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Evaluating the Sensitivity and Specificity of Colposcopy Versus Cytology in VIA-Positive Patients

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Abstract

Introduction: Cervical cancer is a major public health issue, especially in low- and middle-income countries. Visual inspection with acetic acid (VIA) is simple and affordable, but a positive result cannot confirm cervical precancerous lesions, requiring further diagnostics. This study compared colposcopy and cytology among VIA-positive women, using histopathology as the standard. ***Aim of this study:*** To compare the sensitivity, specificity, predictive values, and overall diagnostic accuracy of colposcopy and Pap smear for detecting cervical pre-invasive lesions in VIA-positive women. ***Methods & Materials:*** A cross-sectional study was conducted at Shaheed Suhrawardy Medical College Hospital (SSMCH), Dhaka, Bangladesh, from July 14, 2019, to January 15, 2020. It included 150 VIA-positive women selected by purposive sampling. Participants underwent Pap smear, colposcopy with 3% acetic acid, Lugol's iodine, and Swede Score. Colposcopy-guided biopsy was performed when needed, with histopathology as the reference. Diagnostic performance was measured by sensitivity, specificity, PPV, NPV, and accuracy. ***Results:*** The mean age of the participants was 36.4 ± 11.5 years. Pap smear detected epithelial abnormalities in 69 (46.0%) women, whereas colposcopy identified suspected premalignant lesions in 58 (38.6%). Histopathology confirmed premalignant lesions in 51 (34.0%) women. The sensitivity, specificity, PPV, NPV, and accuracy of Pap smear were 78.4%, 70.7%, 58.0%, 86.4%, and 73.3%, respectively. For colposcopy, the corresponding values were 94.1%, 89.9%, 82.8%, 96.7%, and 91.3%. ***Conclusion:*** Colposcopy outperformed conventional cytology in VIA-positive women, showing higher sensitivity, specificity, predictive values, and accuracy. It can help evaluate women with positive VIA, but histopathology is still essential for a definitive diagnosis.

Keywords: Cervical cancer; VIA; Colposcopy; Pap smear; Cytology; Histopathology.

INTRODUCTION

Cervical cancer is a major health issue globally, especially in low- and middle-income countries. It ranks as the fourth most diagnosed and deadly cancer among women.[1] In 2020, about 604,000 women were diagnosed, and 342,000 died, mainly in countries with limited screening and treatment.[2] Persistent high-risk HPV infection causes most cases, but prevention through HPV vaccination, screening, and early treatment is effective.[2,3] Bangladesh faces a significant cervical cancer burden.[4,5] Despite expanded screening, many women present with advanced disease due to limited awareness, coverage, access issues, and delays in diagnosis and treatment. [5] Many are diagnosed only after disease progression, emphasising the need for early detection strategies.[6] Cervical cancer develops gradually through precancerous changes called cervical intraepithelial neoplasia (CIN), which can stay stable, regress, or progress over years. [7] Early detection and treatment of precancerous lesions can greatly reduce incidence and mortality. Screening methods include Pap smear, liquid cytology, HPV testing, and visual

inspection.[8] In well-established systems, cytology has reduced incidence and mortality, but it requires resources, trained staff, quality control, and good communication, which are challenging in resource-limited settings. [9]

WHO's recommendation is clear: HPV testing is the preferred primary screening method for cervical cancer prevention.[10,11] Quality-assured high-performance HPV testing is recommended as the preferred approach.[12] The guideline outlines recommendations primarily for the general population of women, with consideration of program capacity, particularly in relation to follow-up and treatment services, and describes preferred screening strategies under varying resource conditions.[10] VIA is a simple, inexpensive method of screening. VIA followed by colposcopy is suitable for screening cervical cancer in rural areas of Bangladesh and other LMICs, where screening techniques such as Pap smear and HPV tests are not yet widely available and accessible.[6] VIA, being a low-cost, easily administered screening test with immediate results, emerges as a practical alternative.[13] The Government of Bangladesh established a visual inspection with acetic acid (VIA)-based cervical cancer screening program at 600 primary, secondary, and tertiary health facilities following a pilot program in 2005.[14-16] The VIA-positive women were referred for colposcopy in the nearest colposcopy centers.[4] WHO suggests using partial genotyping, colposcopy, VIA, or cytology to triage women after a positive HPV DNA test. VIA is a screening test, not diagnostic. A positive result does not confirm precancer, as acetowhite changes can occur with benign conditions, necessitating secondary evaluation to confirm the presence and severity of cervical lesions.[11]

