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Epidemiological analysis of human papillomavirus infection in women at a Basic Health Unit in Olinda, Pernambuco

Análise epidemiológica da infecção feminina pelo papilomavírus humano em uma Unidade Básica de Saúde de Olinda, Pernambuco

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Abstract

Objective: This cross-sectional descriptive study aimed to determine the epidemiological profile and existence of human papillomavirus (HPV) infection in women who underwent preventive gynecological examination at a basic health unit in Olinda (Pernambuco, Brazil) between August 2023 and January 2024. **Methods:** This is a cross-sectional study in which women answered a questionnaire to collect sociodemographic, socioeconomic, and epidemiological data associated with HPV infection. **Results:** Most women were single (60.71%), brown (52.57%), had children (75%), and had an income lower than one minimum wage (64.28%). Regarding HPV infection, 39.28% reported being vaccinated, whereas 42.85% were unaware of HPV. Most women (85.71%) presented benign cellular changes. Microbiology data revealed that 57.14% of participants presented *Cocci*, 10.71% presented *Bacilli*, 21.42% presented *Gardnerella vaginalis* or *Mobiluncus* sp., 7.14% presented *Lactobacillus* sp., and 3.57% presented *Trichomonas vaginalis*, *Actinomyces* sp., or *Candida albicans*. **Conclusion:** Early sexual intercourse, multiple partners, and socioeconomic vulnerability increase the risk of HPV infection. Most women were unaware of HPV, but none presented lesions or changes related to HPV.

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Resumo

Objetivo: Traçar o perfil epidemiológico e determinar se houve infecção pelo papilomavírus humano (HPV) entre as mulheres que realizaram o exame preventivo ginecológico em uma Unidade Básica de Saúde (UBS) de Olinda, Pernambuco, durante Agosto de 2023 e Janeiro de 2024. **Métodos:** Trata-se de um estudo descritivo do tipo transversal no qual foi realizado um questionário de levantamento de dados sociodemográficos, socioeconômicos e informações relacionadas a variáveis epidemiológicas associadas à infecção por HPV com as mulheres que realizaram o exame preventivo ginecológico na UBS. **Resultados:** Dentre as participantes, observou-se o predomínio de mulheres solteiras (60,71%), pardas (52,57%), com filhos (75,00%) e com renda menor do que um salário mínimo (64,28%). No que tange ao HPV, 39,28% afirmam serem vacinadas e 42,85% não sabem o que é o vírus. Quanto ao diagnóstico descritivo, a maioria (85,71%) indicou alterações celulares benignas. Em relação à microbiologia, 57,14% apresentaram cocos; 10,71% apresentaram bacilos; 21,42% apresentaram supracitoplasmáticos (Gardnerella/Mobiluncus); 7,14% apresentaram *Lactobacillus sp.*; e 3,57% apresentaram *Trichomonas vaginalis*, *Candida albicans* ou *Actinomyces sp.*. **Conclusão:** Início precoce da vida sexual, múltiplos parceiros e vulnerabilidade socioeconômica aumentam o risco de infecção pelo HPV. A maioria das participantes dessa pesquisa não tinha conhecimentos básicos sobre o vírus, mas nenhuma apresentou lesões ou alterações relacionadas ao HPV.

Palavras-chave: Atenção primária à saúde; Papilomavírus humano; Prevenção primária; Saúde da mulher

INTRODUCTION

Human papillomavirus (HPV) infection is prevalent and may occur after the first sexual intercourse. This is the most common sexually transmitted infection (STI) worldwide and is associated with various pathological conditions, including cancer affecting the anogenital region, oropharynx, and cervix (cervical cancer)[1].

Cervical cancer (CC) is the fourth most common cancer among women worldwide. Approximately 70% of cases are caused by high-risk HPV types, especially genotypes 16 and 18, whereas low-risk types (HPV-6 and HPV-11) are responsible for 90% of cases of genital warts and recurrent juvenile papillomatosis[2]. A total of 118 types of HPV have been described, and approximately 100 types of high or low oncogenic risk infect humans[3].

