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INCIDENCE OF CYTOPATHOLOGICAL CHANGES IN PATIENTS ATTENDED BY THE BRAZILIAN PUBLIC HEALTH SYSTEM (SUS) IN THE CENTRAL REGION OF RIO GRANDE DO SUL: ANALYSIS OF CERVICAL CANCER SCREENING

INCIDÊNCIA DE ALTERAÇÕES CITOPATOLÓGICAS EM PACIENTES ATENDIDAS PELO SUS NA REGIÃO CENTRAL DO RIO GRANDE DO SUL: ANÁLISE DO RASTREAMENTO DO CÂNCER DE COLO DO ÚTERO

Hellen Lucas Mertins[1], Isabela Scheffer Guterres[2], Caroline Arend Birrer[2], Jarbas da Silva Ziani[3], Mylane Genro Santos[4], Gabriela Pozzobon Zamberlan da Silva[5], Renata Casarotto de Oliveira[4] e Francielle Liz Monteiro[6]

ABSTRACT

Cervical cancer is one of the leading causes of morbidity and mortality among women in Brazil and can be prevented through HPV vaccination and cytopathological screening. This study aimed to determine the incidence of cytopathological changes in women treated by the SUS in the central region of Rio Grande do Sul. This is a quantitative, retrospective, and analytical study using data from cytopathological exams performed between January 2022 and July 2023 in 22 municipalities in the central region. During this period, 28,524 Pap smear tests were performed, with an average coverage rate of 23.2 %. Of these exams, 2.5 % showed cervical lesions, with ASC-US being the most frequent lesion (36.7 %), followed by LSIL (21.5 %) and HSIL (11.9 %). The highest incidence of lesions was observed in the age groups of 45 to 54 years (26.0 %), 35 to 44 years (23.9%), and 25 to 34 years (22.8 %). Most lesions (85.1 %) occurred in women aged 25 to 64 years - the age group recommended for the test. The analysis revealed significant variations in coverage among the municipalities. The highest incidence of cervical lesions occurred in the 45 to 54 age group, coinciding with greater adherence to the exam. The results highlight the need to expand public health policies, intensify educational campaigns, strengthen HPV vaccination, and address inequalities in access to healthcare services.

Keywords: Cervical Cancer; Pap Smear Test; Cytopathological Changes; Human Papillomavirus; Screening.

1 Discente da Residência Multiprofissional em Atenção Clínica Especializada com Ênfase em Infectologia e Neurologia, Universidade Franciscana, Santa Maria, Rio Grande do Sul, Brasil. E-mail: hellen.mertins@ufn.edu.br. ORCID: https://orcid.org/0000-0003-3956-5327

2 Discentes do Curso de Biomedicina da Universidade Franciscana, Santa Maria, Rio Grande do Sul, Brasil. E-mail: isabela.guterres@ufn.edu.br; caroline.abirrer@ufn.edu.br. ORCID: https://orcid.org/0009-0004-4978-4675; https://orcid.org/0009-0009-4339-5595

3 Discente do Programa de Pós-Graduação em Enfermagem da Universidade Federal de Santa Maria, Rio Grande do Sul, Brasil. E-mail: jarbasziani230@gmail.com. ORCID: https://orcid.org/0000-0002-9325-9390

4 Discentes do Mestrado em Ciências da Saúde e da Vida, Universidade Franciscana, Santa Maria, Rio Grande do Sul, Brasil. E-mail: mylane.genro@ufn.edu.br; r.casarotto@ufn.edu.br. ORCID: https://orcid.org/0009-0000-8151-4553; https://orcid.org/0009-0004-0395-5192

5 Discente do Curso de Medicina da Universidade Franciscana, Santa Maria, Rio Grande do Sul, Brasil. E-mail: gabriela@zamberlan.com.br. ORCID: https://orcid.org/0009-0009-9645-5029

6 Docente do Curso de Biomedicina e Mestrado em Ciências da Saúde e da Vida, Universidade Franciscana, Santa Maria, Rio Grande do Sul, Brasil. E-mail: francielle.monteiro@ufn.edu.br. ORCID: https://orcid.org/0000-0002-4698-9657

