

Indian Women and the Risk of Cervical Cancer: A Cross-Sectional Study

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Abstract

Background: Cervical cancer is characterized by the unusual growth of cells in the cervix. It accounts for about 25% of deaths in India; due to lack of knowledge, poor practice, and a negative attitude, diagnosis tends to arise at later stages of the disease. The main objective of our study was to evaluate cervical cancer knowledge, attitude, and practice (KAP) and to assess the relationship between educational status with knowledge and attitude toward cervical cancer.

Method: An online survey-based cross-sectional study was conducted among Indian women using a self-generated questionnaire for a period of six months. Cervical cancer awareness measure (C-CAM) was used to assess the knowledge. We recruited a total of 660 women aged 18 years and above.

Results: The majority of the participants had poor knowledge, strong positive attitudes, and poor practice. Among them, only 86 women were found to be vaccinated for HPV. A statistically significant association was found between the level of KAP of cervical cancer ($P < 0.001$). There was a significant positive correlation between KAP of cervical cancer.

Conclusion: Our study concluded that the level of awareness regarding the screening techniques and preventive measures for cervical cancer is very low. Educational status had a significant association with KAP of cervical cancer. Hence, these outcomes suggest the need for more effective awareness-boosting programmes about cervical cancer screening. Promotion of free regular health check-ups and vaccination for cervical cancer among the general population will increase the awareness while decreasing the disease burden.

Keywords: Uterine cervical neoplasm, Awareness, Vaccination, Knowledge, Educational status

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Introduction

Cancer is the unusual proliferation of cells, which primarily remains restricted; through time, it metastasizes, resulting in a malignant

tumour.¹ It is the second largest cause of death worldwide. The World Health Organization (WHO) projects that the number of global cancer deaths will rise by 45% between 2008

Table 1. The scoring for cervical cancer

Poor <7	Knowledge (7 Q)	
	Fair 7 to 14	Good >14
Strongly negative -10 to -6 Strongly positive 6 to 10	Attitude (10 Q)	
	Mildly negative -5 to -1	Neutral 0
Poor 0 to 4	Practice (11 Q)	
	Average 5 to 8	Good 9 to 12

and 2030.² Extensive cancer control involves prevention of the disease, early detection accompanied by diagnosis and treatment, recovery, and palliative treatment.³ A general lack of awareness, ineffective screening programmes, and lack of interest in women's well-being have contributed to alarmingly high cancer rates.⁴

Cervical cancer is the unusual development of cells in the cervix which is enclosed by glandular cells on the endocervix (meaning towards uterus) and squamous cells on the ectocervix (towards the vagina). The place where these cells meet is identified as Transformation Zone, a common site for cervical cancer origin.⁵ It is a sexually transmitted disease caused by the human papillomavirus (HPV), primarily HPV 16 and 18, with low-risk HPV 6 and 11 genotypes playing a role in the development of genital bulge.^{6, 7}

The two types of cervical cancer include squamous tumours and glandular tumours. Cervical cancer is the second most prevalent cancer among women worldwide, following breast

cancer.⁸ Almost half a million women are annually diagnosed with invasive cervical cancer. About 25% of all cervical cancer deaths occur in India, where the incidence is critically high among women in rural areas and low socio-economic status.⁹ Cervical cancer is a major cause of morbidity and mortality in resource-poor settings, where access to cervical cancer screening and vaccination is limited.¹⁰

WHO has recommended that involvement of all health care providers is vital in cervical cancer prevention. Its primary prevention involves avoiding exposure to HPV infection and also vaccination against HPV, while the secondary prevention involves screening. To attain this goal, it is essential to make sure that health care providers have enough knowledge about cervical cancer and its prevention.¹¹

In India, more than 132,000 females are diagnosed with cervical cancer each year, approximately 74,000 of whom die from the disease.^{8, 12} The peak age for cervical cancer incidence in India is 55 – 59 years.⁸ Hence, India