HPV infections are generally asymptomatic. Anogenital warts develop in 1% to 2% of women with HPV infection, and 2% to 5% may present alterations in cervical cytology (Papanicolaou test). Infection prevalence is higher in women under 30, and most HPV infections in this popula-

tion (especially adolescents) resolve spontaneously within 24 months[4].

HPV is the primary risk factor for CC and may cause genital warts, precursor lesions, and cancer, particularly in the cervix and anogenital tracts. Epidemiological profiles may help assess the vulnerability and exposure of a given population to HPV, which has several risk factors (e.g., early sexual initiation, multiple sexual partners, non-use of condoms, oral contraceptive use, smoking, nutritional deficiencies, and lack of immunization). Other STI and skin lesions also contribute to viral entry into the mucosa[5].

Anogenital warts are diagnosed clinically. The biopsy for histopathological examination should be performed in cases of atypical or treatment-resistant lesions, diagnostic uncertainty, and suspected or extensive lesions in women with immunodeficiency. Cervical cytology is needed for CC screening in women with anogenital warts; however, if cytological changes are present, colposcopy and biopsy may be required[6].

Although the Papanicolaou test is fundamental for CC diagnosis in Brazil, systematic repetition is required due to the moderate sensitivity in detecting adenocarcinoma and cervical intraepithelial neoplasia grades 2 or 3. Low sensitivity for preneoplastic adenocarcinoma lesions is linked to the lack of endocervical cells. Additional limitations include subjectivity, low reproducibility, and the high workload in pathology laboratories with reduced staff[7].

Regarding diagnosis, periodic gynecological consultations are crucial to ensure the early detection of potentially cancerous lesions and prevent poor prognoses. Limited access to healthcare services and low socioeconomic status are strongly associated with not performing the Papanicolaou test, a notable issue in regions with high poverty levels and social inequality, such as the state of Pernambuco[8].

In this context, epidemiological studies are needed in low-income areas, such as the municipality of Olinda (Pernambuco - Brazil), to develop more strategies to prevent HPV infection. Data on age, race, marital status, education level, number of children, income, religion, smoking, alcohol consumption, age at first sexual intercourse, age at menarche, number of sexual partners, sexual orientation, contraceptive use, HPV vaccination status, and knowledge about the virus are essential to understand and correlate HPV incidence with the socioeconomic, sociodemographic, and behavioral factors of women in the studied region.

This study aimed to determine the epidemiological profile of women who underwent preventive exams at a basic health unit (BHU) and its associations with HPV infection. The objective was to analyze and determine potential risk factors within the community and promote health education regarding protective and prevention measures for HPV and its associated pathologies.

METHODS

This cross-sectional descriptive study used data from in-person questionnaires applied

to a convenience sample between August 2023 and January 2024. The questionnaires were designed based on discussions about the epidemiology and risk factors for HPV infection within the context of a BHU in Olinda and included questions related to sociodemographic (e.g., age, race, menarche, contraceptive methods, sexual orientation, and number of sexual partners) and socioeconomic characteristics (income, basic sanitation, and educational level).

The presence of epithelium, lesions, cellular changes indicative of preneoplastic conditions, and other anomalies were analyzed in the collected samples. Microbiological analyses were performed to identify infections or imbalances in the vaginal flora and provide a more comprehensive overview of the gynecological health of the participants.

After explaining the study objectives, the volunteers who agreed to participate signed the informed consent form. The study included women over 18 years old residing in the municipality of Olinda, assisted by the BHU, and who underwent preventive gynecological examination during the study. Women younger than 18 years old or who did not undergo cervical sample collection were excluded.

Data were analyzed based on valid responses and carefully tabulated to avoid data loss or missing questionnaires. A total of 28 questionnaires were administered during the study.

