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An Opportunistic Screening Approach for Pre- Cancerous Lesions of Cervix in Asymptomatic Postnatal Women Using Visual Inspection with Acetic Acid and Visual Inspection with Lugol's Iodine - A Cross- Sectional Study

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Abstract

Background: Cervical cancer is the second most common cancer among women, with India contributing nearly one-fourth of global cases. In 2020, about 6,04,000 women were diagnosed and 3,42,000 died. Limited cytology-based screening in resource-poor settings underscores the need for cost-effective alternatives like VIA and VILI, recommended by WHO.

Aim: To evaluate VIA and VILI as opportunistic screening methods for detecting precancerous cervical lesions in asymptomatic postnatal women.

Methods: Postnatal women attending routine checkups or newborn immunization clinics were recruited after informed consent. VIA and VILI were performed to detect cervical precancerous lesions. Clinical, systemic, and per vaginal examinations were conducted. Data were analyzed using SPSS 21.0, with diagnostic accuracy assessed. Ethical approval and participant confidentiality were ensured.

Results: Among 800 women screened, VIA detected 4.88% positives and VILI 4.75%, showing strong concordance. Both tests significantly correlated with low

socioeconomic status and higher parity, especially grand multiparity. No significant links with age, delivery mode, or HPV vaccination, confirming VIA/VILI as effective, feasible screening tools.

Conclusion: VIA and VILI are effective, affordable, and practical screening methods for detecting cervical precancerous lesions in postpartum women. Integrating screening into routine postnatal visits can enhance coverage, support WHO's universal goals, and improve cervical cancer prevention in low-resource settings.

Keywords: Pre- cancerous lesions, opportunistic screening approach, asymptomatic postnatal women, acetic acid & visual inspection

Introduction

Cervical cancer ranks as the second most common cancer among women globally, with India contributing nearly one-fourth of the global burden. In 2020, approximately 6,04,000 new cases and 3,42,000 deaths were reported.[1] Worldwide, nearly 470,000 new cases occur annually, with 80% in developing regions. In India, cervical cancer represents 12.1% of female cancers, with 123,000 new cases and 67,500 deaths yearly.[2] With 432.2 million women at risk, India shows the highest incidence in South Asia (22/100,000).

The disease poses major challenges in low-resource settings due to poor socioeconomic status, poor hygiene, early marriage, multiparity, illiteracy, ignorance, and lack of cytology-based screening. The WHO Global Strategy (2020) has set a target of 70% screening coverage,[3] but achieving this requires region-specific strategies to overcome existing barriers.

Cervical cancer has a long natural history, allowing early detection of precancerous lesions by cytology, VIA, VILI, colposcopy, and biopsy, enabling timely treatment. Prognosis differs markedly between early and advanced cases. Major risk factors include multiple partners, STDs, smoking, HIV, immunosuppression, and prolonged contraceptive use, though HPV infection remains the primary cause. WHO reports a higher HPV prevalence in pregnant women (18%) compared to non-pregnant women (6.2%), due to hormonal and immunological changes.[4]

Cervical cancer carries emotional and economic burdens while escalating healthcare costs. Fortunately, it is preventable, as it follows a long pre-invasive course, making screening critical.[5] However, routine Pap smears face challenges in India due to limited experts and reporting delays.

Alternative screening tools such as VIA and VILI are simple, low-cost, and effective.[6] They provide immediate results, allow a "screen and treat" approach, and are endorsed by WHO. Studies confirm their high sensitivity and specificity, comparable to Pap smears, making them highly suitable in resource-limited settings.[7]

The study aims to assess VIA and VILI as opportunistic, cost-effective screening tools for detecting precancerous cervical lesions among asymptomatic postnatal women in low-resource healthcare settings.

Materials and Methods

Type of Study: Observational study

Study Design: Cross-sectional descriptive study

Study Place: Department of Obstetrics and Gynaecology, SMS Medical College & Attached Group of Hospitals, Jaipur

Study Duration: Planned after Ethics Committee approval. Data collection began in October 2023, continued for one year or until the required sample size

was achieved, followed by 2 months for completion and analysis.

Study Universe: All postnatal women attending the Department of Obstetrics & Gynaecology for routine postnatal checkup or newborn immunization.

