the different racial distributions between both Brazilian states [19]. In a broader study involving 15 female prisons in eight states of all Brazilian regions with a sample of 1,327 women, 65.1% were black or mixed race, with incomplete primary education, single, and Catholic [20].

We also assessed other socio-demographic characteristics such as sexual orientation and occupation. Of these women, 13.9% identified as bisexual, 71.6% as heterosexual, and 14.2% as homosexual. Farel et al. [21] conducted qualitative interviews with 29 African-American women in prison (15 HIV positive, 14 HIV negative). Women reported complex sexual risk profiles during the 6 months before incarceration, including sex with women as well as

Tab. 3. Distribution of alterations in the Pap smear, according to socio-demographic characteristics of female inmates.
Tab. 3. Rozdělení změn v Pap stěru podle sociodemografických charakteristik vězeňkyň.

		ASC-H		ASC-US		Non-neoplastic findings		HSIL		LSIL		P
Level of education	illiterate	–	–	–	–	12	1.6%	–	–	2	6.9%	0.142[a]
	incomplete primary education	4	66.7%	14	23.7%	329	42.6%	11	40.7%	9	31.0%	
	complete primary education	1	16.7%	19	32.2%	225	29.1%	7	25.9%	10	34.5%	
	completed high school	1	16.7%	25	42.4%	194	25.1%	9	33.3%	7	24.1%	
	completed university degree	–	–	1	1.7%	13	1.7%	–	–	1	3.4%	
	total	6	100.0%	59	100.0%	773	100.0%	27	100.0%	29	100.0%	
Marital status	common-law marriage	2	33.3%	12	20.3%	181	23.4%	5	18.5%	5	17.2%	0.556[a]
	married	1	16.7%	7	11.9%	84	10.9%	–	–	2	6.9%	
	divorced	–	–	4	6.8%	21	2.7%	2	7.4%	–	–	
	separated	–	–	–	–	20	2.6%	–	–	–	–	
	single	3	50.0%	35	59.3%	445	57.6%	20	74.1%	20	69.0%	
	widow	–	–	1	1.7%	22	2.8%	–	–	2	6.9%	
	total	6	100.0%	59	100.0%	773	100.0%	27	100.0%	29	100.0%	
Ethnicity	Asian	–	–	–	–	1	0.1%	–	–	–	–	0.482[c]
	white	5	83.3%	29	49.2%	388	50.2%	14	51.9%	12	41.4%	
	mixed	–	–	20	33.9%	291	37.6%	8	29.6%	12	41.4%	
	black	1	16.7%	10	16.9%	93	12.0%	5	18.5%	5	17.2%	
	total	6	100.0%	59	100.0%	773	100.0%	27	100.0%	29	100.0%	
Age (years)	N	6		59		773		27		29		0.073[b]
	mean	40.7		36.3		34.7		36.5		35.6		
	median	41.0		34.0		33		36.0		34.0		
	Min.–Max.	35.0–46.0		22.0–57.0		19.0–73.0		25.0–52.0		21.0–62.0		
	standard deviation	5.2		8.7		9.6		7.0		10.0		
Body mass index (kg/m^2)	N	6		59		773		27		29		0.869[b]
	mean	28.1		25.1		25.0		25.6		25.0		
	median	24.8		25.0		24.4		23.5		24.6		
	Min.–Max.	20.2–45.7		15.1–33.1		16.4–49.6		17.3–38.2		19.6–38.1		
	standard deviation	9.1		3.7		4.5		5.7		4.3		
Tattoo	no	1	16.7%	24	40.7%	310	40.1%	7	25.9%	9	31.0%	0.355[a]
	yes	5	83.3%	35	59.3%	463	59.9%	20	74.1%	20	69.0%	
	total	6	100.0%	59	100.0%	773	100.0%	27	100.0%	29	100.0%	
Religion	catholic	4	66.7%	23	39.0%	331	42.8%	14	51.9%	11	37.9%	0.928[a]
	christian	1	16.7%	6	10.2%	54	7.0%	2	7.4%	4	13.8%	
	spiritist	–	–	4	6.8%	50	6.5%	3	11.1%	4	13.8%	
	evangelical	1	16.7%	26	44.1%	331	42.8%	8	29.6%	10	34.5%	
	muslim	–	–	–	–	6	0.8%	–	–	–	–	
	none	–	–	–	–	1	0.1%	–	–	–	–	
	total	6	100.0%	59	100.0%	773	100.0%	27	100.0%	29	100.0%	