Colposcopy is crucial for further assessment of women with abnormal cervical screening results. It offers a magnified, well-lit view of the cervix, enabling detailed evaluation of the transformation zone and suspicious epithelial or vascular changes. When an abnormality is detected, a targeted biopsy can be taken for histopathological analysis, providing a tissue-based diagnosis. This diagnosis serves as a benchmark for evaluating other diagnostic methods. In Bangladesh's VIA programme, women who test positive via VIA are usually referred for colposcopy and/or targeted biopsy at specialized hospitals and clinics. [15,16] Cervical cytology also plays an important role in detecting abnormal cervical cells. The Pap smear, being inexpensive and non-invasive, can identify various cytological abnormalities. Yet, its accuracy depends on sample quality, preparation, staining, laboratory facilities, and the cytopathologist's experience. False negatives may occur if abnormal cells are missed or not recognized. These limitations are especially relevant when cytology is used to evaluate women already identified as VIA-positive. Studies from Bangladesh show differences between VIA and cytology in detecting cervical issues. One comparison found histopathology identified 38 abnormalities, including CIN and cervical cancer. VIA detected many more abnormalities than Pap smears, with sensitivities of 88.9% for VIA and 33.3% for Pap smears, though Pap smears had higher specificity (95.8% vs. 52.1%). The findings suggest that colposcopic assessment of VIA-positive women can reduce unnecessary treatments due to false-positive VIA results.[17] Early experience with Bangladesh's national VIA programme has shown that linking screening with colposcopy and biopsy is feasible. Over 104,000 women were screened, with about 4.8% testing VIA-positive. Many of these women later attended colposcopy clinics, where CIN2–3 lesions and invasive cancers were diagnosed. These results highlight both the potential of VIA-based screening and the importance of effective referral and diagnostic pathways for women with positive results.[15]

For VIA-positive women, the key question is whether secondary diagnostic methods can accurately detect clinically significant disease. Sensitivity is crucial to avoid missing serious lesions, while specificity reduces unnecessary procedures for women without significant disease. Comparing colposcopy and cytology's sensitivity and specificity against histopathology offers insights into their diagnostic roles, though performance varies with population, prevalence, operator skill, and resources. Limited direct comparisons in Bangladesh indicate the need for local evidence, considering feasibility, cost, and infrastructure. The aim of this study was to compare these methods using histopathology as the standard, identifying their strengths and limitations to improve evaluation and management

OBJECTIVES

General Objective

To compare the diagnostic accuracy of colposcopy and conventional cytology (Pap smear) in VIA-positive women using histopathology as the reference standard.

Specific Objectives

1. To determine the sensitivity and specificity of colposcopy in detecting cervical pre-invasive lesions.
2. To determine the sensitivity and specificity of Pap smear in detecting cervical pre-invasive lesions.
3. To compare the diagnostic performance of colposcopy and Pap smear in VIA-positive women.

METHODS AND MATERIALS

This cross-sectional observational study was conducted in the Department of Obstetrics & Gynaecology, Shaheed Suhrawardy Medical College Hospital (SSMCH), Dhaka, Bangladesh, from 14 July

2019 to 15 January 2020. The study included 150 sexually active women who were VIA-positive and met the predefined eligibility criteria. Although the calculated sample size was 381.2 using the formula $n = z^2pq/d^2$, 150 participants were enrolled based on the study period and feasibility. Purposive sampling was used. The main outcomes were colposcopic findings assessed by the Swede Score and histopathological findings from cervical biopsy. Relevant socio-demographic and reproductive characteristics, including age, education, occupation, residence, age at marriage, and parity, were also recorded. Women were eligible for this study if they were sexually active and tested VIA-positive, aged 25–50 years or married for at least 10 years, whichever came first, and exhibited abnormal vaginal discharge, irregular vaginal bleeding, or postcoital bleeding. Women were excluded from this study if they were unmarried, nulliparous, pregnant, menstruating during examination, or had a history of cervical carcinoma.

