

Cervical Cancer

Audio-Visual Training Improves Awareness and Willingness of Cervical Cancer Screening among Healthy Indian Women: Findings from a Survey

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Abstract



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Objectives We evaluated the impact of a standardized, simple audio-visual (AV) training video developed in regional languages on cervical cancer awareness among apparently healthy women and their willingness to undergo regular cervical cancer screening.

Materials and Methods This cross-sectional noninterventive multicentric survey was conducted in 69 centers across 14 states in India and one center in UAE among women aged between 18 and 88 years attending clinics for a variety of indications. Using a short questionnaire, cervical cancer awareness and willingness to undergo cervical cancer screening were assessed before and after the AV training.

Statistical Analysis In addition to descriptive analysis, improvement in awareness after the AV training was assessed using McNemar's test, and comparison of responses between subgroups was performed using Pearson chi-squared test.

Results The survey was completed by 3,188 apparently healthy women (mean age: 36.8 ± 11.3 years). Before AV training, correct answers were given to only 4/6 questions by majority of the participants; most participants were unaware about the main cause of cervical cancer (1,637/3,188, 51.4%), availability of cervical cancer screening tests (1,601/3,188, 50.2%), and cervical cancer vaccines (1,742/3,188, 54.6%). Only 576 women (18.1%) had undergone cervical cancer screening in the past. After the AV training, the proportion of women correctly responding to all six questions improved significantly ($p < 0.05$), and 84.4% (2691/3188) women showed willingness to undergo periodic cervical cancer screening. Compared to unmarried and professional women, although married women and home-makers had lower awareness scores, the latter subgroups had more often undergone previous cervical cancer screening.

Conclusion It is possible to improve cervical cancer awareness among healthy women, and to enhance their willingness to undergo regular cervical cancer screening tests using a simple, six minute-long, standardized AV training material.

Keywords

- ▶ cervical cancer
- ▶ screening
- ▶ prevention
- ▶ awareness
- ▶ audio-visual training

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Introduction

Cancer of the uterine cervix is the second most common cancer among Indian women, contributing to nearly one-fifth of the global cervical cancer cases every year.¹ The burden of cervical cancer in India is on the rise: the number of new cases as per 2018 Globocan data was 96,922, and as per the 2020 Globocan, data was 123,907.^{2,3} Cervical cancer is also the second most frequent cause of mortality due to cancer among Indian women.⁴ Cervical cancer has been reported to significantly affect the health-related quality of life of women in India, often imposing financial burden, particularly on women belonging to the lower socioeconomic strata.^{5,6} Considering the high global disease burden, and realizing the importance of preventive approaches, the World Health Organization launched the Global Strategy to Accelerate the Elimination of Cervical Cancer in 2020. This strategy has outlined three key steps, namely vaccination, screening, and treatment, and has set targets for the year 2030 for each of the steps to lead the world toward the path of eliminating cervical cancer.⁷

Infection with human papillomavirus (HPV), specially HPV 16 and HPV 18, is the most important and common cause of intraepithelial neoplasia in the cervix and invasive cervical cancer.⁸ In majority of the cases, genital HPV infections are asymptomatic,⁹ and most women with cervical cancer often do not experience major symptoms until the disease reaches an advanced stage.¹⁰ Vaccination with HPV vaccines is emerging as the most effective option of preventing cervical cancer.¹¹ Bivalent and quadrivalent HPV vaccines are currently available and recommended by the Federation of Obstetric and Gynecological Societies of India.¹² Further, it is possible to easily detect cervical cancer and its precursor lesions through relatively noninvasive tests, and the disease is curable in the early stages.⁶ Therefore, regular screening of healthy women is important for detecting cervical cancer early. Among the various methods of cervical cancer screening, the Papanicolaou smear test is the most popular and widely used method.