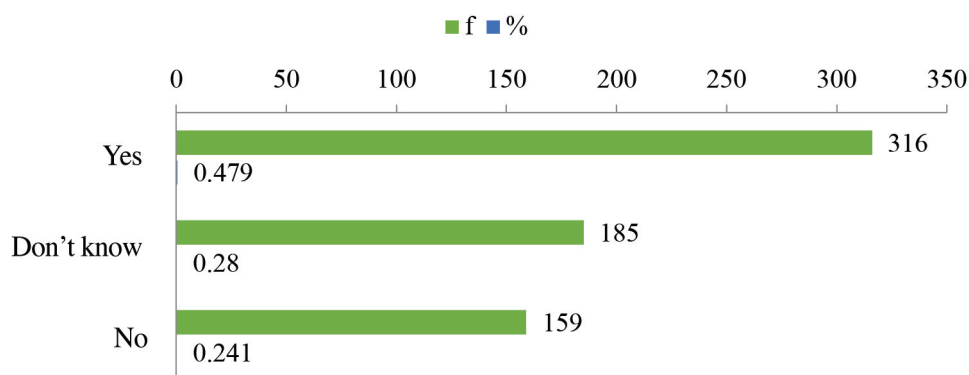


Figure 1. This figure shows the awareness of cancer development in cervix among the study participants. Answering “Yes” meant that they were aware of cancer development in cervix. “Don’t know” represents that they were unaware. “No” also meant that they were unaware.

f: Frequency; %: Percentage

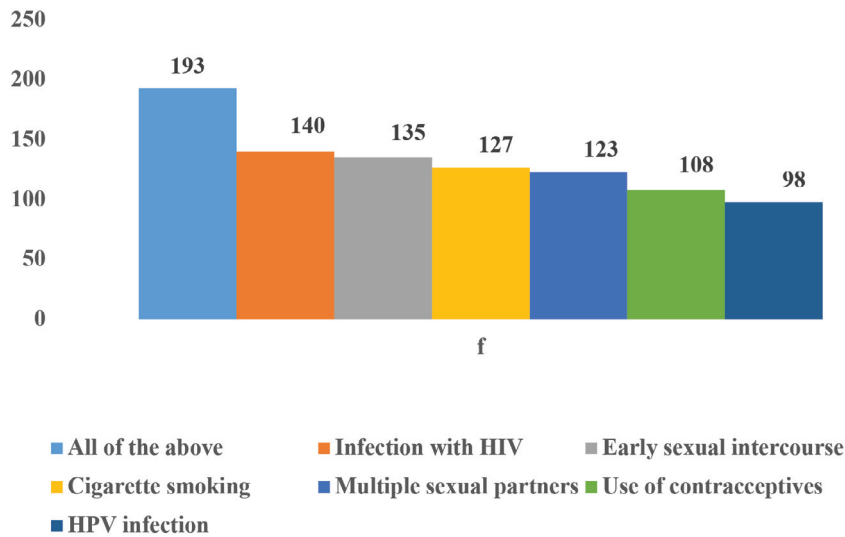


Figure 2. This figure shows the knowledge on the risk factors of cervical cancer among the subjects.
 HIV: Human immunodeficiency virus; HPV: Human papilloma virus; f: Frequency

ranks the highest in age-standardized incidence of cervical cancer in South Asia.¹³ Women are generally infected with HPV in their adolescence, twenties, or thirties. HPV-associated risk factors include early age of first child birth, multiple sexual partners, HIV infection, family history, early sexual activity, lack of regular Papanicolaou (Pap) smear testing, smoking, multiple abortions, and prolonged use of oral contraceptives.^{12, 14}

The stages of cervical cancer are given as

follows:

Stage I: The cancer is formed in the cervix and has not spread to the neighbouring tissues.⁵

Stage II: It has spread to the cervix and vagina but not to the pelvic side wall or lower portion of the vagina.⁵