RESUMO

O câncer de colo do útero é uma das principais causas de morbidade e mortalidade entre mulheres no Brasil, podendo ser prevenido por meio da vacinação contra o HPV e do rastreamento citopatológico. Este estudo objetivou determinar a incidência de alterações citopatológicas em mulheres atendidas pelo SUS na região central do Rio Grande do Sul. Trata-se de um estudo quantitativo, retrospectivo e analítico, realizado com dados de exames citopatológicos realizados entre janeiro de 2022 e julho de 2023 em 22 municípios da região central. Durante esse período, foram realizados 28.524 exames de Papanicolaou, com uma cobertura média de 23,2%. Desses exames, 2,5% apresentaram lesões cervicais, sendo a principal lesão ASC-US (36,7%), seguida por LSIL (21,5%) e HSIL (11,9%). A maior incidência de lesões foi observada nas faixas etárias de 45 a 54 anos (26,0%), 35 a 44 anos (23,9%) e 25 a 34 anos (22,8%). A maioria das lesões (85,1%) ocorreu em mulheres de 25 a 64 anos, faixa etária recomendada para o exame. A análise revelou variações significativas na cobertura entre os municípios. A maior incidência de lesões cervicais ocorreu na faixa etária de 45 a 54 anos, coincidente com a maior adesão ao exame. Os resultados reforçam a necessidade de ampliar as políticas públicas de saúde, intensificar campanhas educativas, fortalecer a vacinação contra o HPV e superar desigualdades no acesso aos serviços de saúde.

Palavras-chave: *Câncer de Colo de Útero; Exame de Papanicolaou; Alterações Citopatológicas; Papilomavírus Humano; Rastreamento.*

INTRODUCTION

Cancer is considered one of the major public health problems worldwide and one of the leading causes of reduced life expectancy (Sung, Ferlay, Siegel, 2021). In Brazil, the estimate for the 2023-2025 triennium is 704,000 new cancer cases, with 483,000 cases excluding non-melanoma skin cancer. Among women, cervical cancer (CC) is the third most common type, with an estimated 17,000 new cases and an incidence rate of 15.38 cases per 100,000 women (INCA, 2022). These figures are alarming, especially considering that cervical cancer is preventable and can be eradicated through Human Papillomavirus (HPV) vaccination and the screening of cervical lesions using the Papanicolaou test (Pap smear).

Cervical cancer (CC) is caused by persistent infection with oncogenic types of HPV, particularly types 16 and 18, which are responsible for approximately 70 % of cancer cases (Cardial *et al.,* 2019). HPV is transmitted through direct contact with infected skin or mucosa and is considered a sexually transmitted infection (STI) of significant public health concern (Cheffer *et al.,* 2022). The virus replicates in cells with high mitotic activity, primarily found in the deep layers of the stratified squamous epithelium of the ectocervix and in the reserve cells of the squamocolumnar junction (SCJ). The production of viral proteins is associated with the maturation stage of these cells (Cardial *et al.,* 2019).

Factors such as prolonged use of oral contraceptives, smoking, multiparity, and infection with the human immunodeficiency virus (HIV) or other immunosuppressive conditions are considered risk factors for disease progression (Nascimento, Silva, Honostório, 2021; Rodrigues *et al.,* 2021). Almost all sexually active women will come into contact with HPV at some point in their lives; how-

ever, less than 1 % will develop precancerous cervical lesions, thanks to the immune system's ability to suppress or eliminate the infection (Santos, 2021). This disease progresses slowly and is generally asymptomatic in its early stages, with clinical manifestations such as intermittent vaginal bleeding, post-coital bleeding, abnormal vaginal discharge, and abdominal pain with urinary or intestinal complaints only appearing at more advanced stages (Alves *et al.,* 2021).