Even though it is known that screening and vaccination among healthy women are two essential components for early detection and prevention, respectively, of cervical cancer, the uptake of both these steps has been low in India. Perhaps the most important factor leading to this observation is lack of awareness of the disease among the susceptible population, which leads to other risk factors of cervical cancer, such as sexual intercourse with multiple partners, early age of sexual intercourse, early age of giving birth, prolonged consumption of oral contraceptives, poor genital hygiene, malnutrition, and tobacco consumption. Other contributing factors for the low screening rates in Indian include an absence of a national campaign for cervical cancer screening in India, inability to afford the screening procedure, poor infrastructure, as well as certain traditional customs and taboos.^{1,13-17}

Realizing the central role played by lack of awareness in lowering early detection through screening thereby worsening cervical cancer rates, we were interested to evaluate the

extent to which a standardized educational module developed in regional languages can enhance the willingness of apparently healthy women belonging to the susceptible age group to undertake regular cervical cancer screening tests. Through this study, we also wanted to explore the baseline knowledge and attitudes of apparently healthy women about cervical cancer and its screening.

Methodology

Study Setting, Study Participants, Methodology

This cross-sectional, noninterventional, multicentric survey was conducted between March 2021 and June 2021 in 68 centers spread across 14 states in India and one site from UAE. For this survey, we included women who were aged 18 years and above, either married or unmarried, who were visiting the participating clinics for a variety of indications, and willing to participate in the survey.

After collecting the basic demographic details, consenting participants were asked six questions pertaining to their knowledge about cervical cancer screening and vaccination. After this, an educational video was shown to the participants, followed by an interactive session wherein the participants clarified their doubts. Subsequently, they were asked the same six questions in a separate sheet, along with an additional question to assess the willingness of the participants to undergo periodic screening for cervical cancer, after attending the audio-visual (AV) training, to measure the impact of the whole exercise. The entire process took 10 to 15 minutes on average to complete.

The video used for this study was 6 minutes long, and contained information about cervical cancer: disease burden, symptoms, treatment, prognosis, vaccination, and importance of early detection through screening. The content of the video was developed by Dr. Priya Ganesh Kumar in English language. The video was translated into six languages (Marathi, Hindi, Tamil, Telugu, Kannada, and Malayalam) with the help of doctors who are native speakers of the languages so that the integrity of both the content and language is maintained. It was ensured that all information in the video was presented in simple terms, avoiding difficult medical terminology, and in local languages. The translated versions of the videos were also validated for their accuracy.

The questionnaire used for this survey is available as [Supplementary Table S1](#) (available online only), and the standardized video used for providing AV training is available from the corresponding author on reasonable request.

Data Handling, Statistical Analysis, Data Availability

All collected data was entered electronically into Microsoft Excel. After data cleaning and reconciliation for missing data, all demographic details were analyzed descriptively. Each question that was answered correctly was given one point, and the average awareness scores of the participants before and after the AV training were compared using McNemar's test. Subgroup analyses pertaining to the baseline awareness scores among women with different educational background, marital status, socioeconomic status, and occupation were

performed using Pearson chi-squared test, for estimating the profile of women who would benefit the most from the AV training about cervical cancer screening. Microsoft Excel was used for statistical analysis, and *p*-values <0.05 were considered statistically significant. All datasets leading to the conclusions of the present study are available from the corresponding author on reasonable request.

Ethics Committee and Informed Consents

The study was performed by taking into consideration the principles of conduct of human studies as enshrined in the Declaration of Helsinki and all other relevant guidelines. All women who participated in the survey did so only after explicitly providing consent after being explained in detail about the study process, and were aware that the information collected will be used for drafting a research paper. Since this noninterventional multicentric survey included simple questions pertaining to awareness of healthy women about cervical cancer, and since no identifying information or medical data were collected as part of the survey, ethics committee permission was not deemed necessary by the investigators.

Results

Baseline Demographics

The survey was answered by a total of 3,188 apparently healthy women visiting participating clinics located in urban centers in India, with the mean age of 36.8 ± 11.3 years. The demographic details of the participants of the survey are summarized in **Table 1**. Majority of the women (2,840/3,188; 89.1%) were educated, and 38.5% (1,228/3,188) had completed postgraduation. Most women were married (2,671/3,188; 83.8%), were homemakers (1,921/3,188; 60.2%), and belonged to middle socioeconomic class (2,101/3,188; 65.9%). History of cervical cancer screening was given only by 576 (18.1%) of the 3,188 participants. Out of the various factors perceived by the participants as barriers that prevented them from undergoing cervical cancer screening in the past, the most frequent reason was an absence of symptoms (646/3,188; 20.3%).