Stage III: It has spread to the organs nearby, such as the lungs, liver, or bones (metastasis).⁵

The most common symptoms of cervical cancer are abdominal pain, before and after

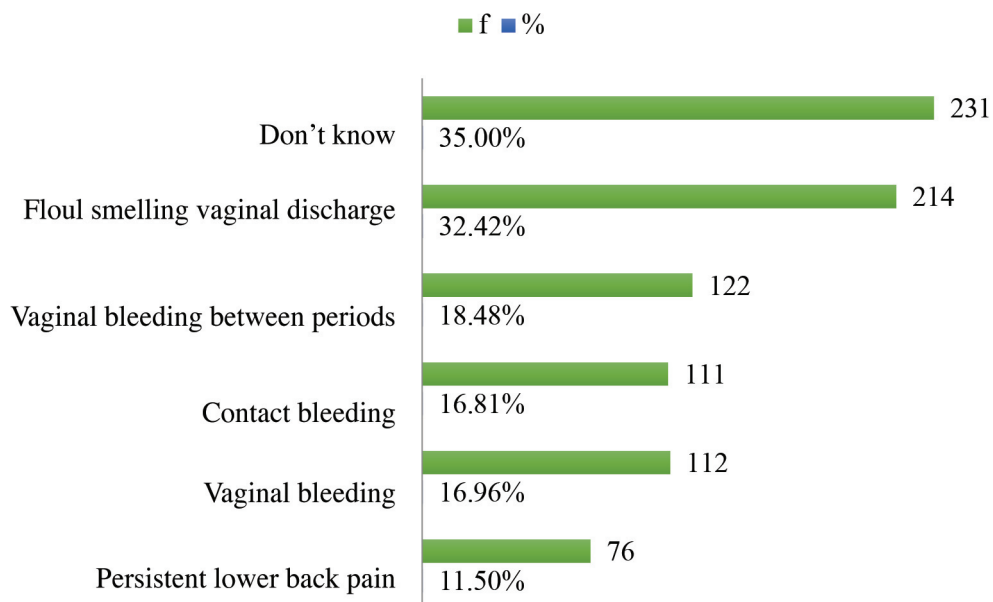


Figure 3. This figure shows the participants' knowledge regarding the signs of cervical cancer.
 f: Frequency; %: Percentage

Table 2. Demographic characteristics of the subjects

Characteristics	No. of subjects	Percentage (%)
Age of women		
Below 20	47	7.1%
21 – 30	268	40.6%
31 – 40	156	23.6%
41 – 50	111	16.8%
51 – 60	63	9.5%
Above 60	15	2.3%
Marital status		
Divorced	67	10.2%
Married	265	40.2%
Single	288	43.6%
Widow	40	6.1%
Location		
Rural	263	39.8%
Urban	397	60.2%
Number of children		
Nil	41	6.2%
1	50	7.6%
2	180	27.3%
3	63	9.5%
4	35	5.3%
5	8	1.2%
6	2	0.3%
NA	281	42.6%
Age at first child birth		
≤ 20	51	7.73%
21 – 25	172	26.06 %
26 – 30	77	11.67 %
31 – 35	33	5 %
36 – 40	4	0.61 %
Above 40	1	0.15 %
NA	322	48.79 %
Level of education		
Diploma/Master's	386	58.5%
High school	170	25.8%
No formal education	28	4.2%
Primary school	76	11.5%
Occupation		
Retired	9	1.4%
Student	197	29.8%
Unemployed	153	23.2%
Working	301	45.6%

No.: Number; Nil: No children; NA: Not applicable

intercourse bleeding, persistent lower back pain, urinary urgency, smelly vagina, vaginal discharge, and contact bleeding. In many cases, women with cervical cancer do not show any of the above-mentioned symptoms.¹²⁻¹⁵

