

Original Research Article

Evaluating the impact of Pap smear screening on cervical cancer prevention in tribal women

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ABSTRACT

Background: Cervical cancer is one of the most preventable cancers, yet it remains a major cause of morbidity and mortality in tribal communities due to limited access to healthcare and poor screening uptake. Early detection through Pap smear screening significantly reduces the disease burden.

Methods: A community-based cross-sectional study was conducted from January 2022 to December 2022 at Dr. N. Y. Tasgaonkar Institute of Medical Science (NYTIMS), Karjat, Maharashtra, India, to assess the impact of Pap smear screening on cervical cancer prevention in tribal women aged 25-65 years. Demographic data, screening participation, and follow-up outcomes were collected and analyzed.

Results: Of 1,000 eligible women, 750 (75%) underwent Pap smear screening. Participation was influenced by age, education, and prior health education. Among screened women, 85% had normal results, 12% had minor cytological abnormalities, and 3% showed significant precancerous changes requiring further management. Cervical cancer incidence decreased by 35%, and mortality was 50% lower among the screened population.

Conclusions: Pap smear screening substantially reduces cervical cancer incidence and mortality in tribal populations. Improving awareness, addressing cultural barriers, and expanding mobile screening services are critical to increasing participation and ensuring timely intervention.

Keywords: Cervical cancer, Early detection, Pap smear, Public health, Screening, Tribal women

INTRODUCTION

Cervical cancer remains a significant public health challenge, with an estimated 570,000 new cases and 311,000 deaths annually worldwide.¹ In India, it is the second most common cancer among women, accounting for a substantial proportion of cancer-related morbidity and mortality.² Despite being largely preventable through screening and vaccination, many cases in low- and middle-income countries are detected at advanced stages due to inadequate screening infrastructure and poor awareness.³

Tribal populations represent one of the most underserved and vulnerable groups, facing additional barriers such as poor access to healthcare facilities, cultural taboos, low literacy, and socioeconomic constraints.⁴ As a result, screening uptake among tribal women remains critically low.

The Papanicolaou (Pap) smear is a simple, cost-effective, and reliable method for detecting precancerous and cancerous lesions of the cervix.⁵ Community-based programs consistently demonstrate that regular Pap smear screening significantly reduces cervical cancer incidence and mortality.^{6,7}

This study evaluates the effectiveness of Pap smear screening in reducing cervical cancer incidence and mortality among tribal women by analyzing participation rates, cytological outcomes, and follow-up adherence.

METHODS

Study design and setting

This community-based cross-sectional study was conducted from January 2022 to December 2022 at Dr. N. Y. Tasgaonkar Institute of Medical Science (NYTIMS), Karjat, Maharashtra, India, and nearby tribal communities.

Study population

Women aged 25-65 years residing in tribal areas were invited to participate. Written informed consent was obtained from all participants. The Institutional Ethics Committee of NYTIMS approved the study protocol.

Screening procedure

Trained healthcare professionals performed Pap smear tests during mobile clinics and outreach camps. Participants received health education on cervical cancer prevention. Abnormal findings were followed up with colposcopy and biopsy when indicated.

Data collection and analysis

Demographic characteristics, participation rates, cytology results, and follow-up outcomes were recorded. Statistical analysis was conducted using SPSS version 25. Descriptive statistics are presented as mean±SD or percentages. Chi-square tests assessed associations, with $p<0.05$ considered statistically significant.

RESULTS

A total of 1,000 tribal women were approached for Pap smear screening, of whom 750 (75%) participated in the study. The average age of participants was 38.5 years, and a majority (55%) had education below high school level (Table 1). Most women were married (90%) and had at least one child (60%), reflecting the typical reproductive-age population in this region.

Of the screened participants, 85% had normal cytology, 12% showed minor abnormalities such as ASC-US or LSIL, and 3% had significant precancerous changes (HSIL/CIN2+) requiring further evaluation (Table 2). This indicates that nearly one in seven screened women had cytological changes needing clinical attention.

Follow-up compliance among women with abnormal results was high (90%), demonstrating the effectiveness of local counselling and health education. A comparative review between screened and unscreened populations

showed a 35% reduction in cervical cancer incidence and a 50% decrease in mortality among screened women (Table 3). Furthermore, late-stage diagnosis rates were substantially lower in the screened group (18% vs 32%), indicating improved early detection outcomes due to screening.

Table 1: Demographic characteristics of study participants (n=750).

Characteristic	Value
Mean age (years)	38.5±8.4
Education <high school	55%
Married	90%
≥1 child	60%

Table 2: Pap smear results.

Cytology result	N (%)
Normal findings	638 (85)
Minor abnormalities (ASC-US/LSIL)	90 (12)
Significant changes (HSIL/CIN2+)	22 (3)

Table 3: Outcomes and impact of screening.

Outcome	Screened	Unscreened
Cervical cancer incidence (per 1000 women)	3.2	4.9
Late-stage diagnosis rate (%)	18	32
Cervical cancer mortality (per 1000 women)	1.0	2.0
Follow-up compliance for abnormal results (%)	90	-

DISCUSSION

The present study demonstrated that Pap smear screening substantially reduced cervical cancer incidence, mortality, and late-stage diagnosis among tribal women. The participation rate of 75% in this study is considerably higher than previous reports from rural India, where participation ranged between 45-60% (Gupta et al, Singh et al).^{10,4} This improvement may be attributed to the use of mobile screening clinics and focused community awareness initiatives.

The proportion of abnormal cytology (15%), including 3% high-grade lesions, aligns with earlier community-based studies by Shastri et al and Basu et al, which documented abnormal findings in 10-18% of screened women in low-resource settings. These similarities reinforce the consistency of cytological patterns across rural Indian populations.

Importantly, the follow-up compliance rate (90%) in the current study is notably higher than those reported in earlier Indian studies (typically 60-70%), reflecting the effectiveness of local counselling and referral networks.

Improved follow-up ensures that abnormal cases receive timely diagnosis and management, thereby reducing disease progression.

A 50% reduction in mortality among screened women in this study is comparable to findings from large-scale trials such as Sankaranarayanan et al and Shastri et al, both of which demonstrated significant survival benefits with organized screening programs.^{5,6} Collectively, these findings emphasize that structured screening and community outreach can bridge the healthcare gap in underserved tribal populations.

CONCLUSION

Pap smear screening is an effective and scalable strategy for cervical cancer prevention in tribal populations. Strengthening community outreach, addressing sociocultural barriers, and ensuring robust follow-up pathways are essential for sustaining long-term impact.

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