Awareness of Survey Participants before and after the Audio-Visual Training

The key findings of the impact of AV training on cervical cancer awareness are provided in **Table 2**. Prior to the AV training, correct answers were given by the majority of the participants only for four out of the six questions in the questionnaire, and over half of the participants were unaware of the presence of a vaccine against cervical cancer (1,742/3,188; 54.6%) and about screening tests for detecting cervical cancer (1,601/3,188, 50.2%). A large proportion of participants (1,637/3,188, 51.4%) were unaware that infection was the main cause of cervical cancer. After the AV training, the proportion of women giving correct responses improved significantly in all six questions (*p* < 0.05), with four questions (those pertaining to the cause of cervical cancer, existence of screening tests and vaccines against

Table 1 Baseline demographic characteristics of the study participants

Parameter	Description
Age in years (mean ± SD)	36.8 ± 11.3
Education (N, %)	1,228 (38.5%)
• Postgraduation	1,612 (50.6%)
• Graduation	190 (6.0%)
• Others	158 (5.0%)
• No response	
Marital status (N, %)	2,858 (89.6%)
• Married	304 (9.5%)
• Unmarried	26 (0.8%)
• No response	
Occupation (N, %)	1,920 (60.2%)
• Homemaker	1,089 (34.2%)
• Working professional	33 (1.0%)
• Student (college)	146 (4.6%)
• No response	
Economic status (N, %)	125 (3.9%)
• High	2,101 (65.9%)
• Middle	631 (19.8%)
• Low	331 (10.4%)
• No response	
Cervical cancer screening in the past	576 (18.1%)
• Yes	2,558 (80.2%)
• No	54 (1.7%)
• No response	
Barriers preventing regular cervical cancer screening in the past	1,773 (55.6%)
• No symptoms	646 (20.3%)
• Unaware of screening and whom to approach	176 (5.5%)
• Fear of diagnosis of cancer	139 (4.4%)
• Fear/ anxiety of pain	100 (3.1%)
• Don't know	56 (1.8%)
• Multiple reasons	298 (9.3%)
• No response	
Overall	3,188

Abbreviation: SD, standard deviation.

cervical cancer, and the correct modality of cervical cancer screening) having over 75% correct responses. Even after the training, it appeared that many participating women were not able to understand that cervical cancer screening can be performed even when the woman is not having any pointing symptoms.

After the AV training, as many as 84.4% (2,691/3,188) of the participating women were willing to undergo cervical cancer screening periodically, with only 395 women (12.4%) not showing such a willingness; 102 women (3.2%) did not respond to this question. This is a major improvement from the number of participating women (*N* = 576, 18.1%) who had undergone cervical cancer screening at least once in the past.

Subgroup Analysis: Baseline Awareness Levels among Participants with Different Features

When we compared the results of the survey between women who had completed their graduation (*N* = 1,612)

Table 2 Impact of audio-visual training on cervical cancer awareness among a cohort of women