[a] Pearson's chi-square, [b] Kruskal-Wallis, [c] extension of Fisher's exact test
ASC-H – atypical squamous cells which cannot exclude a high-grade lesion, ASC-US – atypical squamous cells of undetermined significance, HPV – human papillomavirus, HSIL – high-grade squamous intraepithelial lesion, LSIL – low-grade squamous intraepithelial lesion, N – number, P – P-value

Tab. 3 – continuing. Distribution of alterations in the Pap smear, according to socio-demographic characteristics of female inmates.
Tab. 3 – pokračování. Rozdělení změn v Pap stěru podle sociodemografických charakteristik vězeňkyň.

		ASC-H		ASC-US		Non-neoplastic findings		HSIL		LSIL		P
Sexual orientation	bisexual	1	16.7%	6	10.2%	111	14.4%	4	14.8%	2	6.9%	< 0.001[a]
	heterosexual	5	83.3%	26	44.1%	581	75.5%	16	59.3%	12	41.4%	
	homosexual	–	–	27	45.8%	78	10.1%	7	25.9%	15	51.7%	
	total	6	100.0%	59	100.0%	770	100.0%	27	100.0%	29	100.0%	
Last Pap smear	< 3 years	3	60.0%	19	38.0%	243	37.6%	8	33.3%	12	44.4%	0.779[a]
	≥ 3 years	2	40.0%	31	62.0%	403	62.4%	16	66.7%	15	55.6%	
	total	5	100.0%	50	100.0%	646	100.0%	24	100.0%	27	100.0%	
Time until Colposcopy (months)	< 3 months	3	50.0%	47	79.7%	–	–	14	51.9%	20	69.0%	0.025[c]
	≥ 3 months	3	50.0%	12	20.3%	1	100.0%	13	48.1%	9	31.0%	
	total	6	100.0%	59	100.0%	1	100.0%	27	100.0%	29	100.0%	
HPV verrucous lesions	absent	3	50.0%	51	86.4%	772	99.9%	23	85.2%	9	31.0%	< 0.001[c]
	present	3	50.0%	8	13.6%	1	0.1%	4	14.8%	20	69.0%	
	total	6	100.0%	59	100.0%	773	100.0%	27	100.0%	29	100.0%	
HIV	no	6	100.0%	56	94.9%	768	99.4%	27	100.0%	24	82.8%	< 0.001[c]
	yes	–	–	3	5.1%	5	0.6%	–	–	5	17.2%	
	total	6	100.0%	59	100.0%	773	100.0%	27	100.0%	29	100.0%	

[a] Pearson's chi-square, [b] Kruskal-Wallis, [c] extension of Fisher's exact test
ASC-H – atypical squamous cells which cannot exclude a high-grade lesion, ASC-US – atypical squamous cells of undetermined significance, HPV – human papillomavirus, HSIL – high-grade squamous intraepithelial lesion, LSIL – low-grade squamous intraepithelial lesion, N – number, P – P-value

Tab. 4. Distribution of alterations in the colposcopy, according to socio-demographic characteristics of female inmates.
Tab. 4. Rozdělení změn v kolposkopii podle sociodemografických charakteristik vězeňkyň.

