


Literature Review

Effectiveness of visual inspection of Acetic Acid (VIA) and Pap Smear in cervical cancer screening: Literature review**Mastina^{1*}**, **Ana Puspita Sari²**, **Siti Lestari²**¹ Universitas Kader Bangsa, I. Mayjen HM Ryacudu No.88, 7 Ulu, Kecamatan Seberang Ulu I, Kota Palembang, Sumatera Selatan 30253, Indonesia² Sekolah Tinggi Ilmu Kesehatan Keluarga Bunda Jambi, Jl. Sultan Hasanuddin No.RT 43, Talang Bakung, Kec. Jambi Sel., Kota Jambi, Jambi 36138, Indonesia mastina943@yahoo.co.id

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Abstract

Cervical cancer is the second most common cancer among women worldwide, with an estimated 528,000 cases and 260,000 deaths yearly (Kagabu *et al.*, 2020). The incidence of cervical cancer in Indonesia in 2018 was 23.4 per 100,000, with an average death rate of 13.9 per 100,000 (Profil RI, 2020). This study aimed to compare the effectiveness of VIA and Pap Smear examinations. The research method uses literature, which involves reviewing and critically evaluating existing literature sources. Review of journals in this study by searching for journals in the database (Google Scholar and PubMed). The results of the study state that the sensitivity value of Pap smear is 97.14%. This shows that it is higher than the sensitivity of VIA examination, and the specificity value of VIA is higher at 94.5% compared to the specificity value of VIA. Of the two methods, Pap Smear Visual Inspection screening is more effective than VIA. This study concludes that the Pap Smear Visual Inspection screening method is more effective than the IVA method. The sensitivity and discipline for detecting high-grade scrotal intraepithelial lesions (HSIL) and squamous cell carcinoma (SCC) are higher than a pap smear.

Keywords: cervical cancer; HPV (Human Papilloma Virus); screening**1. Introduction**

Screening is very effective in reducing cases and deaths associated with cervical cancer because it detects abnormalities before they develop into cancer (Majid *et al.*, 2019). Effective screening has greatly reduced cervical cancer cases in developed countries (Brousseau *et al.*, 2019). Screening can lead to reduced case occurrence and mortality rates. The benefits of screening are greater when disease detection is at an early stage (Clarke *et al.*, 2020). Inadequate screening increases cervical cancer cases and mortality, especially in resource-limited settings (Gabrielli *et al.*, 2018).

Cervical cancer is caused by a prolonged infection with a very high papillomavirus risk (Kremer *et al.*, 2020). Cervical cancer is mostly caused by the Human Papilloma Virus (HPV) (Lukac *et al.*, 2020). The most common cause of pre-cancerous cervical lesions is the human papillomavirus or HPV. High-risk or androgenic HPV infections lead to cancer. There are two types of genital HPV: high-risk (oncogenic) HPV and low-risk (non-oncogenic) HPV. These groups are separated according to their connection to cervical cancer and precancerous lesions. Non-oncogenic HPV types incorporate 16, 11, 42, 43, and 44. On the other hand, there are 16, 18, 31, 33, 35, 39, 45, 51, 52, 56, 58, 59, 68, 73, and 82 high-risk or oncogenic HPV types. Okunande (2020) states that the most prevalent type of HPV worldwide is HPV 16, followed by HPV18 and HPV33. In Asia, HPV52 and HPV58 have relatively low infection rates. High-risk types, particularly HPV16, were viewed as exceptionally predominant in people (Cohen *et al.*, 2019). A meta-analysis of the bimodal distribution of cervical

cancer in several areas of observation following sexual activity for HPV outbreaks revealed a second peak at 45 years of age and an increase in adulthood (Zhang et al., 2020).