Questions and responses ^a	Before training (N, %)	After training (N, %)	Percent change	p-Value ^a
1. Most important cause of cervical cancer				
• Infection [correct response]	1,410 (44.2%)	2,501 (78.5%)	+34.2%	<0.05
• Hereditary	286 (9.0%)	83 (2.6%)	-6.4%	
• Infection and hereditary	2(0.1%)	0 (0%)	-0.1%	
• Don't know	1,349 (42.3%)	451 (14.1%)	-28.2%	
• No response	141 (4.4%)	153 (4.8%)	+0.4%	
2. Awareness about vaccines against cervical cancer				
• Yes [correct response]	1,385 (43.4%)	2,702 (84.8%)	+41.3%	<0.05
• No	1,742 (54.6%)	423 (13.3%)	-41.4%	
• No response	61 (1.9%)	63 (2.0%)	+0.1%	
3. Awareness about cervical cancer screening tests				
• Yes [correct response]	1,534 (48.1%)	2,744 (86.1%)	+38.0%	<0.05
• No	1,601 (50.2%)	392 (12.3%)	-37.9%	
• No response	53 (1.7%)	52 (1.6%)	-0.0%	
4. Cervical cancer screening should be undertaken for women having health complaints only				
• No [correct response]	1,672 (52.4%)	2,100 (65.9%)	+13.4%	<0.05
• Yes	1,451 (45.5%)	1,007 (31.6%)	-13.9%	
• No response	65 (2.0%)	81 (2.5%)	+0.5%	
5. Cervical cancer screening should not be undertaken for women with no health complaints				
• No [correct response]	1,726 (54.1%)	2,067 (64.8%)	+10.7%	<0.05
• Yes	1,374 (43.1%)	1,027 (32.2%)	-10.9%	
• No response	88 (2.8%)	94 (2.9%)	0.2%	
6. Cervical cancer screening is done by				
• Cervical swab [correct response]	1,725 (54.1%)	2,738 (85.9%)	+31.8%	<0.05
• Urine test	282 (8.8%)	53 (1.7%)	-7.2%	
• Ultrasonography	509 (15.6%)	149 (4.7%)	-10.9%	
• Blood test	239 (7.5%)	109 (3.4%)	-4.1%	
• All	73 (2.3%)	6 (0.2%)	-2.1%	
• Don't know	201 (6.3%)	0 (0.0%)	-6.3%	
• No response	159 (5.0%)	133 (4.2%)	-0.8%	

^aThe correct/optimal response for each question is highlighted.

[#]Comparison was done between the correct response and a pool of all the other responses, before and after the audio-visual training, using McNemar's test.

and postgraduation ($N=1,228$), we observed that a higher proportion of postgraduate women gave correct responses for all six questions, out of which statistical significance was observed in five questions, the exception being awareness of screening tests for cervical cancer; however, there was no significant difference among the two subgroups with respect to past cervical cancer screening. Next, when compared to married women ($N = 2,858$), a higher proportion of unmarried women ($N = 304$) gave correct answers for all six questions out of which statistical significance was seen in five, the exception being the question pertaining to the cause of cervical cancer; however, a significantly higher proportion of married women (19.42%) had undergone cervical cancer screening in the past compared to unmarried women (6.25%, $p < 0.05$ vs. married women). With respect to occupation, while students ($N = 33$) more frequently observed that cervical cancer should not be undertaken for symptomatic women only, the other five questions were more frequently

answered correctly by working women ($N = 1,089$); however, a higher proportion of homemakers (16.50% of the 1,920 home makers) had undergone cervical cancer screening in the past. Finally, women belonging to higher economic status ($N = 125$) had higher awareness about all parameters in the survey, compared to women from middle ($N = 2,101$) and low ($N = 631$) economic status, and also had more frequently undergone screening for cervical cancer in the past (34.4% of women from high economic status, vs. 16.8 and 20.8% women, respectively, from middle and low economic status). Thus, women who were well-educated and from a higher economic status were more aware about cervical cancer and its screening, and had more frequently been screened for cervical cancer in the past; married women and home makers had lower awareness scores about cervical cancer screening compared to other subgroups, but had more frequently undergone cervical cancer screening (**-Fig. 1A-D; -Supplementary Tables S2-S5**, available online only).