		Cancer		Chronic cervicitis		HSIL		LSIL		Normal		P
Level of education	illiterate	–	–	1	6.7%	–	–	1	3.7%	–	–	0.762[c]
	incomplete primary education	7	41.2%	4	26.7%	15	41.7%	6	22.2%	7	26.9%	
	complete primary education	4	23.5%	6	40.0%	10	27.8%	10	37.0%	7	26.9%	
	completed high school	6	35.3%	4	26.7%	10	27.8%	9	33.3%	12	46.2%	
	completed university degree	–	–	–	–	1	2.8%	1	3.7%	–	–	
	total	17	100.0%	15	100.0%	36	100.0%	27	100.0%	26	100.0%	
Marital status	common-law marriage	3	17.6%	2	13.3%	10	27.8%	8	29.6%	2	7.7%	0.297[a]
	married	–	–	1	6.7%	3	8.3%	2	7.4%	4	15.4%	
	divorced	1	5.9%	3	20.0%	–	–	1	3.7%	1	3.8%	
	single	13	76.5%	9	60.0%	22	61.1%	15	55.6%	18	69.2%	
	widow	–	–	–	–	1	2.8%	1	3.7%	1	3.8%	
	total	17	100.0%	15	100.0%	36	100.0%	27	100.0%	26	100.0%	
Ethnicity	white	12	70.6%	8	53.3%	19	52.8%	12	44.4%	10	38.5%	0.639[c]
	mixed	4	23.5%	5	33.3%	10	27.8%	9	33.3%	12	46.2%	
	black	1	5.9%	2	13.3%	7	19.4%	6	22.2%	4	15.4%	
	total	17	100.0%	15	100.0%	36	100.0%	27	100.0%	26	100.0%	

[a] Pearson's chi-square, [b] Kruskal-Wallis, [c] extension of Fisher's exact test
HPV – human papillomavirus, HSIL – high-grade squamous intraepithelial lesion, LSIL – low-grade squamous intraepithelial lesion, N – numper, P – P-value

Tab. 4 – continuing. Distribution of alterations in the colposcopy, according to socio-demographic characteristics of female inmates.

Tab. 4 – pokračování. Rozdělení změn v kolposkopii podle sociodemografických charakteristik vězeňkyň.

		Cancer		Chronic cervicitis		HSIL		LSIL		Normal		P
Age (years)	N	17		15		36		27		26		
	mean	37.2		34.1		39.6		35.3		33.2		
	median	38.0		33.0		37.0		32.0		33.5		0.033[b]
	Min.–Max.	22.0–55.0		22.0–48.0		28.0–62.0		23.0–57.0		21.0–53.0		
	standard deviation	9.6		7.5		8.2		8.9		7.8		
Body mass index (kg/m²)	N	17		15		36		27		26		
	mean	23.8		25.5		26.9		24.0		25.6		
	median	23.0		24.2		25.8		23.9		25.1		0.078[b]
	Min.–Max.	17.3–33.1		19.4–38.2		18.7–45.7		15.1–33.2		19.6–36.4		
	standard deviation	4.1		5.5		5.0		3.9		4.2		
Tattoo	no	4	23.5%	7	46.7%	9	25.0%	11	40.7%	9	34.6%	
	yes	13	76.5%	8	53.3%	27	75.0%	16	59.3%	17	65.4%	0.440[a]
	total	17	100.0%	15	100.0%	36	100.0%	27	100.0%	26	100.0%	
Religion	catholic	9	52.9%	7	46.7%	15	41.7%	10	37.0%	11	42.3%	
	christian	2	11.8%	2	13.3%	4	11.1%	4	14.8%	1	3.8%	
	spiritist	–	–	2	13.3%	5	13.9%	3	11.1%	1	3.8%	0.806[c]
	evangelical	6	35.3%	4	26.7%	12	33.3%	10	37.0%	13	50.0%	
	total	17	100.0%	15	100.0%	36	100.0%	27	100.0%	26	100.0%	
Sexual orientation	bisexual	6	35.3%	–	–	3	8.3%	–	–	4	15.4%	
	heterosexual	9	52.9%	8	53.3%	20	55.6%	14	51.9%	8	30.8%	
	homosexual	2	11.8%	7	46.7%	13	36.1%	13	48.1%	14	53.8%	0.005[c]
	total	17	100.0%	15	100.0%	36	100.0%	27	100.0%	26	100.0%	
Last Pap smear	< 3 years	5	33.3%	5	35.7%	14	43.8%	9	37.5%	9	42.9%	
	≥ 3 years	10	66.7%	9	64.3%	18	56.3%	15	62.5%	12	57.1%	0.951[a]
	total	15	100.0%	14	100.0%	32	100.0%	24	100.0%	21	100.0%	
Time until Colposcopy (months)	< 3 months	3	17.6%	15	100.0%	17	47.2%	23	85.2%	25	96.2%	
	≥ 3 months	14	82.4%	–	–	19	52.8%	4	14.8%	1	3.8%	< 0.001[a]
	total	17	100.0%	15	100.0%	36	100.0%	27	100.0%	26	100.0%	
HPV verrucous lesions	absent	13	76.5%	12	80.0%	25	69.4%	15	55.6%	20	76.9%	
	present	4	23.5%	3	20.0%	11	30.6%	12	44.4%	6	23.1%	0.361[a]
	total	17	100.0%	15	100.0%	36	100.0%	27	100.0%	26	100.0%	
HIV	no	16	94.1%	13	86.7%	34	94.4%	26	96.3%	24	92.3%	
	yes	1	5.9%	2	13.3%	2	5.6%	1	3.7%	2	7.7%	0.817[c]
	total	17	100.0%	15	100.0%	36	100.0%	27	100.0%	26	100.0%	