HPV vaccination aims to prevent persistent infections and precancerous cervical lesions, as well as genital warts (condylomas) and other cancers associated with HPV infection, including cancers of the anus, vulva, vagina, penis, oropharynx, lung, esophagus, and prostate (Cardial *et al.,* 2019; SBIm, 2023). Currently, Brazil's Public Health System (SUS) offers the quadrivalent HPV vaccine (HPV4), which protects against low-risk types 6 and 11 and high-risk types 16 and 18, for boys and girls aged 9 to 14, and for special populations aged 9 to 45 (Brazil, 2022). Since March 2023, the 9-valent HPV vaccine (HPV9) has been available through private healthcare providers in Brazil for individuals aged 9 to 45. This vaccine is the preferred option for HPV prevention as it includes five additional types (HPV 31, 33, 45, 52, and 58) in addition to those covered by HPV4. However, the HPV4 vaccine remains effective in reducing cancer cases in both sexes, especially from a public health perspective (SBIm, 2023).

In addition to vaccination, the Pap smear is a vital tool for preventing cervical cancer, as it detects cellular changes indicating premalignant and malignant lesions. According to the Brazilian Cytological Classification (CCB), based on the Bethesda System, cellular changes may indicate Low-grade Squamous Intraepithelial Lesions (LSIL) when they affect the intermediate and superficial layers of the epithelium, or High-grade Squamous Intraepithelial Lesions (HSIL) when deeper epithelial layers are involved (INCA, 2016; INCA, 2018; Nascimento, Silva, Honostório, 2021). The CCB also includes classifications such as Atypical Squamous Cells of Undetermined Significance (ASC-US) and Atypical Squamous Cells - cannot exclude HSIL (ASC-H), when the criteria are insufficient to classify as LSIL or HSIL, respectively (INCA, 2018).

A recent study showed that the most frequently observed precursor lesions of cervical cancer are ASC-US and LSIL (Fredrich, Renner, 2019). Changes in endocervical cells are generally referred to as atypical glandular cells of undetermined significance (AGC-US) and atypia - cannot exclude high-grade lesions (AGC-H). Although rare, more advanced stages may be classified as adenocarcinoma in situ or invasive endocervical adenocarcinoma (INCA, 2016; INCA, 2018; Nascimento, Silva, Honostório, 2021).

According to the Brazilian Guidelines for Cervical Cancer Screening by the Ministry of Health, the Pap smear is recommended for sexually active women aged 25 to 64. After two consecutive annual negative exams, the test should be repeated every three years (Fredrich, Renner, 2019). In addition to the low incidence of lesions in women under 25, ASC-US and LSIL abnormalities tend to resolve spontaneously. Early screening may lead to an increase in colposcopies and overtreatment, which could negatively impact obstetric and neonatal outcomes in future pregnancies (Fiocruz, 2019). However, due to early sexual initiation, there is a possibility of precancerous lesions appearing

before the age of 25, which may justify performing the Pap smear earlier than currently recommended (Bueno *et al.,* 2020). The clinical approach to cytopathological diagnoses of precancerous lesions considers both the patient's age and the severity of the identified lesion (INCA, 2016; INCA, 2018).

Screening for cervical lesions is essential for early diagnosis and better patient outcomes, contributing significantly to women's health and public health. Therefore, this study aimed to determine the incidence of cytopathological alterations in women attended by SUS in the central region of Rio Grande do Sul (RS). This research allows for an analysis of health indicators, highlighting the coverage, available resources, and service reach in the studied region, in addition to identifying the need for improvement in public health policies and professional training for the detection and management of cervical lesions, aiming to provide more qualified healthcare services.

METHODOLOGY

This is a quantitative, retrospective, analytical, and cross-sectional study. Data were collected from cytopathological exams of patients treated by the Brazilian Unified Health System (SUS) between January 2022 and July 2023 in 22 municipalities of the Central Region of the State of Rio Grande do Sul (RS): São Sepé, Quevedos, Nova Palma, São Martinho da Serra, Formigueiro, Toropi, Pinhal Grande, Júlio de Castilhos, Agudo, Itaara, Faxinal do Soturno, São Pedro do Sul, Vila Nova do Sul, Silveira Martins, Restinga Seca, São João do Polêsine, Dilermando de Aguiar, Paraíso do Sul, Ivorá, Santa Maria, Dona Francisca, and São Francisco de Assis. The data was obtained from the Specialized Women's Health Care Service of the Municipal Government of Santa Maria, RS.