After confirming eligibility, participants received a unique ID, and study details and consent were obtained. Socio-demographic, reproductive, and clinical data were collected via questionnaire. Participants underwent per-speculum examination, with cervical findings recorded. Cervical samples were collected using Ayre's spatula for ectocervical and a cytobrush for endocervical sampling, then fixed and sent for cytology, interpreted per Bethesda. Post-sampling, colposcopy was performed under proper lighting, using a green filter, with 3% acetic acid and Lugol's iodine to assess features graded by the Swede Score. Suspicious areas prompted biopsies, which were stored, processed, and examined by a blinded pathologist. All findings were documented, then checked, coded, and prepared for analysis. After data collection, all information was checked for completeness and consistency before analysis. Statistical analysis was performed using SPSS, with continuous variables expressed as mean ± standard deviation (SD) and categorical variables as frequencies and percentages. The Chi-square (χ^2) test was used to assess associations between categorical variables. A p-value below 0.05 was considered statistically significant. Histopathological examination of the cervical biopsy served as the reference standard for identifying cervical pre-invasive lesions. The diagnostic effectiveness of colposcopy and Pap smear was evaluated using 2×2 contingency tables, calculating sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), and accuracy. These metrics facilitated comparison of colposcopy and cytology in detecting cervical pre-invasive lesions.

Prior to the study, ethical approval was obtained from the Institutional Review Board of Shaheed Suhrawardy Medical College Hospital. Participants were explained the study's purpose, procedures, risks, benefits, and their voluntary participation in simple Bengali. Written informed consent was secured, and participants were assured of confidentiality and that their data would only be used for research. They were also informed of their right to withdraw at any time without affecting their ongoing medical care.

RESULT

The study included 150 VIA-positive women who underwent Pap smear, colposcopy, and colposcopy-directed biopsy. Histopathological examination served as the reference standard for all diagnostic comparisons.

Table 1: Demographic and Reproductive Characteristics of Study Subjects (N=150)

Characteristics		Frequency	Percentage (%)
Age (years)	25-30	35	23.3
	31-40	69	46.0
	41-50	46	30.7
	Mean ± SD	36.4 ± 11.5	
Education	Primary	49	32.6
	Secondary	38	25.3
	Higher than Secondary	25	16.6
	Graduate	12	8.0
	Illiterate	26	17.3
Occupation	Service holder	24	16.0
	Day labourer	29	19.3
	House wife	86	57.3
	Business	11	7.3
Residence	Rural	57	38.0
	Urban	93	62.0
Age at Marriage	≤18 years	67	44.7
	19-25 years	64	42.6
	>25 years	19	12.7
Parity	Nulli-para	5	3.3
	1-2	30	20.0

Characteristics		Frequency	Percentage (%)
	3-5	65	43.3
	>5	50	33.3

Table 1 shows that the age of participants ranged from 25 to 50 years, with a mean of 36.4 ± 11.5 years. The largest proportion belonged to the 31–40 years age group (46.0%), followed by the 41–50 years group (30.7%). Regarding education, 32.6% had primary schooling, 25.3% had secondary education, 17.3% were illiterate, 16.6% had education beyond secondary level, and 8.0% were graduates. Most respondents were housewives (57.3%), while 19.3% worked as daily labourers, 16.0% held service jobs, and 7.3% were engaged in business. Urban residents accounted for 62.0% of the sample, with the remaining 38.0% coming from rural areas. Age at marriage emerged as a significant risk factor: 44.6% of women were married at ≤18 years, 42.6% between 19–25 years, and only 12.6% after age 25. The association between early marriage and cervical pathology was statistically significant ($p < 0.00001$). In terms of parity, the majority were multiparous—43.3% had 3–5 children and 33.3% had more than 5 children; only 3.3% were nulliparous and 20.0% had 1–2 children.

