



ORIGINAL RESEARCH PAPER

Community Medicine

GYNECOLOGICAL SYMPTOMS AND THEIR
 ROLE IN SHAPING CERVICAL CANCER
 AWARENESS, VACCINATION, AND SCREENING:
 A LARGE-SCALE CROSS-SECTIONAL SURVEY

KEY WORDS:

Daniel Finney Sankuru	Postgraduate, Department Of Community Medicine, Katuri Medical College & Hospital, Guntur, India
Chinnababu Sunkavalli	Clinical Director & Consultant Surgical Oncologist, Yashoda Hi-tec City Hospital, Hyderabad, India
Sumedha Sahanasree Dasari	Consultant Dentist, Andhra Prime Hospitals, Guntur
Suma Gonji	Assistant Professor, Department Of Community Medicine, Guntur Medical College, Guntur, India
Phanindra Dhulipala	Professor & Head, Department Of Community Medicine, Katuri Medical College & Hospital, Guntur, India
Ravi Kiran K	Statistician, Department Of Community Medicine, Katuri Medical College & Hospital, Guntur, India
Raghavendra Rao M V*	Professor Of Microbiology And Vice-President Of The World Academy Of Medical Sciences, Netherlands (Europe) *Corresponding Author

ABSTRACT	Background: Cervical cancer is a major public health challenge in low- and middle-income countries, where low awareness and limited preventive practices exacerbate its burden. Gynecological symptoms, such as abnormal menstruation and pelvic pain, may influence awareness and uptake of preventive measures like HPV vaccination and screening. Objective: To examine the association between gynecological symptoms (abnormal menstruation and pelvic pain) and cervical cancer awareness, screening, and HPV vaccination uptake among women of reproductive age in South India, within the context of a large-scale cervical cancer awareness event. Methods: A cross-sectional study was conducted during a cervical cancer awareness lesson at Vignan University, Guntur, India, on March 18, 2023. Of 3,465 attendees, 3,157 women aged 15–49 (91.1% response rate) completed pre- and post-intervention surveys assessing socio-demographics, gynecological symptoms, cervical cancer awareness (12-question survey), and preventive practices (HPV vaccination and Pap smear screening). Awareness was categorized as high ($\geq 75\%$) or low ($< 75\%$). Chi-square tests assessed associations between symptoms and outcomes, and paired t-tests evaluated pre- and post-intervention changes using SPSS v.20. Results: Most participants were aged 15–24 (90.3%, $n=2,850$) and held B.Tech. degrees (53.8%, $n=1,698$). Abnormal menstruation (22.8%, $n=721$) was associated with higher awareness (62.7% vs. 54.2%, $p<0.0001$), vaccination rates (10.5% vs. 7.2%, $p=0.03$), and screening rates (11.0% vs. 7.3%, $p=0.02$). Pelvic pain (35.2%, $n=1,112$) was linked to higher vaccination (10.1% vs. 6.8%, $p=0.001$) and screening rates (10.8% vs. 6.7%, $p<0.0001$), but not awareness ($p=0.492$). Post-lesson, high awareness increased from 11.6% to 58.3%, vaccination willingness from 38.9% to 78.2%, and screening willingness from 37.6% to 86.1% ($p<0.001$). Conclusion: Gynecological symptoms, particularly abnormal menstruation, are significantly associated with higher cervical cancer awareness and preventive behaviors. The educational intervention markedly enhanced awareness and willingness, emphasizing the need for targeted education to reduce cervical cancer burden in India.
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INTRODUCTION Cervical cancer remains a leading cause of cancer-related mortality in low- and middle-income countries, with approximately 604,000 new cases and 342,000 deaths globally in 2020, 90% occurring in these regions (1,2). Persistent infection with high-risk human papillomavirus (HPV) types, notably HPV-16 and HPV-18, is the primary cause, making HPV vaccination and screening (e.g., Pap smear, HPV DNA testing) critical for prevention (3,4). However, low awareness, limited healthcare access, and cultural barriers hinder uptake in India (5,6). Gynecological symptoms, such as abnormal menstruation and pelvic pain, may prompt women to seek health information or interventions, potentially increasing awareness and preventive behaviors (7,8). The sampling procedure is the same for both; a brush is inserted into the vagina to collect exfoliated cervical cells from the surface of the cervix for testing.(9) Cervical cancer is caused by persistent high-risk HPV	infection. Out of the more than 150 types of HPVs that are currently known, 14 are linked to cervical cancer, with Type 16 and 18 causing the majority (70%) of cervical cancers worldwide.(10) HPV infection is common among young, sexually active women. A local study in 2014 showed that the highest prevalence of HPV infection was in those aged 20–24 years (26.1%).(11) In Nigeria, a study revealed that, a little over half (51.8%) of the respondents had good knowledge about cervical cancer screening and vaccination with their sources mostly from school teachings (12) However, some authors ascertained that knowledge of cervical cancer screening is likely not to translate into utilization of screening services in a sense that, their participants were found to have adequate knowledge on cervical cancer but had poor attitude towards the screening
www.worldwidejournals.com	49