Absolute and relative frequencies were analyzed and presented in tables and figures using Microsoft Word 2020 and Microsoft Excel 2021.

RESULTS

A total of 28 Papanicolaou tests were performed in the BHU in which the study was conducted (Table 1). Of these, 3 (10.71%) women were under 20. 7 (25%) women aged 20 to 29, 6 (21.42%) women aged 30 to 39, 5 (17.85%) women aged 40 to 49, 6 (21.42%) women aged 50 to 59, and only 1 (3.57%) was over 60. Regarding marital status, 17 (60.71%) were single, 8 (28.57%) were married, 2 (7.14%) were divorced, and only 1 (3.57%) was in a stable union.

Table 1. Absolute and relative distribution of women according to sociodemographic and socioeconomic variables. Olinda, Pernambuco, Brazil, 2023.

Variables	N	%
Age		
< 20	3	10.71
20 to 29	7	25.00
30 to 39	6	21.42
40 to 49	5	17.85
50 to 59	6	21.42
> 60	1	3.57

Marital status		
Single	17	60.71
Married	8	28.57
Divorced	2	7.14
Stable union	1	3.57
Educational level		
Elementary school (incomplete)	8	28.57
Elementary school (completed)	3	10.71
High school (incomplete)	4	14.28
High school (completed)	10	35.71
Higher education	2	7.14
Illiterate	1	3.57
Children		
No	7	25.00
Yes	21	75.00
Skin color		
White	3	10.71
Brown	15	52.57
Black	10	35.71
Household income		
< 1 minimum wage	18	64.28
1 to 3 minimum wages	10	35.71
Religion		
Catholic	6	21.42
Evangelical	14	50.00
No religion	8	28.57
Smoking		
Yes	5	17.85
No	21	75.00
Former smoker	2	7.14
Alcohol consumption		
Yes	18	64.28
No	9	32.14
Former drinker	1	3.57
Age at first sexual intercourse		
< 14 years	5	17.85
14 to 18 years	19	67.85
> 18 years	3	10.71
Does not remember	1	3.57
Menarche		
< 13 years	17	60.71
13 to 16 years	10	35.71

16 to 18 years	1	3.57
Number of sexual partners		
< 3 partners	7	25.00
≥ 3 partners	21	75.00
Sexual orientation		
Heterosexual	25	89.28
Bisexual	3	10.71
Contraceptive methods		
Oral contraceptives	7	25.00
Intrauterine device	3	10.71
Condom	3	10.71
Multiple methods	1	3.57
Other	2	7.14
None	12	42.85
HPV vaccination status		
Yes	11	39.28
No	12	42.85
Does not remember	5	17.85
Knowledge about HPV		
Yes	9	32.14
No	12	42.85
Only heard about it	7	25

HPV: human papillomavirus; N: number of women.

Regarding educational level, 10 (35.71%) women had completed high school, 8 (28.57%) had incomplete elementary school, and only 2 (7.14%) had higher education. Regarding skin color, 15 (52.57%) self-reported as brown, 10 (35.71%) as black, and 3 (10.71%) as white. Moreover, 25 (89.28%) reported being heterosexual and 3 (10.71%) bisexual. Among all women, 21 (75%) had children.

A total of 18 (64.28%) women earned less than one minimum wage and 10 (35.71%) between one and three minimum wages. Regarding age at first sexual intercourse, 19 (67.85%) women were between the ages of 14 and 18 years, while 5 (17.85%) were under 14. Among all women, 21 (75%) had three or more sexual partners.

Menarche was reported before the age of 13 by 17 (70.71%) women, whereas 10 (35.71%) reported it between 13 and 16, and only 1 (3.57%) between 16 and 18 years old. Regarding contraceptives, 12 (42.85%) women did not use any method, 7 (25%) used oral contraceptives, 3 (10.71%) had an intrauterine device, and 3 (10.71%) used condoms. Also, 18 (64.28%) consumed alcohol, and 7 (25%) were smokers or former smokers.