Factors influencing a woman to develop cervical cancer include the age of first sexual activity, current age, education, and lifestyle (Eijer et al., 2021). In addition to these factors, genetic factors also influence the occurrence of cancer, meaning that women with a family history of cancer are more likely than women who do not have a family history of cancer to develop cancer, including cervical cancer (Rio et al., 2017).

Squamous epithelial cell-derived cancer of the cervix is a malignant tumor (Nindrea, 2017). Most cervical cancers are caused by high-risk human papillomavirus (HPV) infection, making it one of the most common gynecologic cancers (Ishiguro et al., 2021). Cervical disease is the second most normal malignant growth among ladies worldwide, with an expected 528,000 cases and 260,000 passings yearly (Kagabu et al., 2020).

The World Health Organization (WHO) in 2020 declares that cervical cancer cases are increasing every day from 311,594 cases to 604,100 new cases. The highest cancer prevalence in the world is in Central and Eastern Europe at 10.7 per 100,00 population, followed by Northern Europe at 8.8 per 100,000 people and 8.1 per 100,000 people in Southeast Asia (WHO, 2020b). Okunande (2020) states that the high-risk HPV infection rate is 10.4% worldwide and can reach 36.5 percent in some developing nations. More than 70 nations and international academic societies immediately responded positively to the World Health Organization (WHO)'s call for the global eradication of cervical cancer (WHO, 2018). Additionally, on November 17, 2020, the World Health Organization (WHO) issued a global strategy to accelerate the elimination of cervical cancer as a public health issue to illuminate the path forward for cervical cancer prevention and control. As a result, 194 nations pledged to jointly eliminate cervical cancer for the first time (WHO, 2020a).

In 2018, there were 23.4 cases of cervical cancer for every 100,000 people in Indonesia, with an average death rate of 13.9 per 100,000. The most elevated malignant growth predominance was in DI Yogyakarta Area at 4.86 per 1000, West Sumatra at 2.47 per 1000, and Gorontalo at 2.44 per 1000 (Profil RI, 2020).

Based on the prevalence of cervical cancer on the Jambi Province Health Profile in 2020, there were 64 cases with a percentage of 0.36% in Kerinci Regency 22 cases 2.27%, Bungo Regency 22 cases 0.11%, Sarolangun Regency 6 cases with 0.42%, Jambi City 6 cases with 0.3%, Batang Hari 5 cases with 1.13%, Muaro Jambi 2 cases with 0.47%, and Merangin Regency 1 case with 0.26% (Profil Provinsi Jambi, 2020).

Cervical cancer prevention can be done in various ways, such as controlling the sexual behavior of oneself and one's partner, paying attention to contraceptives, not smoking, and consuming nutritious foods (Nindrea, 2017). Screening for or early detection of precancerous lesions can reduce the incidence of cervical cancer. Precancerous lesions can be caught early and prevented from developing into cervical cancer. Alternatively, the cervix if treatment is immediately done (Herawati et al., 2020). Another factor that causes mothers not to perform VIA examinations is the lack of maternal knowledge and attitudes toward the examination of the mother (Widayanti et al., 2020). Based on research conducted by Rukmana et al. (2021), the variables that impact individuals for early recognition of cervical malignant growth are information and instruction, great information that can raise ladies' consciousness of early location, well-being advancement, and socialization from well-being laborers are exceptionally compelling.

One way to cut down on the number of cases of cervical cancer is to perform screenings or early detection procedures. Cancer screening behavior can remain low due to various obstacles (Vitniawati et al., 2020). The number of women diagnosed with cervical cancer tends to rise despite the fact that the disease can be prevented and caught early, reducing both cases and deaths (Rio et al., 2017).

Due to low socioeconomic conditions and high costs, cervical cancer prevention is rarely

practiced in developing nations (Lukac et al., 2020). Surbakti (2020) states that low- and middle-income nations account for approximately 90% of cervical cancer deaths. Due to the difficulty of accessing screening tests, cervical cancer is so prevalent in developing nations (Paluku et al., 2019). Roughly 85% of cases and 87% of passings happen in less-created districts (Obol et al., 2021).

