

# Role of Papanicolaou Smear in Early Detection of Cervical Cancer: A Review

Pukar Sapkota, Pranay Chettri, Tshering Thendup Bhutia, Suman Koirala, Roshan Koirala, Reena Limboo, Anumika Sharma, Ayan Chatterjee\*

<sup>1</sup>Department of Medical Laboratory Technology, Medhavi Skills University, Sikkim 737134, India.

\*Correspondence Author: Ayan Chatterjee, Department of Medical Laboratory Technology, Medhavi Skills University, Sikkim 737134, India.

**Received Date:** April 01, 2025; **Accepted date:** April 09, 2025; **Published date:** April 17, 2025

**Citation:** Pukar Sapkota, Pranay Chettri, Tshering Thendup Bhutia, Suman Koirala, Ayan Chatterjee et al, (2025), Role of Papanicolaou Smear in Early Detection of Cervical Cancer: A Review, *Clinical Research and Studies*, 4(2); DOI:10.31579/2835-2882/081

**Copyright:** ©2025 Ayan Chatterjee. this is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

## Abstract

Cervical cancer is a global challenge particularly in low and middle level countries. The region like Sub-Saharan Africa, Central America and Southeast Asia, with the highest incidence of cervical cancer and mortality rate. In India cervical cancer bring the second most common cancer among the women. The review highlights effectiveness of the PAP smear test as primary screening tool and for identification of the pre-cancerous lesion. It has proven its efficiency, cost effectiveness and reduce the several barriers such as lack of awareness and cultural stigma. The review highlights the importance of PAP smear test for early detection of cervical cancer and pre-cancerous lesion. The PAP smear test being the effective, simple and affordable, also helps in reducing mortality rate and support early diagnosis and provide treatment plan.

**Key words:** PAP test; cervical cancer; neoplasia; screening tool

## Introduction

Cervical cancer is the most common cancer worldwide. According to the World Health Organization (WHO) 2022 census data, about 94% of the 350,000 deaths are caused by cervical cancer. The highest rate of cervical cancer incidence and mortality are in sub-Saharan Africa, Central America and South-East Asia [1]. In India cervical cancer is the second most common cancer among women; moreover 22.86% of women affected with the cervical cancer. Additionally, it has been also found that in every 8 minutes 1 women dead due to cervical cancer [2]. The women who lie in between age group of 21-60 are mostly affected by cervical cancer [2]. In Sikkim, women aged 30-49 has undergone screening for cervical cancer which include 0.7% from urban, 0.5% from rural and 0.6% in total [3]. The state Sikkim was the first state to introduce the Human Papillomavirus (HPV) vaccine all over the state in 2018-2019, focus on girls who are aged from 9-13 years. This vaccination campaign was primary initiative and the vaccination campaign was done through schools all over the state [4].

Cervical cancer usually progresses at a very slow rate. It initially starts as a pre-cancerous condition such as dysplasia which is also known as intraepithelial neoplasia. Initially this pre-cancerous cell begins to develop in the basal layer of the squamous epithelium of cervix and uteri. These pre-cancerous cells develop gradually and become invasive carcinoma and the pre-cancerous lesion remain stagnant to the epithelium with or without any morphological changes and with a minor diagnostic procedure we can detect

and cure it at initial phase [5]. The cervical cancer is increasing in the developing countries because of multiple reasons, like having many sexual partners, early sexual activities, not using condoms regularly and the main cause of cervical cancer is infection with the Human Papillomavirus (HPV). Majorly there are two types of diagnostic test for cervical cancer screening: Papanikolaou test and HPV test. The PAP test detects early pre-cancerous and cancerous cell lesions and HPV test detect the presence of high-risk type of Human Papillomavirus in the cell collected from a women cervix [6]. In comparison with other screening test the PAP smear test is globally accepted for its effective results and also for the early detection of the cancerous cells. The PAP smear test was developed by Dr. George Papanicolaou with its introduction in the year 1941, the PAP smear test became the most effective and the standard screening method for detecting the cervical cancer or any other pre-malignant lesions. The effectiveness of this test not only plays a role in detection of the cancerous cells but also help in the diagnosis of the bacterial infection or any inflammatory condition where it detect the underlying cause [7]. The abnormality found in the cervical epithelium are basically categorised based on the cell severity and the grading system that is Bethesda system: Cervical Intraepithelial Neoplasia (CIN) 1 indicates mild changes in the cell morphology whereas CIN 2 it indicates moderate changes in the morphology of the cells and CIN 3 it indicates severe dysplasia and this grading system is very much useful and plays a vital role in guiding treatment plans. There are some social barriers for screening despite having

effectiveness, barriers such as lack of awareness, cultural stigma and also inadequate access to healthcare services which limit the use of PAP smear screening, in low or middle-income countries and state all over the world. In this backdrop the present study has been undertaken to identify or access the role of PAP smear for the easy detection of cervical cancer. In this backdrop, the present study has been undertaken to identify or access the role of PAP smear for early detection of cervical cancer.