Table 2: Evaluation of Pap Smear Results (N=150)

Pap Smear Results	Total Number of Patients	Percentage (%)
Normal	81	54.0
ASCUS	14	9.3
LSIL	30	20.0
HSIL	25	16.7

Table 2 shows that the cytological interpretation was performed according to the Bethesda system. Of the 150 women, 81 (54.0%) had smears negative for intraepithelial lesions. Epithelial cell abnormalities were detected in 69 women (46.0%), distributed as follows: ASCUS in 14 (9.3%), LSIL in 30 (20.0%), and HSIL in 25 (16.7%) of the women.

Table 3: Colposcopic Evaluation of Study Subjects (N=150)

Colposcopic Prediction (by Swede Score)	Total Number of Patients	Percentage (%)
Normal	92	61.3
CIN I	29	19.3
CIN II/III	29	19.3

Table 3 shows that the colposcopic grading was performed using the Swede score, which evaluates five variables: acetowhiteness, margin and surface, vessel pattern, lesion size, and iodine staining. Each variable was scored 0, 1, or 2 points. On colposcopy, 92 (61.3%) of the women had normal colposcopic findings, while pre-malignant lesions were predicted in 58 (38.6%) women: CIN I in 29 (19.3%) and CIN II/III in another 29 (19.3%).

Table 4: Evaluation of Colposcopy-Guided Histopathology Reports (N=150)

Colposcopy-Guided Biopsy Report	Total Number of Patients	Percentage (%)
Normal/Benign/Inflammatory	99	66.0
Pre-malignant lesion	51	34.0

Table 4 shows that the colposcopy-guided biopsy with Hematoxylin & Eosin staining revealed that normal, benign, or inflammatory lesions were found in 99 (66.0%) of the subjects, whereas pre-malignant lesions were confirmed in 51 (34.0%) of the women.

Table 5: Correlation of Pap Smear and Colposcopic Findings Result with Histopathology Report (N=150)

Parameter		Histopathology Finding		
		Pre-malignant Lesion	Normal or Benign/Inflammatory	Total
Pap Smear Result	Positive for premalignant lesion	40	29	69
	Negative for premalignant lesion	11	70	81
	Total	51	99	150
Colposcopic Findings	Positive for premalignant lesion	48	10	58
	Negative or normal findings	3	89	92
	Total	51	99	150

Table 5 shows that out of 69 positive reports on Pap smear, 40 were true positives and 29 were false positives according to histopathology reports. From the 81 negative Pap smears, 70 were true negatives, and 11 were false negatives. Out of 58 positive colposcopy findings, 48 were true positives, and 10 were false positives according to histopathology reports. Out of 92 negative colposcopy findings, 89 were true negatives, and 3 were false negatives.

Table 6: Comparison of Diagnostic Performance of Colposcopy and Pap Smear (N=150)

Diagnostic Parameter	Colposcopy	Pap Smear
Sensitivity	94.1%	78.4%
Specificity	89.9%	70.7%
Positive Predictive Value	82.8%	58.0%
Negative Predictive Value	96.7%	86.4%
Accuracy	91.3%	73.3%

Table 6 shows that using histopathology as the gold standard, the sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), and accuracy were calculated for both colposcopy and Pap smear. Colposcopy demonstrated significantly higher sensitivity (94.1% vs 78.4%) and specificity (89.9% vs 70.7%) compared to Pap smear. Colposcopy also showed superior PPV, NPV, and overall accuracy.

DISCUSSION

This study at a tertiary care center involved 150 VIA-positive women over six months. It compared colposcopy and Pap smear in detecting pre-invasive cervical lesions, using histopathology as the standard. Results show colposcopy significantly outperforms Pap smear in sensitivity and specificity, endorsing it as the preferred secondary tool in resource-limited settings.