One way to cut down on the number of cases of cervical cancer is to perform screenings or early detection procedures. The low rate of cancer screening can be attributed to a number of obstacles. Vitniawati and others, (2020). The number of women with cervical cancer tends to rise despite the fact that the disease can be prevented and detected early, thereby reducing cases and deaths (Rio et al., 2017).

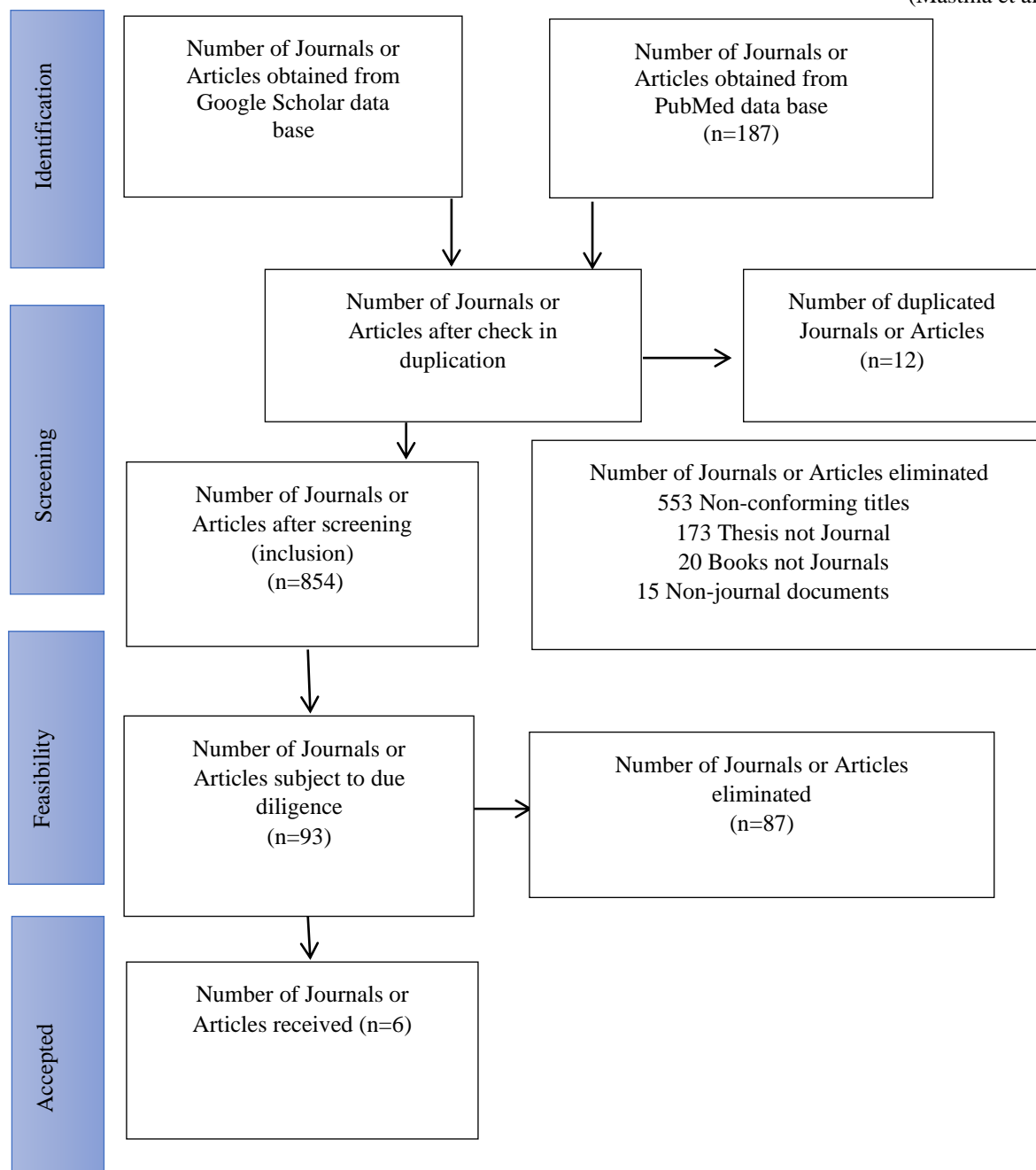
Due to low socioeconomic conditions and high costs, cervical cancer prevention is rarely practiced in developing nations (Lukac et al., 2020). Surbakti (2020) states that low- and middle-income nations account for approximately 90% of cervical cancer deaths. Due to the difficulty of accessing screening tests, cervical cancer is so prevalent in developing nations (Paluku et al., 2019). Roughly 85% of cases and 87% of passings happen in less-created districts (Obol et al., 2021).