Regarding knowledge about HPV, 12 (42.85%) were unaware of HPV, 9 (32.14%) were

aware, and 7 (25%) only heard about HPV. Additionally, 12 (42.85%) women reported no vaccination against HPV, whereas 11 (39.28%) reported being vaccinated.

Table 2 presents the cytopathological results. All samples were classified as “satisfactory” for material adequacy. Squamous and glandular cells were observed in all samples, while metaplasia was observed in 2 (7.14%).

Table 2. Characterization of the Papanicolaou test results. Olinda, Pernambuco, Brazil, 2023.

Criteria	Result	N	%
Material adequacy	Satisfactory	28	100.00
Epithelia represented in the sample	Squamous	28	100.00
	Glandular	28	100.00
	Metaplastic	2	7.14
Descriptive diagnosis	Within normal limits	1	3.57
	Benign cellular changes (inflammation)	24	85.71
	Possible non-neoplastic cellular atypia	21	75.00
Microbiology	*Lactobacillus* sp.	2	7.14
	Gardnerella vaginalis or *Mobiluncus* sp.	6	21.42
	Other *Bacilli*	3	10.71
	Cocci	16	57.14
	Trichomonas vaginalis	1	3.57
	Candida albicans	1	3.57
	Actinomyces sp.	1	3.57

Regarding the descriptive diagnosis, 24 (85.71%) samples indicated benign cellular changes (e.g., inflammation), 21 (75%) showed possible non-neoplastic cellular atypia, and only 1 (3.57%) was within normal limits. Moreover, 16 (57.14%) samples contained *Cocci*, 6 (21.42%) had *Bacilli*, and 3 (10.71%) showed *Gardnerella vaginalis* or *Mobiluncus* sp. *Lactobacillus* sp. was identified in 2 (7.14%) samples, and 3 (10.71%) tested positive for microorganisms, such as *Trichomonas vaginalis*, *Actinomyces* sp., or *Candida albicans*.

DISCUSSION

This study observed the influence of behavioral, sociodemographic, and socioeconomic factors on the susceptibility to HPV infection. Most women reported little or no knowledge about HPV, and less than half were aware of the association between HPV and CC, highlighting the need for effective educational initiatives. Additionally, low adherence to the HPV vaccine was a concern, with less than half of women reporting vaccination. Although 75% of women in this study had children at vaccination age, the lack of awareness about HPV hindered vaccine uptake and may have led many families to skip vaccination or fail to complete the vaccination schedule.

These findings highlight the need for health education programs targeting parents and adolescents to achieve the vaccination goals of the World Health Organization outlined in the Global Strategy to Accelerate the Elimination of CC by 2030[10].

Most women reported early sexual intercourse and had three or more partners. Additionally, 32.14% were aware of HPV, and 42.85% did not use contraceptive methods. These findings suggest an increased risk for HPV infection, as sexual activity is the primary mode of transmission. These results align with literature, which indicates that exposure to infected partners and lack of preventive measures contribute to viral spread[11].

Early sexual intercourse is associated with a higher risk of HPV infection since condom use is often absent, leaving adolescents more susceptible to STI[12]. Despite the risk factors, laboratory evidence of HPV infection was not detected in this study, possibly due to operational limitations that reduced the sample size and, consequently, the probability of confirming the expected findings. Additionally, limited awareness about HPV, oncogenic potential, and preventive measures may contribute to viral dissemination[12].

Regarding sexual orientation, 89.28% were heterosexual, while 10.71% were bisexual. Among bisexual women, the lack of barrier methods for sexual activity increases the risk of infection despite the misconceptions that such contact does not transmit STI. A study conducted in 2020 observed a 45.30% prevalence of HPV infection in bisexual women, highlighting the risks, need for education, and access to adequate resources for prevention[13].