[a] Pearson's chi-square, [b] Kruskal-Wallis, [c] extension of Fisher's exact test
HPV – human papillomavirus, HSIL – high-grade squamous intraepithelial lesion, LSIL – low-grade squamous intraepithelial lesion, N – numper, P – P-value

prior sexual partnerships with both men and women. In a Brazilian study on the sexual behavior of 18 women prisoners, 33.3% reported health behaviors such as sexually transmitted infections, 27.7% related to the use of male condoms, 16.6% prevented unwanted pregnancies, and 11.1% followed good health care and hygiene practices [22]. Regarding occupation, the majority were housewives, followed by domestic workers. In a study by de Araujo et al. [20], the

Tab. 5. Distribution of HPV verrucous lesions, according to socio-demographic characteristics of female inmates.
Tab. 5. Rozdělení HPV verukózních lézí podle sociodemografických charakteristik vězeňkyň.

Examinations and outcomes		HPV verrucous lesions				p
		absent		present		
When was your last Pap smear?	< 3 years	274	38.1%	11	33.3%	0.580[a]
	≥ 3 years	445	61.9%	22	66.7%	
	total	719	100.0%	33	100.0%	
Result of Pap smear	ASC-H	3	0.3%	3	8.3%	< 0.001[b]
	ASC-US	51	5.9%	8	22.2%	
	benign findings	772	90.0%	1	2.8%	
	HSIL	23	2.7%	4	11.1%	
	LSIL	9	1.0%	20	55.6%	
	total	858	100.0%	36	100.0%	
Time until colposcopy	< 3 months	63	73.3%	21	58.3%	0.105[a]
	≥ 3 months	23	26.7%	15	41.7%	
	total	86	100.0%	36	100.0%	
Colposcopy	abnormal	65	76.5%	30	83.3%	0.401[a]
	normal	20	23.5%	6	16.7%	
	total	85	100.0%	36	100.0%	
Pathology results	cancer	13	15.3%	4	11.1%	0.361[a]
	chronic cervicitis	12	14.1%	3	8.3%	
	HSIL	25	29.4%	11	30.6%	
	LSIL	15	17.6%	12	33.3%	
	normal	20	23.5%	6	16.7%	
	total	85	100.0%	36	100.0%	
Outcome	clinical follow-up	803	93.6%	9	25.0%	< 0.001[b]
	permit	2	0.2%	–	–	
	extended biopsy	28	3.3%	15	41.7%	
	total abdominal hysterectomy	11	1.3%	6	16.7%	
	death	1	0.1%	–	–	
	clinical treatment (TAC)	13	1.5%	6	16.7%	
	total	858	100.0%	36	100.0%	
HIV	no	848	98.8%	33	91.7%	0.013[b]
	yes	10	1.2%	3	8.3%	
	total	858	100.0%	36	100.0%	

[a] Pearson's chi-square, [b] Fisher's exact or its extension
ASC-H – atypical squamous cells which cannot exclude a high-grade lesion, ASC-US – atypical squamous cells of undetermined significance, HPV – human papillomavirus, HSIL – high-grade squamous intraepithelial lesion, LSIL – low-grade squamous intraepithelial lesion, P – P-value, TCA – trichloroacetic acid

majority of women prisoners were domestic workers (31.8%).