## Methods

Electronic search has been carried out using the databases viz. Google, Google Scholar, Pub Med for the study. The search was restricted for a period of 17 years ranging from 2008 to 2025. The search terms included

PAP, cervical cancer and HPV, Neoplasia, CIN, abnormality in cervix, screening techniques and Bethesda system. Duplication was avoided by excluding review of multiple copies of the same article in several databases.

## Findings and Discussion

The PAP smear test has been regularly showing its good and effective results in the early detection of the cervical cancer and also its pre-cancerous stages. Multiple studies have shown a major reduction in the cervical cancer cases and also the mortality because of the regular screening [7]. The following table representing few studies conducted among the female individuals and total no of individuals affected with cervical cancer.

Authors	Year of publication	Nation	Study design	CASES paptest_Kcervix	Control_spaptest_no Kcervix	NO paptest_CASES Kcervix	NO paptest CONTROLS_NO Kcervix	TOTAL CASES	Total controls
Ghosh S	2022	India	Case-control	85	93	34	26	119	119
Phoolcharoen	2017	Thailand	Cross-sectional	75	175	98	46	173	221
Kamineni A	2013	USA	Case-control	37	180	32	28	69	208
Mathews CA	2012	USA	Cross-sectional	75	1354	88	117	163	1471
Kaspiinla C	2011	Thailand	Case-control	97	104	33	26	130	130
Decker K	2009	Canada	Case-control	309	2233	357	1110	666	3343
Sasieni P	2009	UK	Case-control	2285	5467	1020	1049	3305	6516
Andrae B	2008	Sweden	Case-control	441	3288	789	2836	1230	6124
Yang B	2008	Australia	Case-control	292	2281	585	333	877	2614

**Table 1: Characteristics of the studies included in the analysis [6]**

The outcome of this review clearly shown an effectiveness of PAP smear in the detection or reduction of the cervical cancer. Regular screening helps in the early detection of abnormal changes in the cervical cells, which can be diagnosed and treated before turning into an invasive cancer. The result from various studies includes in this review confirm that women who undergo regular screening for PAP smear had majorly low risk of developing the cervical cancer compared to those who did not do screening. The PAP smear test is cost-effective screening methods, its implementation is limited in many low and middle level people, due to many factors: such as lack of awareness, social stigma, limited access to healthcare and also insufficient infrastructure. This all factors are mostly relevant in the rural and underdeveloped areas where women are not much aware about all these procedures.

In region like Sikkim, the introduction of the HPV vaccination and also promoting the screening awareness are very much needed steps. However, there are still a need for better public health education about Gynecological care and community-based screening initiative [4]. The PAP smear screening should be integrated with primary healthcare services for further improvement and reduction of the risk of cervical cancer to women.

## Conclusion

This review highlights the significant impact of the PAP smear test for the screening of the cervical cancer and it may reduce the mortality rate. The PAP smear test being a simple, affordable and effective tool, it plays a very

much important role in the diagnosing and additionally making a treatment plan.

## References

- <https://www.who.int/news-room/fact-sheets/detail/cervical-cancer>
- Indian Council of Medical Research. <https://cancerindia.org.in/statistics/>
- [https://ncdirindia.org/All\\_Reports/NorthEast2021/resources/NE\\_chapter8.pdf](https://ncdirindia.org/All_Reports/NorthEast2021/resources/NE_chapter8.pdf)
- Ahmed D, VanderEnde K, Harvey P, Bhatnagar P, Kaur N, et al. (2022). Human Papillomavirus (HPV) vaccine introduction in Sikkim state: Best practices from the first statewide multiple-age cohort HPV vaccine introduction in India–2018–2019. *Vaccine*, 40(Suppl 1), A17–A25.
- Kumbhakar D. (2016). Cervical PAP smear reporting in a tertiary level hospital in Lower Assam. *Indian Journal of Research (PARIPEX)*, 5(7), 1.
- Meggiolaro A, Unim B, Semyonov L, Miccoli S, Maffongelli E, et al. (2016). The role of PAP test screening against cervical cancer: a systematic review and meta-analysis. *Clinica Terapeutica*, 167(4), 124–139.
- Jadav MP, Patel FT, Shah BA, Parikh NR, Gonsai RN. (2019). A study of cervical PAP smears in a tertiary care hospital of Ahmedabad, Gujarat, India. *International Journal of Pathology*, 2(2), 81.

**Ready to submit your research? Choose ClinicSearch and benefit from:**

- fast, convenient online submission
- rigorous peer review by experienced research in your field
- rapid publication on acceptance
- authors retain copyrights
- unique DOI for all articles
- immediate, unrestricted online access

**At ClinicSearch, research is always in progress.**

Learn more <https://clinicsearchonline.org/journals/clinical-research-and-studies->



© The Author(s) 2025. **Open Access** This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>. The Creative Commons Public Domain Dedication waiver (<http://creativecommons.org/publicdomain/zero/1.0/>) applies to the data made available in this article, unless otherwise stated in a credit line to the data.