



ORIGINAL ARTICLE

Characterization of Cervicouterine Cytology at the Comandante Pinares General Teaching Hospital

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ABSTRACT

Introduction: the National Program for the Early Diagnosis of Cervical Cancer is aimed at detecting it at the earliest possible stage.

Objective: to characterize the behavior of cervicouterine cytology at the Comandante Pinares General Teaching Hospital.

Methods: An observational, descriptive, cross-sectional study conducted at the Comandante Pinares General Teaching Hospital from January to December 2024. The universe and sample coincided: results of the 10,359 cervicouterine cytologies processed by cytohistopathology during the study period. Statistical analysis was applied to each variable.

Results: the hospital serves 8 health areas in San Cristóbal, Candelaria, and Bahía Honda, Artemisa Province. A total of 2,7 % positive cases were obtained, and 710 samples were deemed non-useful. By municipality, positives ranged between 2,5 % and 2,9 %, while in health areas the range was between 1,2 % and 4,2 %. The most frequent diagnosis was CIN I. No significant differences were found between municipalities; however, there is an association between overall results and health area.

Conclusions: the characterization of cervicouterine cytology establishes that the effectiveness of the National Program for the Early Diagnosis of Cervical Cancer depends not only on the coverage achieved but also on the technical and organizational quality of screening processes. The variability observed among municipalities and health areas requires the design of specific strategies for each territory, while maintaining the national coherence of the program.

Keywords: Early Detection of Cancer; Uterine Cervical Neoplasms; Cytology.

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INTRODUCTION

Cervicouterine cytology remains an essential tool in the prevention of cervical cancer, whose epidemiological distribution reflects profound inequalities between regions. Worldwide, this cancer continues to be one of the main causes of morbidity and mortality in women, especially in low- and middle-income countries, where the coverage of screening programs and vaccination against human papillomavirus (HPV) is insufficient.⁽¹⁾

In Europe, the implementation of organized screening programs has allowed a sustained reduction in incidence and mortality, consolidating the transition toward molecular HPV tests as the diagnostic standard.⁽²⁾ In the United States, the integration of protocols combining cytology and HPV tests has generated a notable impact on reducing the disease burden, with emphasis on early detection and equitable access to treatment.⁽³⁾ In contrast, Latin America faces a complex scenario characterized by high incidence and mortality rates, conditioned by socioeconomic inequalities, limitations in health infrastructure, and low population adherence to screening programs.⁽⁴⁾

Cuba, within the framework of its national health system, has developed screening strategies that have contributed to the partial reduction of mortality, although challenges related to sample quality and clinical follow-up of cases persist.⁽⁵⁾ In specific territories such as Artemisa and the municipality of San Cristóbal, local studies evidence the need to strengthen coverage in young and rural populations, where the presence of precursor lesions at early ages underscores the urgency of optimizing screening and ensuring care continuity.⁽⁶⁾

It is important to note that the characterization of cervicouterine cytology reflects a heterogeneous scenario that demands differentiated approaches, integrating technological advances, sustainable public policies, and community strategies to achieve the global goal of eliminating cervical cancer as a public health problem.

Currently, vaginal cytology with Papanicolaou staining constitutes the method par excellence for screening for early detection of cervical cancer. Cervical cancer is one of the main public health problems worldwide, as it represents the fourth most frequent neoplasm in women and the second among those aged 15 to 44 years. Mortality from cervical cancer has decreased significantly in many developed countries, and some studies indicate that this is largely due to early diagnosis programs.^(3,4,5,6)

Its incidence rates in the Latin America and Caribbean region are among the highest in the world.⁽⁷⁾ In Cuba, mortality from cervical cancer in 2023 was 1,489 cases, for a crude rate of 26,6 per 100,000 inhabitants (age-adjusted rate to the world population), and an adjusted rate of 17,3 per 100,000 inhabitants (includes the rest of cancer locations).⁽⁴⁾