Study Population: Sample Size: A total of 800 asymptomatic postnatal women were included. Based on VIA sensitivity of 88.8%, 80% power, 5% alpha, and 3% error, the calculated sample was 425, adjusted to 468 for 10% non-response, finalized at 800 for convenience sampling.

Ethical Clearance: Obtained from Institutional Research Review Board (RRB) and Ethics Committee before study initiation.

Sample Size: 800 asymptomatic postnatal women, based on VIA sensitivity 88.8%, 80% power, 5% alpha, 3% error. Calculated N = 425, adjusted 468 for 10% non-response, finalized 800 for convenience sampling.

Eligibility Criteria

Inclusion Criteria: Asymptomatic postnatal women aged ≥30 years or all grand multiparous women, willing to participate and providing written informed consent.

Exclusion Criteria: Women with allergies to acetic acid or Lugol's iodine, those with vaginal bleeding, or participants in other ongoing studies.

Results and Observations

Among 800 participants, 68.88% were aged 30–35 years and 31.13% aged 36–40 years (mean 33.87 ± 2.58). Most were multiparous (64.25%), with 24.13% primiparous and 11.63% grand multiparous. Vaginal delivery occurred in 73.88% versus 26.13% LSCS. Socioeconomically, 33.25% were middle, 27.75% lower, 21.25% middle-lower, 17.75% upper-middle. Education: 51.50% primary, 33.63% secondary, 9.88% illiterate, 5.00% graduates. Religions: 49.63% Hindu, 50.38% Muslim. Rural women comprised 52.63%, urban 47.38%. BMI: 60.13% normal, 23.50% overweight, 6.13% obese, 10.25% underweight (mean 22.36 ± 4.53). Only 11.63% had prior screening; HPV vaccination was 1.13%.

Table 1: Distribution of Study Population According to VIA and VILI Screening Results

Parameter		No. of Patients	Percentage
VIA	Positive	39	4.88
	Negative	761	95.13
VILI	Positive	38	4.75
	Negative	762	95.25

Out of a total of 800 patients screened, Visual Inspection with Acetic Acid (VIA) detected 39 positive cases (4.88%) and 761 negative cases (95.13%), while Visual Inspection with Lugol's Iodine (VILI) identified 38 positive cases (4.75%) and 762 negative cases (95.25%).

Table 2: Distribution of study population according to Association Between Parity and VIA Results.

Parity	VIA				P-Value
	Positive		Negative		
	No. of Patients	Percentage	No. of Patients	Percentage	

Primi	3	7.69	190	24.97	<0.001
Multi	20	51.28	494	64.91	
Grand Multi Para	16	41.03	77	10.12	
Total	39	100.00	761	100.00	

Among VIA-positive cases, 7.69% were primiparous, 51.28% multiparous, and 41.03% grand multiparous, while VIA-negative cases included 24.97% primiparous, 64.91% multiparous, and 10.12% grand multiparous. The association between parity and VIA positivity was statistically significant ($p < 0.001$), with higher VIA positivity in grand multiparous women.

Table 3: Distribution of study population according to Association Between Parity and VILI Results

Parity	VILI				P-Value
	Positive		Negative		
	No. of Patients	Percentage	No. of Patients	Percentage	
Primi	3	7.89	190	24.93	<0.001
Multi	17	44.74	497	65.22	
Grand Multi Para	18	47.37	75	9.84	
Total	38	100.00	762	100.00	

Among VILI-positive cases, 7.89% were primiparous, 44.74% multiparous, and 47.37% grand multiparous, while VILI-negative cases included 24.93% primiparous, 65.22% multiparous, and 9.84% grand multiparous. The association between parity and VILI positivity was statistically significant ($p < 0.001$), with grand multiparous women showing a markedly higher positivity rate.

Table 4: Distribution of study population according to Association between Socioeconomic Status and VIA Results

Socioeconomic Status	VIA				P-Value
	Positive		Negative		
	No. of Patients	Percentage	No. of Patients	Percentage	
Lower	23	58.97	199	26.15	0.001
Middle Lower	8	20.51	258	33.90	
Middle	4	10.26	166	21.81	
Upper Middle	4	10.26	138	18.13	
Total	39	100.00	761	100.00	

Among VIA-positive patients, 58.97% belonged to the Lower socioeconomic class versus 26.15% in VIA-negative. Middle Lower, Middle, and Upper Middle classes accounted for 20.51%, 10.26%, and 10.26% in VIA-positive, compared to 33.90%, 21.81%, and 18.13% in VIA-negative. This difference was statistically significant ($p = 0.001$).