(13)

Some researchers in Hungary identified that some of their participants had poor knowledge regarding CCS and Vaccination (14)

In addition, more than half of women in one study gave incorrect answers for the benefits of the Pap smear such as cleaning of the womb, treatment of sexually transmitted infection and infertility (15)

The single most important etiological agent of cervical cancer is infection by high-risk Human Papillomavirus (HPV) (16)

Indeed, persistent infection with high-risk HPV types is responsible for up to 99.7% of cervical cancer cases (17)

The link between HPV and cervical cancer was established in the last 30 years based on the detection of HPV type 16 in cervical cancer tissue by Harald zur Hausen (18)

HPV is estimated to infect around 291 million women worldwide, with a particularly higher prevalence in women younger than 25 years (19)

The estimated worldwide prevalence of HPV among women with normal cytology is 11.7%, but there is considerable geographic variation with sub-Saharan Africa having the highest HPV prevalence (24.0%) (20)

Human papillomavirus prevalence, viral load and pre-cancerous lesions of the cervix in women initiating highly active antiretroviral therapy in South Africa: a cross-sectional study

This study was conducted during a large-scale cervical cancer awareness lesson at Vignan University, Guntur, India, on March 18, 2023, which significantly improved participants' awareness and preventive intentions. We aimed to explore how gynecological symptoms influence cervical cancer awareness, HPV vaccination, and screening uptake among women of reproductive age, and to assess the role of the educational intervention in amplifying these outcomes.

Objectives

1. To evaluate the association between gynecological symptoms (abnormal menstruation and pelvic pain) and cervical cancer awareness, screening, and HPV vaccination uptake.
2. To assess the impact of a cervical cancer awareness lesson on awareness and preventive practices.
3. To examine variations in awareness and preventive behaviors by socio-demographic factors (age, education, socioeconomic status).

METHODS

Study Design

This cross-sectional study assessed associations between gynecological symptoms and cervical cancer awareness, screening, and vaccination uptake, while evaluating the impact of an educational intervention.

Study Setting And Duration

The study was conducted at Vignan University, Guntur, Andhra Pradesh, India, during a cervical cancer awareness lesson on March 18, 2023. Data collection occurred on the same day.

Study Population And Sample

Of 3,465 attendees, 3,157 women aged 15–49 (91.1% response rate) were included using convenience sampling. Inclusion criteria were informed consent and willingness to participate. Exclusion criteria included women diagnosed

with cervical cancer or with immediate family members (parents/siblings) diagnosed with cervical cancer.

Outcome Variables

- **Primary Outcome:** Association between gynecological symptoms (abnormal menstruation, pelvic pain) and cervical cancer awareness (categorized as high [$\geq 75\%$] or low [$< 75\%$] based on a 12-question survey).
- **Secondary Outcomes:** Association of symptoms with HPV vaccination status and Pap smear screening; changes in awareness and willingness for vaccination and screening post-intervention.

Intervention

The intervention was a cervical cancer awareness lesson delivered during the event. Pre-intervention surveys were completed before the lesson, and post-intervention surveys immediately after.

Study Instrument

A self-designed, pre-tested, semi-structured questionnaire collected data on socio-demographics (age, education, socioeconomic status), gynecological symptoms (abnormal menstruation [bleeding > 7 days], pelvic pain), cervical cancer awareness (12 questions), and preventive practices (HPV vaccination status, Pap smear history, willingness for vaccination and screening). Awareness was scored as high ($\geq 9/12$ correct, $\geq 75\%$), moderate (6–8 correct, 50–74%), or low (≤ 5 correct, $< 50\%$).