The National Program for the Early Diagnosis of Cervical Cancer establishes, since January 1, 2001, the performance of cytology in the female population from 25 years of age who have had an active sexual life. The cytological test will be repeated every 3 years between 25 and 59 years of age. If a woman has 3 or more negative cytological studies performed according to the periodicity established by the Program, between 50 and 59 years of age, no further tests will be necessary after 60 years of age.⁽⁸⁾

The general objective of this program is aimed at decreasing mortality and knowing the morbidity from cervical cancer, through its detection at its earliest possible stage, which allows early and effective therapy; and as specific objectives: to detect cervical cancer in women of risk age, to detect cervical intraepithelial neoplasia (CIN) of the cervix in its different degrees, to detect cancer in its early stages (stages 0 and Ia), to contribute to the diagnosis of other stages of this cancer, to apply adequate treatment to patients in each of the different clinical stages of this cancer, to carry out evolutionary follow-up of detected and treated cases, to improve the quality of statistical information, and to carry out systematic educational work so that the female population acquires knowledge and adopts responsible attitudes and behaviors regarding the prevention of cervical cancer.^(8,9,10)

Likewise, the National Cancer Control Program, in force since 2018, intends to stop the growing trend and reduce by 2030 the adjusted mortality rate from cancer by 15 %. Achieving this objective could mean a contribution of 0,5 years to the increase in life expectancy. Among its main objectives is to reduce to less than 10 % the fraction of cervical cancer in stages II, III, and IV at diagnosis.⁽⁸⁾

According to the San Cristóbal 2024 health profile, malignant tumors occupied the 2nd cause of death, highlighting that in recent years they occupied the 1st cause. In the analysis of premature mortality from cancer in preventable locations, Cervix decreased by 60 %.^(10,11,12,13)

The Cytohistopathology Service of the Comandante Pinares General Teaching Hospital (CPGTH) is in charge of processing cervicouterine and cervicovaginal cytologies from the western zone of Artemisa province (municipalities of San Cristóbal, Bahía Honda, and Candelaria), complying with both programs.

Scientific Problem

What were the characteristics of cervicouterine cytology at the Comandante Pinares General Teaching Hospital during the year 2025?

Problem Justification

Malignant tumors constitute the second cause of death, with the highest incidence rates of cancer in women being skin, breast, bronchus and lung, cervix, colon, uterine body, ovary, and lymphomas.⁽⁵⁾ Therefore, it is important to know if the cytology results in health areas served by the hospital correspond to those reported by the rest of the country, so that this information serves as a starting point for other researchers to propose concrete actions that contribute to the early diagnosis of this entity and/or its prevention. The objective is to characterize the behavior of cervicouterine cytology at the Comandante Pinares General Teaching Hospital during the year 2025.

METHODS

An observational, descriptive, cross-sectional study was conducted at the Comandante Pinares General Teaching Hospital, from January to December 2025, where the study universe and the sample coincided, consisting of the results of 10,359 cervicouterine cytologies included in the National Program for the Early Diagnosis of Cervical Cancer, processed in the Cytohistopathology Service and comprised in the study period.

For the realization of this work, all bibliography to which we had access through the network of medical libraries related to the topic was reviewed. Also, the analysis of the usual records of the Cytohistopathology Service of the Comandante Pinares General Teaching Hospital, and of the Statistical Yearbook of Health. MINSAP, Cuba, 2024,⁽¹³⁾ where the information of the year 2025 was verified, all this to justify the interest in carrying out this work, as well as the discussion of the results.

With all the information obtained, a primary database was prepared in Microsoft Excel; from it, frequency distribution and contingency tables were prepared for better understanding. Chi-square was used to determine the association of variables. All statistical tests were performed with a significance level of $p < 0,05$, using SPSS software version 21.

The ethical principles established in the norms related to the handling of parameters that determine the internal ethical regulation of the Hospital were fulfilled. The total anonymity of the patients was ensured, and the final results will only be used for the preparation of scientific articles or their presentation in biomedical events of recognized prestige, following the basic ethical principles of beneficence, non-maleficence, justice, and respect for persons.