The number of Pap smear tests performed in each of the 22 municipalities was determined. This data was used to infer the screening coverage, based on the female population aged 25 to 64 years, according to data from the Brazilian Institute of Geography and Statistics (IBGE). The number of exams was also determined for each Family Health Strategy (ESF), Basic Health Unit (UBS), District Unit, and for two hospitals in the municipality of Santa Maria. The average, minimum, and maximum age at the time of the exam were calculated for each municipality and for the health centers in Santa Maria.

Based on the Pap smear results, the absolute (n) and percentage (%) number of each cervical lesion was determined according to age group: ≥24 years, 25-34 years, 35-44 years, 45-54 years, 55-64 years, and ≥65 years. Lesions of the ectocervix (ASC-US, LSIL, ASC-H, HSIL, and carcinoma) and of the endocervix (AGC-US, AGC-H, and adenocarcinoma) were considered. All data collected was recorded in an Excel spreadsheet for subsequent tabulation using the GraphPad Prism 8 software. Exclusion criteria included patients with incomplete data, such as missing date of birth, full name, or exam result.

The study compiled with all ethical guidelines, in accordance with Resolution No. 466, dated December 12, 2012, of the National Health Council, and Resolution No. 510, of 2016, of the National Research Ethics Commission (CONEP). The study was approved by the Research Ethics Committee (CEP) under opinion CAAE No. 75661323.0.0000.5306 and opinion No. 6.516.433, by CONEP.

RESULTS

A total of 28,524 Pap smear tests were performed by the SUS between January 2022 and July 2023 in the 22 municipalities of the Central Region of Rio Grande do Sul (RS). Table 1 presents data on the number of exams performed by the SUS in each municipality, the female population aged 25 to 64 years, the exam coverage (percentage of women served), and the average age at which the exam was performed. According to IBGE data, the 22 municipalities comprise a total of 123,170 women within the recommended screening age group of 25 to 64 years.

The data are presented in Table 1 in descending order of coverage, meaning from the municipality with the highest percentage of women served to the lowest. The municipality with the highest screening coverage was São Sepé (54.6 %), while the lowest was São Francisco de Assis (3.3 %). The average coverage among the 22 municipalities was 23.2 %, and the average age at the time of the exam was 46 years. The youngest recorded age was 13 years, and the oldest was 88 years (data not shown).

Table 1 - Papanicolaou tests performed by the Brazilian Public Health System (SUS) in 22 municipalities of the Central Region of Rio Grande do Sul, from January 2022 to July 2023.

Municipalities	Tests Performed	Women Aged 25-64*	Population Covered (%)	Mean Age (Years)
São Sepé	3,174	5,816	54.6%	45
Quevedos	316	681	46.4%	44
Nova Palma	691	1,492	46.3%	45
São Martinho da Serra	311	739	42.1%	46
Formigueiro	686	1,659	41.4%	49
Toropi	257	667	38.5%	46
Pinhal Grande	346	999	34.6%	48
Júlio de Castilhos	1,735	5,039	34.4%	44
Agudo	1,520	4,557	33.4%	43
Itaara	493	1,524	32.3%	45
Faxinal do Soturno	579	1,827	31.7%	45
São Pedro do Sul	1,250	4,168	30.0%	45
Vila Nova do Sul	312	1,046	29.8%	46
Silveira Martins	154	529	29.1%	47
Restinga Sêca	1,017	4,020	25.3%	45
São João do Polêsine	173	706	24.5%	44
Dilermando de Aguiar	326	1,506	21.6%	45
Paraíso do Sul	371	1,765	21.0%	48
Ivorá	91	463	19.7%	49
Santa Maria	14,446	78,260	18.5%	43
Dona Francisca	116	847	13.7%	48
São Francisco de Assis	160	4,860	3.3%	43
	28,524	**123,170**	**23.2%**	**μ 46**

Source: Research Data, 2024.