Data Collection

Surveys were distributed after a briefing on the study's purpose and ethical considerations. Informed consent was implied by submission of completed forms. Study personnel ensured form completeness and participant eligibility.

Ethical Considerations

Ethical clearance was obtained from the Institutional Ethics Committee (IEC). Participants were informed of their right to withdraw, and data confidentiality was maintained.

Statistical Analysis

Data were entered into Microsoft Excel and analyzed using IBM SPSS Statistics v.20. Descriptive statistics (frequencies, percentages) summarized socio-demographics, symptoms, and preventive practices. Chi-square tests assessed associations between gynecological symptoms and awareness, vaccination, and screening. Paired t-tests compared pre- and post-intervention awareness scores. Subgroup analyses by age, education, and socioeconomic status used ANOVA and chi-square tests. Significance was set at $p < 0.05$.

RESULTS

The study included 3,157 women, predominantly aged 15–24 (90.3%, $n=2,850$), with 7.5% ($n=237$) aged 25–34 and 2.2% ($n=70$) aged 35–49 (Table 1). Educationally, 53.8% ($n=1,698$) held B.Tech. degrees, 19.3% ($n=608$) had general degrees, 12.1% ($n=381$) were postgraduates, 3.8% ($n=121$) were M.B.B.S. graduates, and 3.4% ($n=106$) were illiterate (Table 2). Socioeconomic status was balanced, with 23.0% ($n=727$) upper class, 20.4% ($n=645$) upper middle class, 20.1% ($n=636$) lower middle class, 20.5% ($n=648$) upper lower class, and 15.9% ($n=501$) lower class (Table 3).

Gynecological Symptoms And Associations

Gynecological symptoms were prevalent, with 22.8% ($n=721$) reporting abnormal menstruation (bleeding > 7 days) and 35.2% ($n=1,112$) reporting pelvic pain. Table 4 summarizes associations with awareness, vaccination, and screening. Women with abnormal menstruation had significantly higher awareness (62.7% vs. 54.2%, $p < 0.0001$), HPV vaccination rates (10.5% vs. 7.2%, $p = 0.03$), and Pap smear screening rates (11.0% vs. 7.3%, $p = 0.02$) compared to those

with normal menstruation. Women with pelvic pain had higher vaccination (10.1% vs. 6.8%, $p=0.001$) and screening rates (10.8% vs. 6.7%, $p<0.0001$) than those without, but awareness differences were not significant (44.7% vs. 43.4%, $p=0.492$).

Table 1: Age Distribution Of Study Participants (N=3,157)

Age Group	Frequency	Percentage
15–24 years	2,850	90.3%
25–34 years	237	7.5%
35–49 years	70	2.2%
Total	3,157	100%

Table 2: Education Of Study Participants (N=3,157)

Education Level	Frequency	Percentage
M.B.B.S.	121	3.8%
PG (any branch)	381	12.1%
Degree	608	19.3%
B.Tech.	1,698	53.8%
Intermediate	102	3.2%
School	141	4.5%
Illiterate	106	3.4%
Total	3,157	100%

Table 3: Socioeconomic Status of Study Participants (N=3,157)

Socioeconomic Status	Frequency	Percentage
Upper class	727	23.0%
Upper middle class	645	20.4%
Lower middle class	636	20.1%
Upper lower class	648	20.5%
Lower class	501	15.9%
Total	3,157	100%

Table 4: Association of Gynecological Symptoms with Cervical Cancer Awareness, Vaccination, and Screening Uptake (N=3,157)

Symptomatology	Awareness	Vaccination (HPV)	Screening (Pap Smear)	Total
	High (%)	Low (%)	Yes (%)	No (%)
Menstruation				
Abnormal	452 (62.7%)	269 (37.3%)	76 (10.5%)	645 (89.5%)
Normal	1,320 (54.2%)	1,116 (45.8%)	175 (7.2%)	2,261 (92.8%)
Total	1,772	1,385	251	2,906
p-value	<0.0001		0.03	
Pelvic Pain				
Present	497 (44.7%)	615 (55.3%)	112 (10.1%)	1,000 (89.9%)
Absent	888 (43.4%)	1,157 (56.6%)	139 (6.8%)	1,906 (93.2%)
Total	1,385	1,772	251	2,906
p-value	0.492		0.001	