The study participants' demographic profile identified key risk factors for cervical pathology. Most women (46%) were aged 31–40 years, with a mean age of 36.4 ± 11.5, similar to other Bangladeshi research. Ferdous *et al.,*(2013) found peak cervical lesions among women aged 36–45, and Papri *et al.,*(2015) reported that 77.16% of women with cervical abnormalities were housewives, consistent with our finding that 57.3% were homemakers.[18,19] This reflects Bangladesh's social context, where many women have limited access to healthcare outside the home. Nearly half (44.6%) married at or before 18, a significant risk factor ($p < 0.00001$). Lavanya *et al.,*(2011) also noted high dysplasia rates in women married between 15–19.[20] Early marriage increases cervical cancer risk by exposing women earlier to HPV, facilitating multiple sexual partnerships, and leaving the immature cervix vulnerable. The transformation zone, where dysplasia starts, is especially susceptible in adolescence and early adulthood. Early marriage often correlates with lower education and socioeconomic status, affecting health literacy and access to screening. High parity was common, with 76.6% having three or more children supporting Ferdous *et al.,*(2013), who reported 98% of women with cervical cancer were multiparous.[18] High parity can promote HPV persistence, cause cervical trauma during childbirth, and reactivate latent infections. Women with many children often have limited healthcare access, increasing risk. These factors exemplify Bangladesh's socio-demographic reality, necessitating targeted screening and prevention. Educationally, only 8.8% were graduates, 17.3% illiterate, and 32.6% had primary education. Low education links to poor health literacy and awareness, underscoring the need for community health education, culturally appropriate communication, and outreach to women with limited formal education.

Cytological analysis using the Bethesda system showed that 54.0% of women had normal smears, while 46.0% exhibited epithelial cell abnormalities- 46.0% ASCUS, 20.0% LSIL, and 16.7% HSIL. These results align with the expected distribution in a VIA-positive group, which has a higher prevalence of cervical abnormalities than the general screening population. The notably high rates of LSIL (20.0%) and HSIL (16.7%) are due to all participants being VIA-positive, indicating increased cervical pathology risk. The 16.7% HSIL proportion highlights that many VIA-positive women have high-grade lesions needing prompt treatment to prevent cancer progression. The Pap smear demonstrated 78.4% sensitivity and 70.7% specificity in identifying histologically confirmed pre-invasive lesions, consistent with literature reports. Hamashima *et al.,*(2010) noted sensitivity ranges from 50–80%, and specificity from 70–90%. [21] The moderate sensitivity reflects limitations such as sampling errors, misinterpretation, or obscuring inflammation or infection, which complicate interpretation. The lower specificity (70.7%) led to 29 false positives, possibly caused by benign reactive changes, inflammation, or infections mimicking dysplasia- common in settings like Bangladesh with high infection rates, reducing test accuracy. False positives can lead to unnecessary colposcopies, anxiety, and higher healthcare costs, especially when resources such as colposcopy are scarce. Dependence on sample quality, processing, staining, lab quality, and cytologist expertise further affects accuracy, and these issues are magnified in resource-limited environments with weaker quality assurance. These challenges emphasize the difficulties of using cytology as a secondary triage for VIA-positive women, particularly when rapid, accurate results are essential for management. Although the Bethesda

system standardized reporting in 1988, the inherent limitations of cytology remain.[22]

Colposcopic assessment using the Swede score found 61.3% of women with normal results, while 38.6% had pre-malignant lesions (19% CIN I, 19.3% CIN II/III). The score evaluates five variables for standardized grading. The findings reflect higher risks in VIA-positive women. The distribution of CIN I and II/III indicates effective detection of low- and high-grade lesions, aiding management. The test showed high accuracy: sensitivity of 94.1% and specificity of 89.9%. Compared to Boicea *et al.,*(2012), which reported 98.3% accuracy, our sensitivity is slightly higher, possibly due to the systematic evaluation of features.[23] Parvin *et al.,*(2016) reported lower sensitivity and specificity, likely due to population differences.[24] Sharma *et al.,*(2013) emphasised colposcopy's role, with high sensitivity (94%) and a low false-negative rate, making it effective at detecting pre-invasive lesions. [25] Its negative predictive value of 96% reassures women with negative results, reducing unnecessary follow-up. The specificity (89.9%) minimises false positives from benign changes, outperforming Pap smear in preventing overtreatment. The Swede score provides a structured, reproducible approach, improving consistency and guiding intervention decisions.