*Number of women aged 25 to 64 residing in each municipality, according to IBGE 2022 (https://idades.ibge.gov.br/faixa5/panorama).
#Percentage of women who underwent cytopathological screening, relative to the total number of women residing in the municipality.
Σ = Sum of values. μ = Mean of values.

Table 2 presents the location of health centers in the municipality of Santa Maria, RS, including seven district units, 12 Family Health Strategy units (ESF), 14 Basic Health Units (UBS), and two hospitals, along with the number of Pap smear tests performed at each location. During the study period, 14,446 exams were recorded in Santa Maria: 528 in district units, 4,619 in ESFs, 8,992 in UBSs, and 307 in hospitals. The average age at the time of testing in Santa Maria was 43 years, with the youngest age being 13 years and the oldest 88 years (data not shown).

Table 2 - Papanicolaou tests performed by the Brazilian Public Health System (SUS) at Primary Health Care Units in the municipality of Santa Maria, Rio Grande do Sul, from January 2022 to July 2023.

Health Centers	Tests	Health Centers	Tests
District Health Units	**528**	**Basic Health Units**	**8,992**
Arroio do Só	197	Centro Social Urbano	480
Arroio Grande	21	Dom Antônio Reis	486
Boca do Monte	176	Nova Santa Marta	294
Palma	25	Floriano Rocha	497
Santo Antão	86	Itararé	705
Santa Flora	13	Joy Betts	369
São Valentim	10	Kennedy	1,293
Family Health Strategies	**4,619**	Oneyde de Carvalho	704
Alto da Boa Vista	395	Passo das Tropas	409
Bela União	280	José Erasmo Crossetti	1,136
Parque Pinheiro Machado	263	Ruben Noal	914
Roberto Binato	593	Waldir Mozzaquatro	596
São Francisco	307	Walter Aita	616
São João	227	Wilson Paulo Noal	493
São José	476	**Hospitals**	**307**
Victor Hoffman	387	Casa de Saúde	290
Vila Lídia	321	Universitário de Santa Maria	17
Vila Maringá	348		
Vila Santos	425	**Total for Health Units: 14,446 tests**	
Vila Urlândia	597	**μ Age: 43 years**	

Source: Research Data, 2024.

Σ = Sum of values. μ = Mean of values.

Of the 28,524 exams performed in the 22 municipalities from January 2022 to July 2023, 724 presented results indicating one or more cervical lesions, accounting for 2.5 % of the total analyzed (724/28,524). The most frequently identified lesion was ASC-US (36.7 %), followed by LSIL (21.5 %) and HSIL (11.9 %), as shown in Table 3. The age group with the highest incidence of lesions was 45 to 54 years (26.0 %), followed by 35 to 44 years (23.9 %) and 25 to 34 years (22.8 %).

Within the 25 to 64 age group, which is the recommended age range for Pap smear screening, 616 exams indicated cervical lesions, representing 85.1 % (n=616/724) of total abnormal results. In women under 25 and over 64 years of age, 11.6 % (n=84/724) and 3.3 % (n=24/724) of the exams, respectively, showed cervical lesions.

Table 3 - Diagnosis of cervical lesions by age group among patients attended by the Brazilian Public Health System (SUS) in 22 municipalities of the Central Region of Rio Grande do Sul, from January 2022 to July 2023.

Alteration	n	%	≤ 24	25 a 34	35 a 44	45 a 54	55 a 64	≥ 65
ASC-US	266	36.7	34	49	56	82	34	11
LSIL	156	21.5	30	53	41	25	6	1
HSIL	86	11.9	7	28	17	20	11	3
ASC-H	78	10.8	1	12	17	16	28	4
AGC-US	40	5.5	2	7	11	15	5	0
ASC-US + AGC-US	32	4.4	4	4	12	7	2	3
ASC-H + AGC-H	21	2.9	2	6	5	7	1	0
AGC-H	17	2.3	2	0	4	10	1	0
HSIL + AGC-H	12	1.7	1	3	6	2	0	0
AIS	7	1.1	1	1	2	3	0	0
HSIL + AIS	4	0.6	0	1	1	0	1	1
HSIL + AGC-US	2	0.3	0	0	0	0	1	1
ASC-US + AGC-H	1	0.1	0	0	0	1	0	0
ASC-H + AGC-US	1	0.1	0	1	0	0	0	0
ASC-H + AIS	1	0.1	0	0	1	0	0	0
***n* Total**	724	-	84	165	173	188	90	24
% Total	-	100	11.6	22.8	23.9	26.0	12.4	3,3

Source: Research Data, 2024.