RESULTS

In the service, 10,359 cervicouterine cytologies included in the National Program for the Early Diagnosis of Cervical Cancer were processed; 277 (2,7 %) positive cases were reported and 90 % resulted negative, results exposed in Table 1.

The high percentage of unusable samples reported by the service is striking.

Table 1. General results of cervicouterine cytologies.

Results of cervicouterine cytologies	CPGTH	
	n.	%
Negative Cases	9372	90,5
Positive Cases	277	2,7
Unusable	710	6,8
Total	10359	100,0

Source: Usual records of the Cytohistopathology Service of CPGTH. 2025
n: number of cases

From the comparison of cases diagnosed as negative and positive at CPGTH regarding those reported by the Statistical Yearbook of Health for the year 2024(4), the results provided in Table 2 were obtained.

The percentage of positive cases at CPGTH in 2025 is higher than that reported at the national level in 2016.

Table 2. Results of cervicouterine cytologies at CPGTH in 2025 compared with national level results 2016.

General results of the cytological test	CPGTH 2025		National Level 2016	
	n.	%	n.	%
Negative Cases	9372	97,1	790096	99,9
Positive Cases	277	2,9	1098	0,1
Total	9649	100,0	791194	100,0

Source: Usual records of the Cytohistopathology Service of CPGTH 2025 and Statistical Yearbook of Health. MINSAP, Cuba, 2024⁽¹³⁾ n: number of cases

The results of cervicouterine cytologies by municipality can be seen in Table 3. No significant differences are observed in the results of cervicouterine cytologies between municipalities.

Table 3. Results of cervicouterine cytologies by municipalities.

Municipalities	General results of cervicouterine cytologies						Total	
	Negative Cases		Unusable		Positive Cases			
	n.	%	n.	%	n.	%		
San Cristóbal	5022	90,2	395	7,1	149	2,7	5566	
Bahía Honda	2881	90,4	228	7,1	81	2,5	3190	
Candelaria	1469	91,7	87	5,4	47	2,9	1603	
Total	9372	90,5	710	6,8	277	2,7	10359	

Source: Usual records of the Cytohistopathology Service of CPGTH. 2025
 $\chi^2 = 6.5431$ $p = 0.1621$ n: number of cases

A deeper analysis was carried out taking into account the behavior of the results of cervicouterine cytologies by health areas, obtaining the results observed in Table 4. There is an association of the general results of cervicouterine cytologies with the health area.

The health area that showed the lowest percentage of positive cases was area 41 (Pablo de la Torriente) and the one with the highest percentage was area 31 (Niceto Pérez).

On the other hand, the health area that showed the lowest percentage of unusable samples was area 32 (Santa Cruz) and the one with the highest percentage was area 41 (Pablo de la Torriente).

Table 4. Results of cervicouterine cytologies by health areas.

Health Areas	General results of cervicouterine cytologies						Total
	Negative Cases		Unusable		Positive Cases		
	n.	%	n.	%	n.	%	
31 Niceto Pérez	213	88,7	17	7,1	10	4,2	240
32 Santa Cruz	833	92,3	45	5	24	2,7	902
33 San Cristóbal	2789	89,5	244	7,8	84	2,7	3117
34 Candelaria	1448	92,2	83	5,3	40	2,5	1571
35 Ramón López Peña	722	90,8	54	6,8	19	2,4	795
40 Bahía Honda	2111	90,2	152	6,5	77	3,3	2340
41 Pablo de la Torriente Brau	839	90,4	78	8,4	11	1,2	928
42 Central José Martí	417	89,5	37	8	12	2.5	466
Total	9372	90,5	710	6,8	277	2,7	10359