The analysis showed that colposcopy significantly outperforms Pap smear in all diagnostic measures. It has higher sensitivity (94.1% vs. 78.4%), specificity (89.9% vs. 70.7%), positive predictive value (82.8% vs. 58.0%), negative predictive value (96.7% vs. 86.4%), and overall accuracy (91.3% vs. 73.3%). The notably higher sensitivity means colposcopy detects nearly 16 more cases of pre-invasive disease per 100 VIA-positive women, reducing missed diagnoses and the risk of disease progression and mortality. For every 100 VIA-positive women, colposcopy correctly identifies approximately 94 with the disease, compared to 78 with the Pap smear, leaving 16 undetected at risk of progression. This improvement could save hundreds of lives annually in Bangladesh, where cervical cancer affects many women. The high negative predictive value (96.7%) indicates that a negative colposcopy reliably rules out significant pathology, allowing safe, conservative management and avoiding unnecessary procedures and anxiety. Conversely, Pap smear's lower negative predictive value (86.4%) suggests about 14% of women with negative results might still have disease, risking delayed diagnosis and treatment. Colposcopy's higher specificity (89.9% vs. 70.7%) means fewer false positives, preventing unnecessary invasive procedures, psychological distress, and healthcare costs. The difference of 29 false positives with Pap versus 10 with colposcopy helps conserve limited healthcare resources and improve program sustainability, particularly important in resource-limited settings like Bangladesh. The overall accuracy difference of 18.0% (91.3% vs. 73.3%) confirms colposcopy's more reliable and consistent diagnosis, thanks to its ability for real-time visual assessment and immediate biopsy of suspicious areas, unlike cytology, which is more variable. The

LIMITATIONS OF THIS STUDY

This study was conducted at a single tertiary-care hospital with a relatively small sample of 150 VIA-positive women, which may limit the generalizability of the findings. Purposive sampling may have introduced selection bias. The study compared conventional cytology with colposcopy rather than HPV-based primary screening. In addition, no formal statistical comparison between the two diagnostic methods was performed; therefore, the observed differences in diagnostic performance should be interpreted with caution.

CONCLUSION

Findings from this study demonstrate that colposcopy has superior diagnostic performance compared with conventional cytology for detecting histopathologically confirmed premalignant cervical lesions among VIA-positive women. Colposcopy showed higher sensitivity, specificity, predictive values, and overall diagnostic accuracy, with fewer false-negative and false-positive results. Its ability to directly identify cervical abnormalities and facilitate targeted biopsy makes it a valuable tool in the evaluation of women with abnormal screening findings. Nevertheless, colposcopic assessment should complement rather than replace histopathological confirmation. In resource-limited settings such as Bangladesh, strengthening colposcopy services, referral pathways, and follow-up systems may improve the management of women with abnormal cervical screening results alongside the gradual expansion of HPV-based screening.

REFERENCES

1. Singh D, Vignat J, Lorenzoni V, Eslahi M, Ginsburg O, Lauby-Secretan B, *et al.,*Global estimates of incidence and mortality of cervical cancer in 2020: a baseline analysis of the WHO Global Cervical Cancer Elimination Initiative. Lancet Glob Health. 2023 Feb;11(2):e197-206. DOI: 10.1016/S2214-109X(22)00501-0. PMID: 36528031.
2. IARC marks Cervical Cancer Awareness Month 2021 [Internet]. Lyon: International Agency for Research on Cancer; 2021 Jan 6 [cited 2026 Sep 8]. Available from: https://www.iarc.who.int/news-events/iarc-marks-cervical-cancer-awareness-month-2021.[reference:2][reference:3]
3. World Health Organization. Cervical Cancer Elimination Initiative [Internet]. Geneva: WHO; [cited 2026 Sep 8]. Available from: https://www.who.int/initiatives/cervical-cancer-elimination-initiative.[reference:4]
4. Nessa A, Azad AK, Uddin SMN, Khan MAH, Zaman S, Khan MAS. Cervical cancer screening data from the case-based national electronic registry

in Bangladesh. BMC Glob Public Health. 2025; 3:34. DOI: 10.1186/s44263-025-00145-x.