Regarding Pap smears, 86.5% of the exams showed benign findings. We observed a higher number of homosexuals in the LSIL group, a shorter time until colposcopy in the ASC-US group, a higher number of HPV warty lesions in the LSIL group, and a higher number of HIV cases in the LSIL group. Audi et al. [23] performed a study with 702 female inmates aged between 25 and 64 years and in a unit prison in the São Paulo state for not less than 12 months. The mean women's age was 34.7 years and the performance of Pap smear was 26.3%. There were no differences in prevalence when assorted by age group, marital status, ethnicity/race, religion, education, income, work at the prison, and the fact of having children. Silva et al. [18] found

that of the incarcerated women who had received a Pap smear, 298 (69.8%) reported no cellular changes at the time, while 70 (16.4%) reported changes, of which 42 (60.0%) reported infection as the most common change. Delage de Luget et al. [24] estimated the prevalence of cervical dysplasia among incarcerated women in a prison unit in Marseille, France. A total of 201 Pap smears were evaluated, 135 were normal (67.2%), 33 were unsatisfactory (16.4%), and 33 (16.4%) were abnormal.

We observed 20.2% of co-infections in Pap smears results, including *Gardnerella vaginalis/Mobiluncus sp.* (65.2%), *Trichomonas vaginalis* (28.7%), and *Candida sp.* (6.1%). A Brazilian study assessed the sexual behavior of partners of female inmates, being that 41.2% of them reported a history of sexually transmitted diseases. Association was observed between having more than one partner in the last 12 months, sexual violence, having sex for money, and under the influence of alcohol and drugs [25]. In a study of 387 incarcerated women from the Rhode Island Department of Corrections who submitted a self-collected vaginal swab for APTIMA transcription-mediated amplification testing, the prevalence of *Trichomonas vaginalis* was 14% [26]. In a study of juvenile incarcerated women in Kingston, Ontario, Canada, of the women tested, 4% were positive for *Neisseria gonorrhoeae*, 10% for *Chlamydia trachomatis*, 32% for bacterial vaginosis, and 5% for *Trichomonas vaginalis* [27].

Of the female inmates who had a Pap smear, 13.5% were referred for colposcopy and the main findings in the pathology were as follows: cancer 1.9%, chronic cervicitis 1.7%, HSIL 4.0%, and LSIL 3.0%. Downley et al. [28] evaluated 206 incarcerated women who had colposcopy. The prevalence of low-grade disease – cervical intraepithelial neoplasia grade (CIN) grade I was 406 (8.0%), while the prevalence of high-grade disease – CIN grades II and III was 250 (4.9%). Invasive squamous carcinoma occurred in 18 (0.4%) cases. Invasive cervical squamous cell carcinoma has as a main etiologic factor, infection by HPV, which presents at a high prevalence in incarcerated women [29]. In Brazil, excluding non-melanoma skin tumors, cervical cancer is the third most common type of cancer among women. For each year of the three-year period 2023–2025, 17,010 new cases were estimated, which represents a crude incidence rate of 15.38 cases per 100,000 women [30].

The strengths of our study were the large sample size of Pap smears, and the fact that both Pap smears and colposcopy were performed by only two experienced examiners, which could increase sensitivity of methods.

In summary, we presented the Pap smear and colposcopy findings of female inmates of a prison unit in São Paulo State, Brazil. We observed 13.5% and 78.5% of abnormal findings in the Pap smear and colposcopy, respectively. These findings can contribute to the development of public policies aimed at improving the health care of female inmates.

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Submitted/Doručeno: 25. 4. 2024
Accepted/Přijato: 30. 4. 2024

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Publication ethics: The Editorial Board declares that the manuscript met the ICMJE uniform requirements for biomedical papers.
Publikační etika: Redakční rada potvrzuje, že rukopis práce splnil ICMJE kritéria pro publikace zasílané do biomedicínských časopisů.
Conflict of interests: The authors declare they have no potential conflicts of interest concerning the drugs, products or services used in the study.
Konflikt zájmů: Autoři deklarují, že v souvislosti s předmětem studie/práce nemají žádný konflikt zájmů.
Dedication: This study was approved by the Ethics Committee of the University of São Paulo (CAAE: 69562523.2.0000.5421).
Dedikace: Tato studie byla schválena Etickou komisí Univerzity v São Paulu (CAAE: 69562523.2.0000.5421).