ASC-US: Atypical squamous cells of undetermined significance. **LSIL**: Low-grade squamous intraepithelial lesion. **HSIL**: High-grade squamous intraepithelial lesion. **ASC-H**: Atypical squamous cells cannot exclude HSIL. **AGC-US**: Atypical glandular cells of undetermined significance. **AGC-H**: Atypical glandular cells cannot exclude high-grade lesions. **AIS**: *Adenocarcinoma in situ*.

DISCUSSION

The Pap smear test plays a crucial role in the early detection of cervical lesions and the prevention of cervical cancer. Analyzing the number of tests performed in each region is essential to understanding the local public health landscape and assessing the effectiveness of screening strategies.

In this context, the present study initially analyzed the number of patients who underwent Pap smears through Brazil's Unified Health System (SUS) across 22 municipalities over a 19-month period (January 2022 to July 2023), totaling 28,524 tests. This number was compared to the total number of women aged 25 to 64 living in the 22 municipalities, amounting to 123,170 women, according to IBGE data. Based on this comparison, the average Pap smear coverage through SUS was 23.2 %.

Data from the Brazilian National Cancer Institute (INCA) in 2022 showed that, in Rio Grande do Sul, 547,738 women aged 25 to 64 underwent Pap smears. In relation to the female population in this age group in the state - 3,111,910 women - this results in a coverage rate of 17.6 %, a value quite similar to that observed in the municipalities of this study.

Coverage across the 22 municipalities was highly heterogeneous, ranging from the highest in São Sepé (54.6 %) to the lowest in São Francisco de Assis (3.3 %). This variation can be attributed to different levels of access to health care, especially in more rural areas where patients face long waits for appointments and often lack awareness of the importance of cervical cancer screening, as well as inadequate medical guidance (Martins, Thuler & Valente, 2005; Cesar *et al*., 2023).

Studies have shown that test adherence is not only related to geographic location and access to care, but also influenced by socioeconomic factors, such as lower income and educational level - conditions typically more prevalent in rural regions (Thuler & Valente, 2005; Oliveira *et al.*, 2018; Cesar *et al*., 2023). Women with lower income are often exposed to other vulnerabilities, such as low educational attainment and higher prevalence of Black or mixed-race skin color.

This study also assessed the total number of tests conducted in each health center in Santa Maria, RS, where the highest number of exams was recorded - 14,446 in total. Of these, 8,992 were conducted in UBS (Basic Health Units) and 4,619 in ESF (Family Health Strategy units). The average number of exams conducted was 507 per UBS and 385 per ESF. These numbers are quite comparable, considering that a UBS typically serves 12,000 to 20,000 people, whereas an ESF covers around 3,000 to 4,000 people.

Studies show that the Family Health Strategy (ESF) produces better outcomes in cervical cancer screening due to its closer, more comprehensive approach, which includes home visits and stronger community engagement (Martins, Thuler, Valente, 2005; Oliveira *et al*., 2018; Oakes *et al.*, 2023). This structure facilitates individualized patient follow-up, encouraging greater adherence to preventive exams. In contrast, UBS units - focused more on specialized, fixed-location services - may be less effective in areas where community engagement is critical for exam participation. The ESF's organization and infrastructure are more conducive to expanding screening coverage, especially among vulnerable and low-income populations.