Early detection of this disease increases the likelihood of successful treatment and can prevent any early cervical cell changes from progressing

to cancer. The HPV and Pap tests are employed for cervical cancer screening. A primary HPV test may not be an option worldwide, but a co-test every 5 years or a Pap test every 3 years is an acceptable option. The Pap test is a procedure in which cells from the cervix are collected and examined in the lab to detect cancer and pre-cancer.¹⁶

Table 3. Descriptive statistics for cervical cancer

Variables	N	Descriptive statistics			
		Min	Max	Mean	SD
Knowledge (cervical cancer)	660	2	20	7.4455	4.47
Practice (cervical cancer)	660	0	11	3.5242	2.12
Attitude (cervical cancer)	660	-10	10	-0.0636	6.53

n: Number of subjects; SD: Standard deviation; Min: Minimum score obtained by participants; Max: Maximum score obtained by participants; Mean: Average of the number

Cervical cancer risk remains high due to a lack of awareness about HPV infection or the ineffectiveness of the existing preventive programmes.^{7,8} The higher rate of mortality in India is due to a lack of awareness about its symptoms, risk factors, screening programmes, and preventive measures.⁹ Therefore, this study aimed to evaluate the level of cervical cancer knowledge, attitude, and practice (KAP) and to assess the relationship between educational status with knowledge and attitude toward cervical cancer.

Materials and Methods

An online survey-based cross-sectional study was conducted among Indian women using a self-generated questionnaire for a period of six months. Ethical approval was obtained from the Institutional Ethics Committee (BPC/IEC/69/2020-2021) of Bapuji Pharmacy College, Davangere, Karnataka. The study subjects consented to participate in this study. A cervical cancer awareness measure (C-CAM) was used for assessing knowledge concerning the disease.

The CAM was developed by Cancer Research UK, University College London, King's College London, and Oxford University. We included a question about the warning signs and symptoms of cervical cancer, followed by a question about the risk factors for cervical cancer from CAM. For our convenience, we slightly modified the questions regarding cervical cancer screening programmes and vaccinations.

To understand the attitudes and practices regarding cervical cancer, we developed a questionnaire, consisting of 28 questions in total. Knowledge of cervical cancer was evaluated through seven questions followed by an attitude section that involved 10 questions, followed by a practice section with 11 questions (including the questions adapted from CAM) that were used in our questionnaire after appropriate validation. The study covered women aged 18 and above. The women who were unable to understand the questionnaire or refused to participate in the survey were excluded. We used a single proportion formula for calculating the appropriate sample

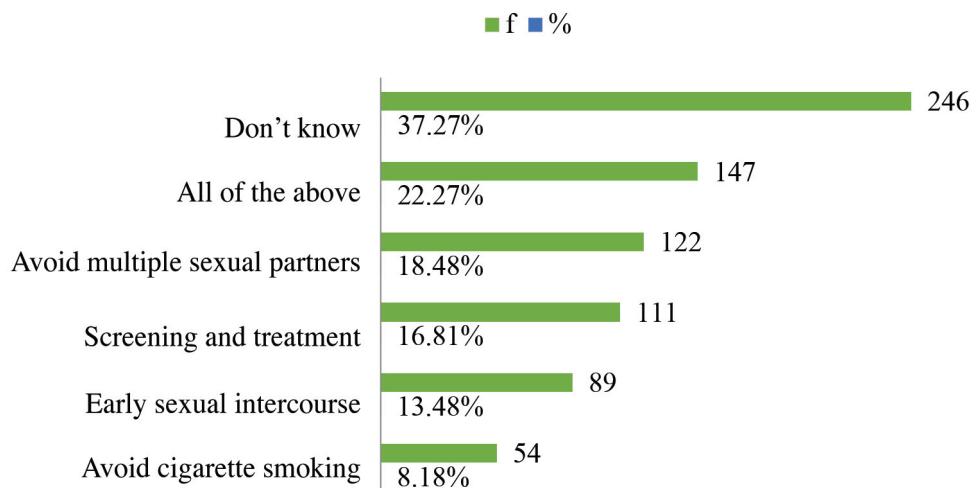


Figure 4. This figure shows the women's awareness of preventive measures of cervical cancer.