Acetic Acid Visual Infection (VIA) is the most commonly recommended screening strategy for countries with limited resources. An Indonesian government policy to anticipate and reduce the incidence of cervical cancer is the VIA cervical cancer early detection program (Surbakti, 2020). The IVA test is a visual acidic basic analysis utilizing a vinegar arrangement (3-5% acidic corrosive) on the cervix and seeing various changes after the spread. The point is to see the presence of dysplasia cells as an evaluating strategy for cervical malignant growth (Herawati et al.,2020). While Pap Smear sensitivity and specificity were 90.6% and 70.6%, VIA sensitivity, and specificity increased to 65.6% and 75.5%, respectively. VIA triage can be considered part of the cervical cancer screening strategy because it may not be possible to triage HPV-positive women using quality-assured cytology or genotyping due to costs. Through and Paps Smear assessments are utilized to emergency the HPV position of dynamic ladies to figure out who ought to be alluded for extra treatment (Mremi et al., 2022). The purpose of VIA and Paps Smear examination, according to Kemenkes RI (2019) to find precancerous lesions and determine the presence of cervical cell changes.

The review in the study focused on studies conducted on the topic of VIA and Paps Smear screening. The contribution of this review lies in the activities undertaken to develop and interpret evidence-based findings to address existing problems in cervical cancer knowledge and facilities in Indonesia.

2. Research Methods

A literature review utilizing the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) diagram to search journal databases (Google Scholar and PubMed) between 2019 and 2021. The following is how the Prisma diagram appears in Figure 1.

**Figure 1.** Flow chart

The inclusion and exclusion criteria can be seen as follows

Table 1. Inclusion and exclusion criteria

No.	Inclusion Criteria	Exclusion Criteria
1.	Journal from 2019-2021	Journal year before 2019 after 2021
2.	VIA and Pap smear examinations with patients without comorbidities	Using languages other than Indonesian and English
3.	Journal of iva examination in patients aged 25 to 60 years	Journal with cervical cancer treatment
4.	National and international journals with Indonesian and English language	
5.	The Journal database is taken from Google Scholar and PubMed.	