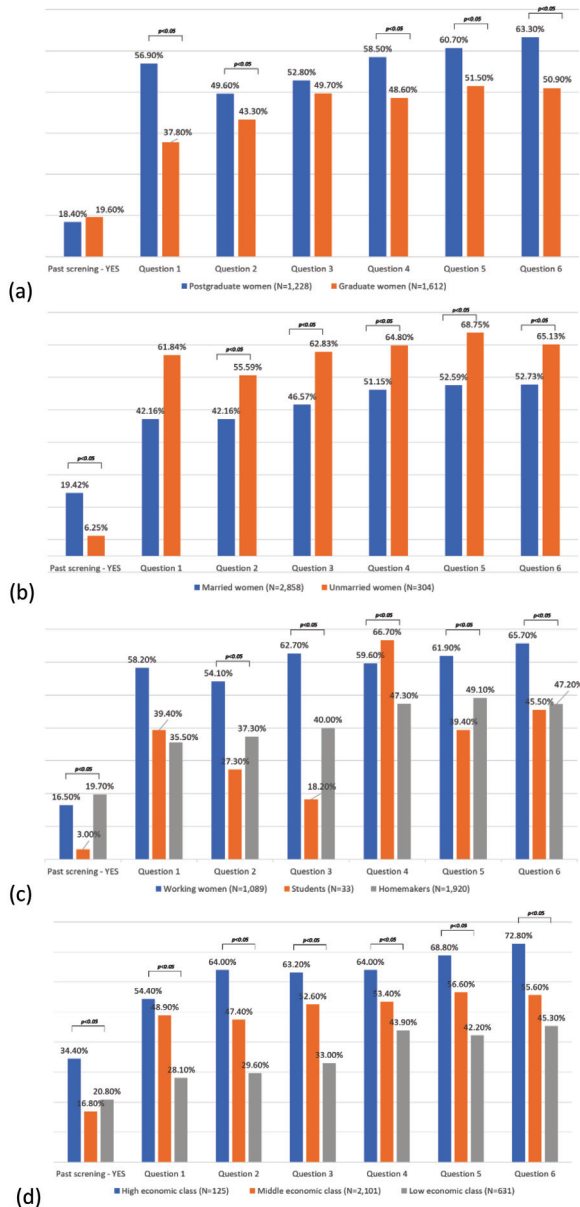


Fig. 1 Baseline awareness about cervical cancer screening among different subgroups: (A) postgraduate vs graduate women; (B) married vs unmarried women; (C) different occupational status; and (D) different economic status. **Note:** $p < 0.05$ suggests statistically significant difference. **Question 1:** What is the cause of cervical cancer? Answering as “Infection”; **Question 2:** Are you aware of availability of vaccines for cervical cancer? Answering as “Yes”; **Question 3:** Are you aware of cervical cancer screening tests? Answering as “Yes”; **Question 4:** Cervical cancer screening should be undertaken for women having health complaints only. Answering as “No”; **Question 5:** Cervical cancer screening should not be undertaken for women having no health complaints. Answering as “No”; **Question 6:** Cervical cancer screening examination is done by: Answering as “Cervical Swab.”

Discussion

Cervical cancer vaccination and screening programs that were implemented in developed countries have been successful in lowering the rates of cervical cancer incidence and mortality.^{18,19} Despite these clear and confirmed benefits,

the uptake rates for vaccination and screening programs for cervical cancer remain a challenge in low-income countries, including India.²⁰ Findings from a secondary data analysis of the National Family Health Survey-4 from 2015 and 2016 in India showed only 30% of 336,777 women aged between 30 and 49 years reporting to have ever undergone cervical cancer screening.²¹

Various barriers have been reported to be responsible for such low rates of cervical cancer screening in India. The cultural taboo in India surrounding the disease prevents a free discussion about the condition. In many regions, cervical cancer is perceived as a “traditional” disease,²² often labeling the excessive vaginal bleeding as a normal part of menstruation and an obligation that every woman faces in her life. The illness is also believed to be treatable with self-medication at home, thus not warranting a visit to the doctor that might “waste money and time.”²² Other major barriers include the fear of revealing private parts, especially to a male healthcare practitioner, the lack of family support,^{14,22,23} the fear of the examination procedure, the fear to undergo a test, particularly the one detecting cancer, in the absence of symptoms.^{24,25} Next, economic limitations direct women toward self-neglect of their health issues, often by curtailing their expenses in the form of time and money in visiting the screening health facilities.^{14,22,23} Logistical and technical barriers, such as lack of trained staff and infrastructure at the grassroots level, quality assurance, repeat screening/testing, and economic barriers, affect the feasibility of traditional, cytology-based examinations for screening programs in India.^{26,27}

Perhaps the main underlying factor for most of these barriers pertains to the low awareness about the disease among the general public; provision of extensive, accessible, and sensitive public health education surrounding the disease, its screening, and prevention is thus essential to ensure an increased screening uptake in India.²⁸ It is important to utilize popular mass media, commercials, and social media campaigns to achieve this.^{14,22,23} Particularly in rural areas, trained nonmedical personnel, such as social healthcare workers, preferably females, can also act as a critical link for raising awareness. Appropriate health infrastructure must be built up across urban and rural India to screen and treat women sufficiently and efficiently. Systematized screening programs will encourage the government to monitor program participation, processes, and outcomes, along with referral pathways and follow-ups.^{29,30}