Another important point is that the number of exams conducted at each ESF in Santa Maria, RS, showed considerable variation. As previously mentioned, regions with higher poverty rates and lower education levels tend to have lower screening adherence rates (Madeiro; Rufino, 2022; Ayres *et al.,* 2027). Other factors also influence adherence, such as availability and ease of access to health services (e.g., proximity and appointment hours), educational campaigns about the Pap smear's importance, the bond between health professionals and the community, and local culture. Health beliefs, myths, and taboos surrounding sexual and reproductive health can also impact women's decisions to seek care (Martins, Thuler, Valente, 2005; Oliveira *et al*., 2018; Cesar *et al*., 2023; Oakes *et al*., 2023).

It is important to note that this study evaluated Pap smear coverage only for patients using SUS services. Total coverage would likely be higher if private exams were included. Still, there is an

urgent need to target actions toward more rural municipalities and specific ESF units in Santa Maria, RS, to increase screening coverage. A study by Zhang *et al.* (2022) showed that educational interventions significantly improved knowledge and acceptance of cervical cancer screening in rural populations. The educational content included basic information on screening, psychological issues, barriers to participation, strategies to overcome them, and available local resources. This reinforces the need to direct resources and efforts toward areas with lower access or adherence and to train professionals to strengthen cervical cancer prevention efforts.

Regarding the age at which women undergo the Pap smear, the average was 46 years in the municipalities and 43 years in Santa Maria, RS. This average is slightly higher than that found in other studies, where the highest test adherence occurred among women aged 30-39, followed by those aged 40-44 (Slovinski, Slovinski, Oliveira, 2020; Bezerra, Nascimento, Sampaio, 2021). Nationally, the highest coverage is observed among women aged 35-44. The Ministry of Health recommends cytopathological screening for women aged 25 to 64 (INCA, 2018). A study by Nourrison *et al.* (2022) showed that women who use contraceptive methods tend to have more regular medical appointments, which facilitates the performance of Pap smears and other preventive care. Additionally, women in this age group often seek medical care to stop using contraceptives or plan a pregnancy, creating an opportunity for screening (Madeiro & Rufino, 2022).

Although healthcare-seeking behavior is more common among women using contraceptives or planning pregnancy - typically aged 30 to 44, who are also those with the highest Pap smear rates - our study's average ages (43 and 46 years) may be related to these factors. However, it is important to consider that women aged 40 to 50 often experience hormonal changes associated with perimenopause or menopause, which may lead to symptoms such as vaginal dryness and pain during intercourse. These symptoms frequently prompt gynecological consultations.

A relevant point is that the 46-year age group, which had the highest number of exams, also had the highest incidence of cervical lesions (26.0 %), followed by the 35-44 (23.9 %) and 25-34 (22.8 %) age groups. Age, along with pathological and clinical conditions, is known to influence both the progression and regression of cervical lesions (Nourrison *et al*., 2022). Women over 30 years of age are more likely to develop severe lesions due to persistent high-risk HPV infections, declining immunity, and hormonal changes linked to perimenopause and menopause. Therefore, increasing screening and early detection in this age group is a key cervical cancer prevention strategy.

Although HPV infection is more common in younger women, it is usually transient and tends to regress spontaneously within two years without causing severe cervical lesions (Gravdal *et al*., 2021). Early testing may detect these temporary lesions, which often do not progress to cancer. This explains the Ministry of Health's recommendation to avoid Pap smears before age 25.

Additionally, treating mild cervical abnormalities in young women may do more harm than good. Interventions such as biopsies or invasive treatments can lead to complications, including increased risk of preterm birth in future pregnancies. Given these factors, the best way to prevent disease in younger women is through education about risk factors and HPV vaccination (Madeiro & Rufino, 2022).

In our study, among women aged 25 to 64 - the recommended screening age range - we found 616 cases of cervical lesions, representing 85.1 % (n=616/724) of all abnormal test results. These findings are highly relevant, as they show that the vast majority of cervical lesion diagnoses occur within the recommended screening age group. Among women under 25 and over 64, we found 11.6 % (n=84/724) and 3.3 % (n=24/724) of exams with cervical lesion diagnoses, respectively. Most lesions in women under 25 and over 64 were low-grade (ASC-US and LSIL), reinforcing the importance of screening within the recommended age range. Nevertheless, each case should be evaluated individually, and screening may be necessary outside this age range in some situations.