Source: Usual records of the Cytohistopathology Service of CPGTH. 2025

 $\chi^2 = 33.1958$ $p = 0.0027^*$ n: number of cases

DISCUSSION

The analysis of the quality of cervicouterine cytologies has been the subject of attention in contemporary literature, not only for its diagnostic value but also for the impact it has on the efficiency of screening programs. In Europe, the trend toward the incorporation of molecular HPV tests as a primary method has allowed a consistent decrease in the proportion of inadequate samples, which translates into greater reliability of results and a reduction in the need to repeat exams.⁽⁸⁾ In the United States, risk-based management guidelines have transformed clinical practice, by integrating cytology with HPV tests and establishing follow-up algorithms that optimize resources and improve early detection of precursor lesions.⁽⁹⁾

In contrast, the situation in Latin America continues to be marked by structural inequalities. Regional investigations have documented that the frequency of inconclusive cytologies is higher than that reported in high-income countries, reflecting deficiencies in technical training and health service infrastructure.⁽¹⁴⁾ In Mexico, for example, a large-scale study evidenced that, despite the wide coverage of the national program, limitations in sample quality persist, which compromises the effectiveness of screening and underscores the need to strengthen supervision and staff training.⁽¹⁰⁾

In the Cuban context, recent literature confirms that screening programs have achieved advances in reducing mortality from cervical cancer, but percentages of unusable samples that exceed international standards are still reported.⁽¹⁵⁾ This finding highlights the importance of reinforcing continuous training and guaranteeing optimal conditions for sample collection and processing, aspects that are decisive for improving the effectiveness of the national program.

Considering this, the comparison with international evidence reveals a heterogeneous scenario: while countries with consolidated health systems have managed to minimize technical limitations through the incorporation of molecular tests and standardized protocols, in Latin America and the Caribbean, challenges persist that require specific strategies aimed at improving the technical and organizational quality of screening programs.

The comparison between the results obtained at CPGTH in 2025 and those reported at the national level in 2016 reveals substantial differences that deserve to be analyzed in the context of international literature. Firstly, the proportion of positive cases at the local level is considerably higher than that registered at the national level, suggesting a possible variability in the quality of screening, population coverage, or distribution of risk factors. This finding coincides with studies conducted in Latin America, where a marked heterogeneity in the incidence of precursor lesions of cervical cancer between regions and provinces has been documented, attributed both to social determinants and to differences in the implementation of screening programs.⁽¹¹⁾

In European countries, the homogeneity of results between regions is more evident, thanks to the existence of organized and standardized programs that guarantee uniformity in sample quality and patient follow-up.⁽¹⁵⁾ In the United States, recent literature emphasizes that the integration of HPV tests as a primary method has allowed reducing regional disparities, ensuring greater diagnostic sensitivity and lower variability in screening indicators.⁽¹⁶⁾

On the other hand, the difference observed between local and national results in Cuba can be interpreted as a reflection of the epidemiological particularities of the population served at CPGTH, as well as the specific conditions of organization and available resources. Investigations carried out in provincial hospitals have pointed out that the frequency of positive lesions can vary depending on the age of the patients, access to health services, and the quality of sample collection, which coincides with the trend observed in this analysis.⁽¹²⁾

Therefore, the comparison with international bibliography suggests that discrepancies between local and national results are not exclusive to Cuba, but are part of a global phenomenon in which equity and the quality of screening programs constitute determining factors. Available evidence supports the need to strengthen process standardization and incorporate more sensitive technologies, such as molecular HPV tests, to reduce differences and guarantee a uniform impact on cervical cancer prevention.

The distribution of results by municipalities highlights the existence of variations that cannot be attributed solely to chance, but reflect differences in the local dynamics of screening programs. In San Cristóbal and Bahía Honda, a similar proportion of unusable samples is observed, suggesting the presence of common factors in the organization of the service or in the conditions of sample collection. In contrast, Candelaria presents a lower percentage of inadequate cytologies, which could be related to greater stability in technical personnel or more standardized practices in collection and processing.