The results of the Papanicolaou test, which involves collecting cells from the cervix to detect anomalies, were also analyzed. All samples were deemed satisfactory and ensured an accurate and reliable analysis. In Brazil, Papanicolaou is the standard cytopathological test and involves collecting cervical cells using an endocervical brush or spatula; the sample is considered satisfactory when containing an adequate number of high-quality cells. Screening may be discontinued at the age of 65 if suitable follow-up has been conducted over the preceding ten years[14].

A study conducted in 2020 in Porto Alegre (Brazil) reinforced the importance of evaluating epithelial types to assess cervical health. Cervical epithelial transformation is crucial for reproductive health. During puberty, the squamocolumnar junction (cervical transformation zone) becomes more susceptible to HPV infection and is the primary site for CC development. The study emphasized that cytological changes in this region were directly associated with HPV, underscoring the need for early monitoring and intervention[15].

In this context, the characteristics of the cervical epithelium in the Papanicolaou test are essential for gynecological assessment. The epithelium can be classified as squamous (predominant in the cervix), glandular (less common), and metaplastic (glandular epithelium replaced by squamous epithelium). Although metaplasia is generally not a concern, monitoring is crucial[16].

Inflammatory cytology was observed in over 85% of women. Local inflammation may promote squamous metaplasia in the transformation zone and favor HPV proliferation. Among the identified microorganisms, *Lactobacillus* sp. was the most prevalent. This bacterium plays a crucial role in maintaining vaginal pH balance, inhibiting the growth of other microorganisms, and contributing to vaginal microbiota homeostasis.

Pathogenic microorganisms were also detected, including *Candida* sp., which is associated with candidiasis and characterized by thick white discharge, dysuria, and pruritus; *Trichomonas vaginalis,* a sexually transmitted protozoan that causes trichomoniasis, leads to vaginal microlesions, and increase the susceptibility to other STI; and *Gardnerella vaginalis*, which is responsible for bacterial vaginosis.

Although HPV infections were not detected in this study, *Trichomonas vaginalis* and *Gardnerella vaginalis* are associated with HPV. A study conducted in northern Rio Grande do Sul (Brazil) in 2020 identified *Gardnerella vaginalis* as the most prevalent pathogen, aligning with cytological findings indicating that these infections cause local inflammation, promote squamous metaplasia and HPV proliferation, and increase the risk of precursor lesions for CC[17].

Microbiological findings can guide suitable diagnosis and treatment to restore the microbiota balance and prevent complications. Improved screening and increased adherence to the Papanicolaou test may also reduce the transmission of inflammation-associated microorganisms and the incidence of premalignant and malignant cervical lesions; thus, indirectly contributing to HPV control.

This study presented limitations. The low adherence to the Papanicolaou test reduced the sample size, and some left the BHU before the examination. This low participation may be due to the lack of awareness about HPV and practical challenges (e.g., childcare responsibilities, household chores, and employment). Additionally, shortages of medical supplies (e.g., gloves, gynecological speculums, and microscope slides) hindered the study execution, exposing the poor resource management and weaknesses in public health policies.

Socioeconomic factors may have also impacted the study since the BHU experienced closures and reduced hours due to restrictions imposed by local authorities related to drug conflicts in the community. Consequently, many women were unable to attend their preventive screenings due to service suspensions or safety concerns.

CONCLUSION

This study highlights the importance of HPV prevention and education and observed a low adherence of women to the Papanicolaou test, especially in vulnerable communities. Furthermore, local adversities, such as prolonged medical supply shortages and regional security issues, limited the number of samples collected in the study. Regarding vaccination, adherence

was higher in younger women.

Despite the risk factors and socioeconomic vulnerability, no HPV infections were detected. This finding suggests the need for further investigations to better understand the protective factors and emphasize the importance of investments in education and incentive programs, especially in underserved populations. Such efforts could reduce HPV infection rates and associated diseases and improve public health.

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CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

AUTHOR CONTRIBUTIONS

All authors contributed to all stages of the manuscript preparation and approved the final version.

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