f: Frequency; %: Percentage

Table 4. Comparison of demographics to the level of knowledge about cervical cancer

	Level of knowledge			χ ² *	df	P-value
	Poor	Fair	Good			
Age						
Below 20	15	29	3	70.24	10	< 0.001*
20 – 30	83	135	50			
31 – 40	103	46	7			
41 – 50	57	46	8			
51 – 60	32	28	3			
Above 60	9	4	2			
Marital status						
Divorced	53	14	0	72.09	6	< 0.001*
Married	118	122	25			
Single	96	145	47			
Widowed	32	7	1			
Location						
Rural	158	82	23	38.73	2	< 0.001*
Urban	141	206	50			
Occupation						
Retired	7	2	0	32.46	6	< 0.001*
Student	58	108	31			
Unemployed	82	59	12			
Working	152	119	30			

*Chi square; df: Degree of freedom

size.

$$n = z^2 p (1-p) / d^2$$

Sample size = 665.64

Statistical analysis

The collected data were entered into MS Excel

and analysed with SPSS software. The women's education status was compared to the KAP of cervical cancer using the chi-square test. The correlation among the variables of KAP was calculated via Pearson correlation. We considered

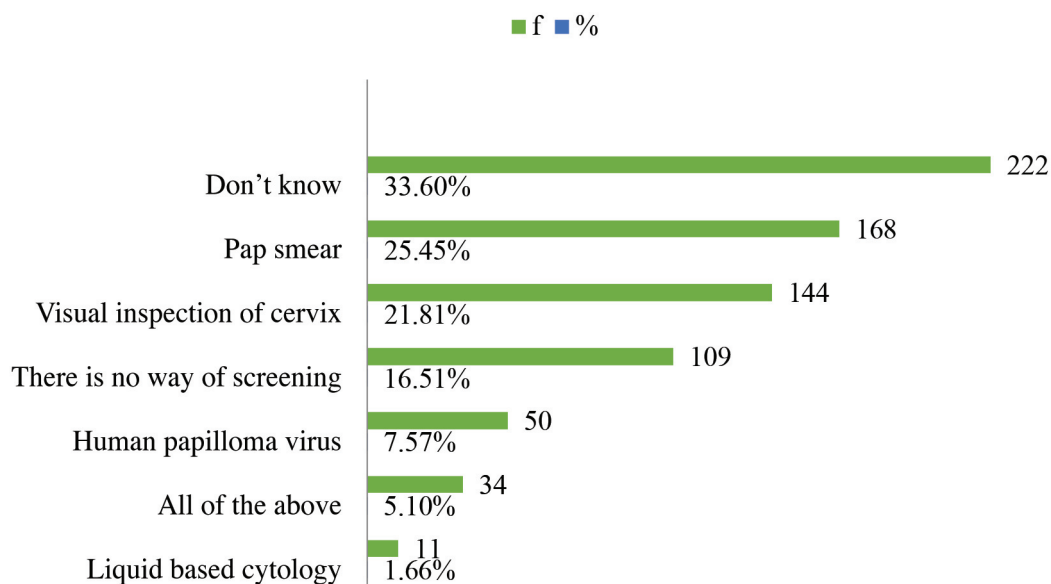


Figure 5. This figure shows the knowledge regarding methods of screening for cervical cancer among the participants.

f: Frequency; %: Percentage; Pap: Papanicolaou

Table 5. Comparison of the demographics with the level of practice of cervical cancer