Table 2. Charting Data

No.	Researcher Name and Research Title	Year	Country	Research Objectives	Sample	Methodology	Research Results
1.	Rapar et al. Oncogenesis, Morphology, and Early Detection Modalities of Cervical Carcinoma	2021	Indonesia	Knowing Oncogenesis, morphology, and early detection modalities of cervical carcinoma	24 Literature	The literature review research method uses three databases, namely Clinical Key, PubMed, and Google Scholar.	Pap smear and HPV examination provide clear advantages compared to a single cytology examination at the first follow-up visit, 90% sensitivity, 50% specificity, 52.9% positive predictive value and a negative predictive value of 88.9% were obtained, while at the second follow-up visit, 100% sensitivity and 100% negative predictive value were obtained.
2.	Asmalinda and Sapadae Early Detection of Uterine Cancer by Visual Inspection of Acetic Acid (VIA) in Fertile Women	2021	Indonesia	Early detection of cervical cancer using the visual acetate inspection (VIA) method in Women of childbearing age.	29 participants	The method of activity is the practice of examination directly on the client/patient	The most common results of VIA examination were moderate lesions in as many as 14 people (48.3%), mild lesions in as many as five people (17.2%), and inflammation in as many as six people (20.7%), while the results of negative VIA in the examination were four people (13.8%). The results of this study obtained a sensitivity value of 86.2% and a specificity value of 13.8%.
3.	Katanga et al. Performance of care HPV, hybrid capture two and visual inspection with acetic acid for detection of	2019	Denmark	To test the performance of the Care HPV test, Hybrid Capture2 (HC2) and visual	4080 Participant s	Cross-sectional study	In total, care HPV tests were positive for 23.6%, HC2 tests were positive for 19.1%, and VIA tests were positive for 6.3 percent. Care HPV had a

No.	Researcher Name and Research Title	Year	Country	Research Objectives	Sample	Methodology	Research Results
	high-grade cervical lesions in Tanzanian: A cross-sectional study			Inspection with acetic acid (VIA) to detect high-grade cytological cervical lesions or cancer (HSIL+)			sensitivity/specificity ratio of 91.1% and 78.9%, respectively. 83.7%, for HC2. For HSIL+ detection, VIA had a high specificity of 94.6 percent despite a low sensitivity of 31.1%. Younger and HIV-positive women are more sensitive to care for HPV, HC2, and VIA. Using emergency HPV-positive ladies care further develops particularity. However, awareness dropped to 27%.
4.	Vahedpoor et al., Comparison of the diagnostic value of the visual inspection with acetic acid (VIA) and Pap smear in cervical cancer screening	2019	Iran	In cervical cancer screening, comparing the diagnostic value of VIA to that of a Pap smear	440 Participants	Cross-sectional	Results: According to the findings, 29.9% of women had abnormal Pap smears. Pap smears had a false positive rate of 40.2% and a false negative rate of 37.4%. For VIA, the rates of false positives and false negatives were 4.6% and 21.2%, respectively. The NPV, PPV, sensitivity, and PPV of the Pap smear were 29.7%, 85.5%, 59.8%, and 62.6%, respectively. The VIA's values were 94.6%, 81.6%, 78.8%, and 95.4%, respectively. The Pap smear and Through mix showed a responsiveness of 97.3% and 100

No.	Researcher Name and Research Title	Year	Country	Research Objectives	Sample	Methodology	Research Results
							percent in low and high-grade cervical sores.
5.	Li et al. Evaluation of Human papillomavirus screening for cervical cancer in China's rural population	2019	China	determining the most effective treatment method for women in China's rural population who are positive for HPV.	A total of 18,000 women 35-64 years old	Methods. Between October 2014 and January 2016, the populace-based screening was done in seven provinces in Jiangxi Territory.	Results. Complete data were available for 17,782 women. The frequency of HPV was 13.6%. The referral rates for colposcopy for LBC, Pap smear, HPV16/18, viral load, VIA/VILI, and viral load were respectively 4.5%, 2.8%, 2.8%, 6.6%, and 3.7%. The previous triage tests' sensitivity was 65.7 percent, 51.9 percent, 86.8%, 73.3%, and 41.7%. Separately, the specificities were 69.8%, 81.0%, 85.8%, 52.2%, and 65.3%. The mean time to diagnosis was significantly reduced by HPV16/18, viral load, and VIA/VILI compared to LBC and Pap smear. In addition, viral burden significantly reduced the cost of screening a single HSIL+ woman, resulting in her identification.
6.	Veijalainen et al. Implementation of HPV-based Cervical Cancer Screening in an Organized Region III Screening Program: Three Years of	2019	Finland	Within the context of a planned cervical cancer screening program, evaluate the effectiveness of HPV-based screening.	17,770 Women	Methods: A sum of 46,708 ladies matured 35-60 years were welcome to join a territorial cervical malignant growth screening	Results: The HPV and Pap groups had similar attendance rates (72 percent and 71 percent, respectively). In total, 6.0% of women in the HPV group were referred for intensive follow-up, compared to 6.4% in the Pap group (relative risk 0.94, 95% CI: 0.87- 1.03). The