Impact Of Educational Intervention

The awareness lesson significantly improved outcomes. Pre-lesson, only 11.6% ($n=367$) had high awareness ($\geq 75\%$), with 46.1% ($n=1,456$) moderate and 42.3% ($n=1,334$) low. Post-lesson, high awareness rose to 58.3% ($n=1,841$), with moderate at 27.5% ($n=867$) and low at 14.2% ($n=449$) ($p<0.001$). Willingness for HPV vaccination increased from 38.9% ($n=1,227$) to 78.2% ($n=2,469$), and for screening from 37.6% ($n=1,186$) to 86.1% ($n=2,717$) ($p<0.001$). Awareness test scores improved from a mean of 4.28 (± 2.66) to 9.21 (± 2.43) ($t=48.874$, $p<0.0001$). Subgroup analyses showed significant improvements across all education levels (e.g., M.B.B.S.: 6.21 $\pm$ 3.34 to 11.89 $\pm$ 1.29; illiterate: 3.05 $\pm$ 2.95 to 5.71 $\pm$ 2.65; $p<0.0001$) and socioeconomic groups (e.g., upper class: 5.41 $\pm$ 2.69 to 10.75 $\pm$ 2.36; $p<0.0001$).

DISCUSSION

This cross-sectional study, conducted during a cervical cancer awareness event at Vignan University, Guntur, India, on

March 18, 2023, with 3,157 women, provides novel insights into the role of gynecological symptoms in shaping cervical cancer awareness and preventive behaviors in South India. Women with abnormal menstruation (bleeding >7 days) demonstrated significantly higher awareness (62.7% vs. 54.2%, $p<0.0001$), HPV vaccination rates (10.5% vs. 7.2%, $p=0.03$), and Pap smear screening rates (11.0% vs. 7.3%, $p=0.02$) compared to those with normal menstruation. Similarly, women with pelvic pain reported higher vaccination (10.1% vs. 6.8%, $p=0.001$) and screening rates (10.8% vs. 6.7%, $p<0.0001$), but no significant difference in awareness (44.7% vs. 43.4%, $p=0.492$). These findings suggest that symptoms, particularly abnormal menstruation, prompt health-seeking behavior, increasing exposure to cervical cancer education and preventive services. Harlow et al., noted that menstrual disorders, with prevalence ranging from 4% to 53% for menorrhagia and 17% to 90% for dysmenorrhoea in developing countries, often lead to medical consultations (7).

Similarly, Harlow et al., found that 25%–50% of college women experience menstrual cramps, supporting the high prevalence of pelvic pain (35.2%) in our sample and its association with preventive actions (8).

The educational intervention significantly enhanced outcomes, with high awareness ($\geq 75\%$ correct answers on a 12-question survey) rising from 11.6% ($n=367$) to 58.3% ($n=1,841$), moderate awareness at 27.5% ($n=867$), and low awareness at 14.2% ($n=449$) post-intervention ($p<0.001$). Willingness for HPV vaccination increased from 38.9% ($n=1,227$) to 78.2% ($n=2,469$), and for screening from 37.6% ($n=1,186$) to 86.1% ($n=2,717$) ($p<0.001$). Mean awareness scores improved from 4.28 (± 2.66) to 9.21 (± 2.43) ($t=48.874$, $p<0.0001$), with gains across all education levels (e.g., M.B.B.S.: 6.21 $\pm$ 3.34 to 11.89 $\pm$ 1.29; illiterate: 3.05 $\pm$ 2.95 to 5.71 $\pm$ 2.65; $p<0.0001$) and socioeconomic groups (e.g., upper class: 5.41 $\pm$ 2.69 to 10.75 $\pm$ 2.36; $p<0.0001$). This success aligns with findings from WHO and Campos et al., who emphasize educational interventions as critical for improving prevention in low-resource settings (25,26).

Aswathy et al., studied 809 women in rural Kerala, finding that 72.1% had heard of cervical cancer, with 74.2% aware of early detection, but only 5.8% could name the Pap test, and 6.9% had been screened (23).