International literature has pointed out that territorial variations in cytology quality indicators respond, to a large extent, to the interaction between social determinants and the capacity of health systems to guarantee uniformity in screening.⁽¹³⁾

In European countries, the homogeneity of results between regions has been achieved through the implementation of strict protocols and periodic audits, which reduce differences attributable to local factors.⁽¹⁷⁾ In the United States, the integration of molecular HPV tests has contributed to decreasing regional disparities, by offering a more sensitive method and less dependent on sample collection quality.⁽¹⁸⁾

In Latin America, on the contrary, recent research shows that differences between municipalities or provinces are frequent and reflect inequalities in access to health services, staff training, and resource availability.⁽¹⁴⁾ In Cuba, the observed variability between municipalities such as San Cristóbal, Bahía Honda, and Candelaria highlights the need to strengthen process standardization and guarantee homogeneous conditions in the implementation of the National Program, so that local differences do not compromise the overall effectiveness of screening.⁽¹⁹⁾

The comparison of municipal results evidences that the quality of cervicouterine cytology does not depend solely on coverage, but also on organizational and technical factors that vary between territories. International experience supports the importance of establishing control and supervision mechanisms that ensure uniformity in indicators, while national reality underscores the urgency of reinforcing training and infrastructure to reduce local disparities.

The analysis by health areas reveals differences that suggest the influence of organizational and population factors on the quality and effectiveness of screening. The variability in the proportion of unusable samples between territories such as San Cristóbal, Pablo de la Torriente Brau, and Central José Martí indicates that homogeneity in technical processes still constitutes a challenge. This behavior has been described in international studies, where the quality of cytology depends largely on staff training and the standardization of laboratory procedures.⁽¹⁸⁾

In areas such as Santa Cruz and Candelaria, the relatively lower proportion of inadequate samples can be interpreted as a result of greater stability in work teams and better organization of services, which coincides with European experiences where the implementation of strict protocols has allowed reducing territorial differences.⁽¹⁹⁾ On the contrary, the variability observed in Bahía Honda and Niceto Pérez, with higher percentages of positive results, suggests the existence of local epidemiological factors that could be related to the distribution of social determinants of health, as documented in Latin American investigations.⁽¹⁵⁾

US literature emphasizes that the incorporation of molecular HPV tests as a primary method has contributed to decreasing regional disparities, by offering a more sensitive diagnosis and less dependent on sample collection quality.⁽¹⁶⁾ In Cuba, the heterogeneity between health areas reflects the need to strengthen supervision and continuous training, ensuring that local differences do not compromise the effectiveness of the National Screening Program.⁽²¹⁾

The comparison with international evidence shows that territorial variations in cytology quality indicators are a common phenomenon, but surmountable through standardization strategies, quality control, and eventual incorporation of molecular tests that ensure uniformity in results.

CONCLUSIONS

The characterization of cervicouterine cytology allows establishing that the effectiveness of the National Program for the Early Diagnosis of Cervical Cancer depends not only on the coverage achieved but also on the technical and organizational quality of screening processes. The variability observed among municipalities and health areas necessitates designing specific strategies for each territory, without losing sight of the need to maintain the national coherence of the program. The study reaffirms that cervicouterine cytology, although still a valuable resource, needs to be complemented with new diagnostic technologies and stricter quality control policies. Only in this way will it be possible to guarantee that screening fulfills its essential purpose: to sustainably reduce the incidence and mortality of cervical cancer, ensuring equity and effectiveness in all territories of the country.

Conflict of Interest

The authors declare that there is no conflict of interest.

Author Contributions

GECA: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Resources, Supervision, Writing – original draft, Writing – review and editing.

BDLG: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Resources, Software, Visualization, Writing – original draft, Writing – review and editing.

MHB: Conceptualization, Data curation, Formal analysis, Methodology, Project administration, Resources, Software, Writing – original draft.

MAP: Conceptualization, Data curation, Software, Supervision, Validation, Visualization, Writing – review and editing.

JRSP: Writing – original draft, Writing – review and editing.

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