No.	Researcher Name and Research Title	Year	Country	Research Objectives	Sample	Methodology	Research Results
	Experiencee					program from January 1, 2012, to December 31, 2014. In general, 17,770 Ladies were screened with the Abbot Realtime hrHPV test with hr HPV test with emergency cytology, and 15,605 were screened with customary.	relative sensitivity of HPV testing using cytology triage compared to conventional screening was 1.64 (95 percent CI: 1.05-2.55) and 2.06 (95 percent CI: 1.17 to 3.41 for CIN3+. The cytologic triage for CIN2+ and CIN3+ had a specificity comparable to that of Pap screening (99.2% vs.

Source: Pubmed and Google Scholar

3. Results and Discussion

Articles meet the inclusion criteria based on the topic of the literature review discussion, namely cervical cancer screening. After identifying those relevant to the title, only six articles are read that have good quality because they are more complete in their research methods consisting of national and international journals. Pubmed and Google Scholar articles from 2019 to 2021 met the inclusion and exclusion criteria.

Table 3. Compilation of review articles on the VIA examination

No.	Author	Sensitivity (%)	Specificity (%)
1.	Asmalinda and Sapada (2021)	86.2	13.8
2.	Li et al. (2019)	41.7	65.3
3.	Vahedpoor et al. (2019)	94.6	81.6
4.	Katanga et al., 2019	91.1	83.8

Source: Pubmed and Google Scholar

Table 4. Compilation of Pap smear review articles

No.	Author	Sensitivity (%)	Specificity (%)
1.	Rapar et al. (2020)	90	50
2.	Vahedpoor et al. (2019)	29.7	85.5
3.	Li et al. (2019)	51.9	81.0
4.	Veijalainen et al. (2019)	18.0	48.0

Source: Pubmed and Google Scholar

Table 5. Compilation of Review Articles on Combination of VIA and Pap Smear Examination

No.	Author	Sensitivity (%)	Specificity (%)
1.	Vahedpoor et al., (2019)	71.4	71

Source: Pubmed and Google Scholar

Table 6: Compilation of Review Articles on Combined High-level VIA and Pap Smear Examination

No.	Author	Sensitivity (%)	Specificity (%)
1.	Vahedpoor et al. (2019)	100	46

Source: Pubmed and Google Scholar

The VIA has a higher sensitivity and specificity than the Pap Smear, as shown in Tables 3 to 5. Compared to a single VIA and Pap Smear examination, the combination has greater sensitivity and specificity. Additionally, combining a VIA and a high-level Pap smear examination results in much higher sensitivity and specificity.