Our lower baseline awareness (11.6%) likely reflects our stricter criterion ($\geq 75\%$ correct answers, combining moderate and low categories for symptom analyses) compared to their simpler measure, though our screening rate (8.2%) and willingness (37.6% vs. 32.6%) are comparable, highlighting persistent low uptake in India (23).

Similarly, in another study found that 33.3% of Kenyan women had heard of cervical cancer, with 14.3% screened, compared to our 8.2% screening rate, suggesting that our rigorous awareness definition (high: $\geq 75\%$) accounts for the discrepancy, while both studies confirm awareness as a predictor of screening uptake (27)

The study's predominantly young (90.3% aged 15–24) and educated (53.8% B.Tech.) sample aligns with trends noted by Marmot et al., and Cutler et al., linking higher education and socioeconomic status to greater health awareness (28).

However, baseline vaccination (8.0%) and screening rates (8.2%) were low, reflecting India's challenges with access and cost barriers. Bruni et al., estimated HPV vaccination coverage at 13.2% in lower-middle-income countries, higher than our 8.0%, likely due to our university-based sample not reflecting national trends (4).

Post-intervention, our vaccination willingness (78.2%)

suggests educational efforts could bridge this gap (4).

Sankaranarayanan et al., showed that a single round of HPV screening in rural India reduced cervical cancer incidence by 31% and mortality by 25%, underscoring the need for increased screening uptake, as our study's 86.1% screening willingness post-intervention indicates potential for similar impacts if translated into action (5).

The lack of association between pelvic pain and awareness ($p=0.492$) suggests that while symptoms drive preventive actions, they may not always lead to cervical cancer-specific awareness, possibly due to varied causes of pelvic pain, as noted by Murillo et al., (22).

This finding is consistent with Kivuti-Bitok et al., who observed that symptoms like pelvic pain may prompt medical visits but not necessarily targeted education (24).

The study's strengths include its large sample size ($N=3,157$) and high response rate (91.1%), enhancing statistical power and reliability. The focus on gynecological symptoms as predictors of cervical cancer awareness and preventive behaviours offers a novel contribution, addressing a gap in the literature. Transparent reporting of non-significant findings (e.g., pelvic pain and awareness) reduces publication bias and strengthens credibility. However, limitations include self-reported data, which may introduce recall or social desirability bias, potentially affecting the accuracy of reported symptoms and practices. The university-based sample, predominantly young and educated, may limit generalizability to rural or less-educated populations. The lack of long-term follow-up prevents assessment of sustained behaviour change, and the study did not differentiate between chronic and transient symptoms, which could influence outcomes. The global context of cervical cancer, with 604,000 new cases and 342,000 deaths in 2020, 90% in low- and middle-income countries, underscores the urgency of addressing these barriers (1,2).

These findings highlight the critical role of gynecological symptoms in driving health-seeking behavior and the efficacy of educational interventions in enhancing cervical cancer awareness and preventive intentions. Integrating cervical cancer education into routine gynecological care could leverage existing healthcare interactions to promote prevention, particularly for symptomatic women and less-educated groups (e.g., illiterate participants with post-test scores of 5.71 ± 2.65). Sustained, targeted educational programs, coupled with improved access to vaccination and screening, are essential to align with WHO goals for 90% vaccination and 70% screening coverage by 2030 (2).

Future research should explore the mechanisms linking symptoms to preventive behaviours and assess long-term impacts of educational interventions on actual uptake, building on evidence from de Sanjose et al., and the National Cancer Institute that HPV vaccination and screening are critical for reducing cervical cancer burden (3,6).

CONCLUSION

Gynecological symptoms, particularly abnormal menstruation, are significantly associated with higher cervical cancer awareness, HPV vaccination, and Pap smear screening uptake. The educational intervention markedly improved awareness and preventive intentions across all demographic groups, underscoring its potential in public health strategies. Sustained, targeted educational programs, coupled with improved access to vaccination and screening, are critical to reducing cervical cancer burden in India. As the world observes International Women's Day, India's interim Union Budget 2024-25 has emerged as a beacon of hope, particularly in the realm of women's health. Encourage the vaccination of girls from 9-14 years against cervical cancer

stands out as a pivotal move towards safeguarding women's well-being.

Cervical Cancer: 'Prevent the preventable and kill it before it kills you'

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