Of the total 28,524 Pap smears analyzed, 2.5 % (n=724) showed a diagnosis of cervical lesions. A quantitative epidemiological study conducted in Brazil between 2017 and 2022 found a 2.9 % prevalence of cervical lesions, similar to our findings. As in other studies, “negative” was the most common result, indicating that cytological screening is effectively identifying cervical lesions in their early stages, offering a better prognosis and patient follow-up (Slovinski, Slovinski, Oliveira, 2020; Bezerra, Nascimento, Sampaio, 2021; Possante, Rodrigues, Furtado, 2021). The most frequent lesion in our study was ASC-US (37.2 %), followed by LSIL (21.5 %).

To overcome the main challenges in preventing cervical cancer, it is essential to implement actions addressing social determinants of health, quality of life, and lifestyle factors. Doing so can reduce exposure to risk factors and mitigate inequalities in healthcare access. Social determinants of health refer to social, economic, cultural, ethnic, and psychological factors that influence the occurrence of health problems and their associated risks. The most effective way to reduce cervical cancer incidence and mortality is to ensure recommended screening coverage for the target population and promote HPV vaccination (Ayres *et al.*, 2017; Zhang *et al.*, 2022).

Despite significant advances in screening programs, disparities in test uptake persist, making it imperative to address these inequalities in order to achieve the WHO’s goal of eradicating cervical cancer. Future research should explore culturally sensitive approaches, strengthen healthcare infrastructure, and evaluate new screening technologies - such as self-sampling - which can help reduce emotional barriers like embarrassment and fear. It is also crucial to assess the impact of public policies and the funding of screening programs, with efforts focused on improving access to preventive care (Rauf *et al.*, 2022).

A major breakthrough in 2024 was the incorporation of molecular testing for HPV DNA detection into Brazil’s national cervical cancer screening guidelines (Febrasgo, 2024). Unlike the

conventional Pap smear, which identifies cellular abnormalities, the molecular test enables early detection of HPV infections, especially the oncogenic types that lead to cervical cancer. This method offers greater sensitivity in identifying at-risk women and allows for longer intervals between screenings, optimizing public health resources. Its implementation could also improve adherence, as it reduces the frequency of required tests. These innovations are expected to lower cervical cancer mortality rates, aligning with global goals to eliminate HPV as a cause of cervical cancer.

FINAL CONSIDERATIONS

The Pap smear test plays a crucial role in the early detection of cervical lesions and the prevention of cervical cancer. The analysis of test coverage in 22 municipalities revealed an average of 23.2 %, with significant heterogeneity among the different locations. In the municipality of Santa Maria, RS, health centers also showed variations in the number of tests performed, indicating the need for targeted actions to increase adherence in specific areas.

The average age of the women who underwent the exam - 46 years in the municipalities and 44 years in Santa Maria - reflects the recommended screening age range, which is also the range with the highest incidence of cervical lesions. The occurrence of cervical lesions was 2.5 %, with the highest incidence observed among women aged 45 to 54, the same group with the highest adherence to the test. The most commonly identified lesion was ASC-US, demonstrating the effectiveness of screening in the early detection of cervical changes.

These results reinforce the importance of maintaining and expanding public health policies aimed at increasing Pap smear coverage, especially in areas with lower adherence. Such policies should be complemented by educational campaigns, ongoing training for healthcare professionals, and initiatives to strengthen the bond between healthcare services and the community. Furthermore, it is essential to intensify the promotion of HPV vaccination as a complementary preventive strategy to screening.

Finally, overcoming inequalities in access to healthcare services, along with addressing the social determinants of health, is essential to reduce the incidence and mortality of cervical cancer in Brazil. The eradication of cervical cancer is an achievable goal, requiring intersectoral efforts and the development of strategies tailored to the needs of the most vulnerable populations. This study contributes to the understanding of the incidence of cytopathological changes in the central region of Rio Grande do Sul, highlighting the importance of screening for early detection and disease prevention.

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