Table 5: Distribution of study population according to Association Between Socioeconomic Status and VILI Results

Socioeconomic Status	VILI				P-Value
	Positive		Negative		
	No. of Patients	Percentage	No. of Patients	Percentage	
Lower	17	44.74	205	26.90	0.006
Middle Lower	16	42.11	250	32.81	
Middle	4	10.53	166	21.78	
Upper Middle	1	2.63	141	18.50	
Total	38	100.00	762	100.00	

Among VILI-positive patients, 44.74% were from the Lower class versus 26.90% in VILI-negative, and 42.11% from Middle Lower versus 32.81%. Middle and Upper Middle classes comprised 10.53% and 2.63% of VILI-positive, compared to 21.78% and 18.50% in VILI-negative. This difference was statistically significant ($p = 0.006$).

Table 6: Distribution of patients according to Evaluation of VIA compared to VILI

Evaluation of VIA compared to VILI		VILI	
cervical biopsy		Positive	Negative
VIA	Positive	38	1
	Negative	0	761

When evaluating VIA against VILI findings, 38 patients who tested positive on VIA were also VILI-positive, while 1 VIA- positive patients were VILI-negative. Notably, no VIA-negative patients were found to be VILI-positive, and 761 were VIA-negative.

Discussion

Cervical cancer, the commonest in females, is preventable but preceded by premalignant lesions progressing over 5–15 years. Poverty, multiparity, early menarche, and multiple partners increase risk. Limited infrastructure hinders universal screening in India. VIA and VILI, low-cost alternatives, offer practical "see and treat" options. This study screens asymptomatic postnatal women.[8]

In this study, VIA positivity was highest in the lower class (58.97%, $p = 0.001$), while VILI positivity was more common in lower (40.48%) and middle (33.33%) groups ($p = 0.13$). Kanash S et al[9] reported predominance in middle (48.2%) and lower (43.1%) groups, whereas Arun R et al[10] found highest VIA positivity in the upper class (50%).

In this study, VIA positivity was significantly associated with parity ($p < 0.001$), with 41.03% grand multiparous versus 10.12% in VIA-negative. Similarly, Mehta N et al[11] reported highest VIA positivity among women with 3–4 children (68.75%), while Deepika K M et al[12] found parity 2–4 showed maximum VIA positivity.

In this study, VILI positivity was significantly associated with parity ($p < 0.001$), with 47.37% grand multiparous versus 9.84% in VILI-negative. Similarly, Raifu A O et al[13] found lowest VILI positivity in women with 0–1 child and highest in 2–5, while Paswan A et al[14] reported increased positivity with higher gravidity.

In this study, VIA positivity was highest in the lower socioeconomic group (58.97% vs. 26.15% VIA-negative, p = 0.001), while VILI positivity was more frequent in lower (40.48%) and middle (33.33%) groups (p = 0.13). Similarly, Kanash S et al[9] noted middle (48.2%) and lower (43.1%) predominance, whereas Arun R et al[10] reported highest VIA positivity in the upper class (50%).

In this study, VILI positivity was higher among lower (40.48%) and middle (33.33%) socioeconomic groups, though not statistically significant (p = 0.13). Similarly, Kanash S et al[9] observed predominance in middle (48.2%) and lower (43.1%) SES, while Arun R et al[10] found highest VIA positivity in the upper class (50%) and lowest in the lower-middle group (1.5%).

In this study, parity significantly influenced VILI positivity (p < 0.001), with 47.37% of grand multiparous women testing positive. VIA and VILI showed strong concordance, with only one discordant case. Similarly, Kalgong G et al[15] reported high combined VIA/VILI sensitivity (93.58%) and specificity (97.01%). Bhattacharya A K et al[16] found VIA more sensitive (96.15%) and accurate (88.23%) than VILI.

Conclusion

VIA and VILI are efficient, low-cost tools for cervical cancer screening, feasible even in resource-poor settings. This study found higher positivity among multiparous, low socioeconomic women. Postnatal visits for child vaccination provide an ideal opportunity for opportunistic screening. Implementing compulsory VIA/VILI for women >30 years can enhance coverage, aid early detection, and support WHO's universal screening target.

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