5. Nessa A, Islam T, Noor-E-Ferdousi NE, Sultana A, Khan KH, Rashid HU. Staging and Management of Cervical Cancer at the Colposcopy Clinic of Bangabandhu Sheikh Sheikh Mujib Medical University (BSMMU), Bangladesh. South Asian J Cancer. 2024 Feb 21;13(1):17-26. doi: 10.1055/s-0043-1776288. PMID: 38721107; PMCID: PMC11076093.
6. Azhari HA, Chawdhury M, Islam F, Zakaria GA, Dalal K, Reza HM. Visual inspection with acetic acid and colposcopy: screening of cervical cancer in resource-limited healthcare settings. Front Glob Womens Health. 2025; 6:1684205. DOI: 10.3389/fgwh.2025.1684205.
7. Sankaranarayanan R, Qiao YL, Keita N. The next steps in cervical screening. Womens Health (Lond). 2015 Mar;11(2):201-12. doi: 10.2217/whe.14.70. PMID: 25776294.
8. Kyrgiou M, Bowden SJ, Ellis LB, Hammer A, Lyons D, Freeman-Wang T, et.al. Active surveillance of cervical intraepithelial neoplasia grade 2: 2025 British Society of Colposcopy and Cervical Pathology and European Society of Gynaecologic Oncology consensus statement. Lancet Oncol. 2025 Mar;26(3):e140-e151. doi: 10.1016/S1470-2045(24)00524-2. PMID: 40049205.
9. Bergqvist L, Virtanen A, Kalliala I, Bützow R, Jakobsson M, Heinonen A et.al. Predictors for regression and progression of actively surveilled cervical intraepithelial neoplasia grade 2: A prospective cohort study. Acta Obstet Gynecol Scand. 2025 Apr;104(4):763-773. doi: 10.1111/aogs.15032. Epub 2025 Feb 10. PMID: 39930620; PMCID: PMC11919748.
10. World Health Organization. WHO guideline for screening and treatment of cervical pre-cancer lesions for cervical cancer prevention: use of human papillomavirus (HPV) DNA genotyping [Internet]. Geneva: World Health Organization; 2026 [cited 2026 Sep 9]. 69 p. (ISBN: 978-92-4-012174-4). Available from: https://www.who.int/publications/i/item/9789240121744
11. World Health Organization. Recommendations for the use of HPV DNA tests and HPV mRNA tests and other cervical screening methods. In: WHO guideline for screening and treatment of cervical pre-cancer lesions for cervical cancer prevention: use of dual-stain cytology to triage women after a positive test for human papillomavirus (HPV). 2nd ed. Geneva: World Health Organization; 2024. Available from: https://www.ncbi.nlm.nih.gov/books/NBK604757/
12. World Health Organization. Evidence-informed guidance for the implementation of HPV-based cervical cancer screening programmes [Internet]. Geneva: World Health Organization; 2026 [cited 2026 Sep 9]. Available from: https://www.who.int/publications[reference:2]
13. Mishra E, Chaudhary E, Mishra S, Rawat V, Tripathi S, Rathoria R, et.al. Cervical Cancer Screening Using Papanicolaou Smear and Visual Inspection With Acetic Acid and Their Correlation With Colposcopy. Cureus. 2025 Jul 24;17(7):e88679. doi: 10.7759/cureus.88679. PMID: 40861646; PMCID: PMC12374757.
14. Islam MF, Nessa A, Zaki QA, Akbar Ashrafi SA, Qayum MO, Hassan MR, *et al.,*Evaluation of the National cervical cancer surveillance program in Bangladesh: Performance, strengths, and opportunities for improvement. PLOS Glob Public Health. 2025;5(5):e0004595. DOI: 10.1371/journal.pgph.0004595.
15. Nessa A, Hussain MA, Rahman JN, Rashid MH, Muwonge R, Sankaranarayanan R. Screening for cervical neoplasia in Bangladesh using visual inspection with acetic acid. Int J Gynaecol Obstet. 2010 Nov;111(2):115-8. doi: 10.1016/j.ijgo.2010.06.004. Epub 2010 Aug 2. PMID: 20674919.
16. Basu P, Nessa A, Majid M, Rahman JN, Ahmed T. Evaluation of the National Cervical Cancer Screening Programme of Bangladesh and the formulation of quality assurance guidelines. J Fam Plann Reprod Health Care. 2010 Jul;36(3):131-4. doi: 10.1783/147118910791749218. PMID: 20659365.
17. Nessa A, Nahar KN, Begum SA, Anwary SA, Hossain F, Nahar K. Comparison between visual inspection of cervix and cytology based screening procedures in Bangladesh. Asian Pac J Cancer Prev. 2013;14(12):7607-11. doi: 10.7314/apjcp.2013.14.12.7607. PMID: 24460341.
18. Ferdous J, Begum SA, Ferdous NE, Nahar Q, Khatun SF, Khatun S. Presentation of invasive cervical cancer in Bangladesh. Bangabandhu Sheikh Mujib Med Univ J. 2016;6(1):29-32. DOI: 10.3329/bsmmuj.v6i1.29021.
19. Papri FS, Khanam Z, Islam F, Hakim MM. Knowledge and awareness about risk factors of cervical cancer, its screening and vaccination among the women attending Chittagong Medical College Hospital. Chatt Maa Shi Hosp Med Coll J. 2015 Jul;14(2):57-60. DOI: 10.3329/CMOSHMCJ.V14I2.25719.
20. Gundrajakuppam L, Shanthi V, Rao NM, Dora ML. Clinicopathological correlation of cervical carcinoma by pap smear. J Biosci Tech. 2011;2(6):439-45. Available from: https://www.semanticscholar.org/paper/CLINICOPATHOLOGICAL-CORRELATION-OF-CERVICAL-BY-PAP-Lavanya-Shanthi/d38d07a053d4bc0e7ae242e899f4b67b6052ab5c