The Pap Smear Test, Acetic Acid Visual Inspection (VIA), VIA magnification with gynecopy, colposcopy, cervicography, thin prep, and HPV test are methods for screening and early detection of cervical cancer. Because the Acetic Acid Visual Inspection (VIA) method is currently the most suitable in Indonesia, it is recommended for all women between the ages of 30 and 50 and women who have had sexual relations. This is because the method is simple, low-cost, easy to use, fast, and sensitive enough to identify abnormalities at the stage of cell abnormalities (dysplasia) or before precancer. Talkah and Munawaroh, (2019). Investigate Li et al. (2019) expressed that the most widely recognized essential evaluating tests for cervical disease incorporate the Papanicolaou test (Pap Smear), a visual assessment of the cervix with acidic corrosive (By means of). The consequences of this investigation discovered that a pap smear has a responsiveness worth of 51.9% specificity of 81.0%. VIA has a specificity of 65.3% and a sensitivity of 41.7 percent. IVA is significantly lower for diagnosis than for a Pap Smear. This screening is affordable and encourages women to identify. The research is identical to this one (Asmalinda & Sapada, 2021). In this study, moderate lesions were found in 14 people (48.3 percent), followed by mild lesions in as many as five people (17.2 percent), and inflammation in as many as six people (20.7%). Four individuals, or 13.8%, had negative IVA examination results. The study's findings had a sensitivity of 86.2 percent and a specificity of 13.8%. In contrast to previous studies (Katanga et al., 2019), the primary screening test in many systems is acetic acid visual inspection (VIA) because it is inexpensive and simple to obtain. The subjective nature of the diagnosis is one of the drawbacks of VIA. This study acquired the aftereffects of HPV-positive 23.6%, HC2-positive 19.1%, and Through sure 6.3%. HC2 has a sensitivity of 91.1 percent and a specificity of 83.7%, while HPV has a sensitivity of 88.9 percent and a specificity of 78.9 percent. Additionally, the VIA has a specificity of 94.6 percent and a sensitivity of 31.1%. Young HIV-positive women were more sensitive to HPV, HC2, and IVA care.

Rapar et al. (2021) research informs that the first follow-up visit yielded a value of 90% sensitivity, 50% specificity, 51.9 percent positive predictive value, and 88.9 percent negative predictive value, while the second follow-up visit yielded a value of 100% sensitivity. 100% of the negative predictions were correct. This examination is equivalent to exploration (Kang et al., 2020). Compared to HPV tests, pap smears have a higher sensitivity and discipline for detecting squamous cell carcinoma (SCC) and high-grade scrotal intraepithelial lesions (HSIL). Pap spreads have a responsiveness worth of 97.14% and a particularity of 85.58%, and HPV tests have an awareness worth of 88.32% and an explicitness of 54.92%. HPV test and Pap smear did not contrast in recognizing poor quality squamous intraepithelial sores, 85.35% for HPV test and 80.31% for pap smear. Researchers upheld the two examinations (Veijalainen et al., 2019) who found that the participation rate in the HPV bunch was 72% and the pap smear bunch 71%. In total, 6.0% of women in the HPV group and 6.4% in the pap smear group were referred for further evaluation. The Pap smear has a sensitivity of 18.0% and a specificity of 48.0%, while HPV has a sensitivity of 68.0% and a specificity of 22.1%.

Evaluating strategies for the cervical disease are primarily as follows: Conventional Pap smear, visual investigation with acidic corrosive and Lugol's iodine (Through/VILI), fluid-based cytology (LBC), and HPV testing. Since the 1950s, Pap smears have significantly reduced the disease burden of cervical cancer in developed nations, particularly the United States. However, the following factors can easily affect the accuracy of conventional Pap smears: the cytologist's experience, the level of the

cytology room, professional technicians, sampling techniques, slide quality, and coloring abilities. The sensitivity of cytology can reach 80-90% in developed nations with high-standard experimental conditions and technical levels. On the other hand, cytology can only be as sensitive as 30% to 40% in areas with limited resources.

This study reveals that the PPV of VIA is higher than that of the Pap smear, that the Iva examination only requires basic tools, and that no sophisticated laboratory test equipment is required. Tools for tissue sampling, preparations, and other complete tools are required for the Pap Smear examination (Aprianti et al., 2021). Regarding detecting low- and high-grade cervical lesions, VIA is more sensitive than a Pap smear, but it is less specific than a Pap smear. This way, it is prescribed to utilize Using along with a Pap smear to accomplish higher responsiveness.

4. Conclusion

The lack of effective and applicable screening programs leads to underreporting of advanced Cervix Ca cases. If detected at CIN or early cervical Ca stage, effective treatment can be given with encouraging results. Hence effective & applicable Cervical Ca screening needs to be provided in our country.

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