In this background, the findings of our study provide a significant contribution to the growing literature surrounding this disease area. It has been possible for us to significantly improve the baseline awareness about cervical cancer and its screening and prevention among a sample of apparently healthy Indian women, using a six-minute-long standardized AV training material delivered using simple language. Our study results also show that, with the improved awareness of the participants, it is possible to improve their willingness to undergo regular cervical cancer screening tests. The training that we imparted included AV components, which have contributed to a better

improvement of awareness; thus, the effort that went into the preparation of the training material was rewarded with a significant behavioral and cognitive change among the participants. It is possible that such a change in health-related behavior could translate to increased adaptation of risk reduction behavior, for example, tobacco awareness. Additionally, in our study, while married women and home makers were observed to have a lower awareness score compared to unmarried and professional women pertaining to cervical cancer screening, the former subgroups were observed to have more frequently undergone previous cervical cancer screening than the latter subgroup.

Our findings are in sync with similar studies done in the past. In a 2014 study conducted in rural Puducherry, it was reported that better education and occupation influenced the awareness of cervical cancer screening significantly.²⁸ In another community-based study in rural Kerala (India), almost three-fourth of the study population (74.2%) was reportedly aware of cervical cancer and its screening.³¹ Another cross-sectional study from Haryana, North India, reported majority of women from rural setting to lack knowledge about cervical cancer and screening, when compared to those from the urban setting.³² Thus, imparting disease information through simple, jargon-free language, preferably in AV mode, can enhance the awareness about cervical cancer, and through our survey, it appears that such a training session is most likely to be successful in unmarried women with little to no education, and among women belonging to middle and lower socioeconomic strata.

In addition to health education, two additional steps that need to be implemented across India include subsidized cervical cancer screening and HPV vaccination camps for all eligible women, through a nationwide screening drive and vaccination program. Both HPV vaccination and cervical cancer screening, when compared with no vaccination and no screening, have been shown to be cost-effective, yielding significant health benefits.³³ The important factors to successfully facilitate cervical cancer screening and vaccination include adequate training of involved personnel, optimum resource allocation, and appropriate infrastructure. Finally, as identified by our study, it is essential to impart educational programs to women who are likely to benefit the most from early screening programs, such as unmarried women, women with poor education, and women belonging to middle and lower socioeconomic strata.

The most important strength of our study was that the training was imparted in AV format instead of a printed pamphlet, and the training video did not use medical terminologies that are difficult to comprehend. We also ensured accurate translation of the educational material into regional languages, and perhaps this is the reason for the observed improvement in awareness and willingness to undergo regular screening among women from all subgroups that participated in our study. However, our study is not without limitations. The study design was a cross-sectional study, and the heterogeneity in the data collected due to the diversity of the pan-India population might have impacted the results.

The data collection process was not totally uniform, and we did not identify and remove the effects of confounders.

Conclusions

Our study shows that a well-designed educational module, developed jargon-free in regional languages and delivered in an AV format, improves the awareness among the susceptible population about the importance of cervical cancer screening, as well as enhances the willingness of healthy women to undergo periodic screening tests, indirectly hinting that the entire exercise was successful in alleviating fears about cervical cancer screening among the participants. Enhancement of awareness, improvements in willingness to undergo screening, and reduction in anxiety around screening, using techniques such as the one reported in our study, are crucial for the success of mass-scale programs aimed at cervical cancer screening in India.

Author's Contribution

Dr Priya Ganeshkumar was involved in conceptualization, methodology, data collection, curation, and analysis, and writing of original draft and final draft.

Ethical Committee Approval

Since this is a multicentered survey of healthy women and no intervention was performed, and since no identifying information was obtained from the participants, ethics committee approval is not deemed necessary. The entire research was performed with full conformation to the ethical principles enshrined in the Declaration of Helsinki and all other relevant applicable guidelines. Written informed consent was obtained from all participants prior to their enrolment into the study, and participant information was kept completely confidential.

Conflicts of Interest

None.

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