21. Hamashima C, Aoki D, Miyagi E, Saito E, Nakayama T, Sagawa M, Saito H, Sobue T; Japanese Research Group for Development of Cervical Cancer Screening Guidelines. The Japanese guideline for cervical cancer screening. Jpn J Clin Oncol. 2010 Jun;40(6):485-502. doi: 10.1093/jjco/hyq036. Epub 2010 Apr 30. PMID: 20436034.
22. The 1988 Bethesda System for reporting cervical/vaginal cytologic diagnoses: developed and approved at the National Cancer Institute workshop in Bethesda, MD, December 12-13, 1988. Diagn Cytopathol. 1989;5(3):331-4. doi: 10.1002/dc.2840050318. PMID: 2791840.
23. Boicea A, Pătraşcu A, Surlin V, Iliescu D, Schenker M, Chiuţu L. Correlations between colposcopy and histologic results from colposcopically directed biopsy in cervical precancerous lesions. Rom J Morphol Embryol. 2012;53(3 Suppl):735-41. PMID: 23188433.
24. Parvin MI, Alam MF, Talukder SI, Alam AS. Correlation between colposcopy and histologic findings in cervical intraepithelial neoplasia. Dinajpur Med Col J. 2016 Jan;9(1):13-8. Available from: https://www.semanticscholar.org/paper/Correlation-between-Colposcopy-and-Histologic-in-Talukder-Alam/c07028f19f43018a675c4e2cabb6a7018627a2b5
25. Sharma B, Singh N, Gupta N, Lal P, Pande S, Chauhan S. Diagnostic Modalities of Precancerous and Cancerous Cervical Lesions with Special Emphasis on CD31 Angiogenesis Factor as a Marker. Patholog Res Int. 2013;2013:243168. doi: 10.1155/2013/243168. Epub 2013 Sep 17. PMID: 24167753; PMCID: PMC3791664.
26. Kalpana B, Anju S, Hina C, Megha A, Devendra B, Amarawatin K. Pap smear versus colposcopy for diagnosis of precancerous lesions of cervix. Int J Sci Res Manag. 2016 Jul;4(7):4383-8. Corpus ID: 35053697. Available from: https://www.semanticscholar.org/paper/Pap-Smear-Versus-Colposcopy-For-Diagnosis-Of-Of-Kalpana-Anju/62052192e93e30f35d7c5c7ebdb2e81ad84147c3