	Level of practice (cervical cancer)			* 	df	P-value
	Poor	Fair	Good			
Age						
Below 20	37	10	0	17.47	10	0.065
20 - 30	177	91	0			
31 - 40	111	44	1			
41 - 50	93	17	1			
51 - 60	45	18	0			
Above 60	11	4	0			
Marital status						
Divorced	57	10	0	13.87	6	< 0.05*
Married	181	82	2			
Single	202	86	0			
Widowed	34	6	0			
Location						
Rural	215	48	0	21.87	2	< 0.001*
Urban	259	136	2			
Occupation						
Retired	7	2	0	9.44	6	0.15
Student	132	65	0			
Unemployed	103	49	1			
Working	232	68	1			

*Chi square; df: Degree of freedom

$P < 0.005/0.001$ as the level of significance. Each correct response was granted the score of 1, while an inappropriate response or “don’t know” response was given 0.

Table 1 represents the scoring for cervical cancer.

Results

A total of 660 women participated in this study. Most of them were in the age group of 21-30 years (40.6%). 58.5% of the women in this study were diploma/master holders; tables 2 and 3 represent the descriptive statistics. The majority of them (316) confirmed that cancer can develop

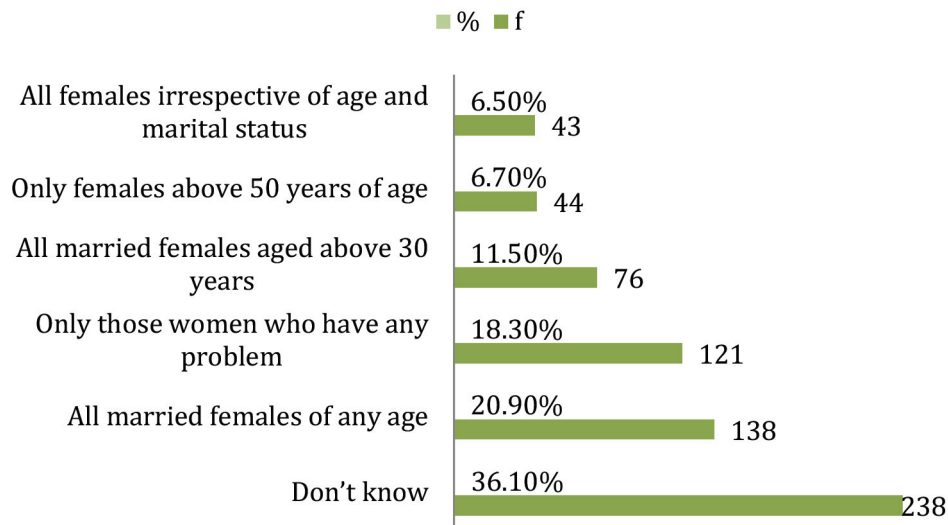


Figure 6. This figure shows the knowledge regarding screening practice among the study participants.

f: Frequency; %: Percentage

Table 6. Association between education status and the level of knowledge

Education status	Level of knowledge about cervical cancer					
	Poor		Fair		Good	
	f	%	F	%	f	%
Diploma/Master's	116	38.8%	207	71.9%	63	86.3%
High school	117	39.1%	47	16.3%	6	8.2%
Primary school	45	15.1%	27	9.4%	4	5.5%
No formal education	21	7.0%	7	2.4%	0	0.0%

Pearson chi-square = 95.22;

df = 6;

P < 0.001*

f: Frequency; df: Degree of freedom

in cervix (Figure 1). Only 193 women thought that “all the factors” can be the risk factors for cervical cancer. Other commonly identified risk factors included infection with HIV followed by early sexual intercourse as shown in figure 2. Most of the women responded “don’t know” when asked about the signs of cervical cancer. “Foul smelling vaginal discharge” and “vaginal bleeding between periods” were commonly identified as signs of cervical cancer, represented in figure 3. Among the subjects, 246 were unaware of the preventive measures for cervical cancer; 22.27% of them identified “all of the above” as preventive measures (Figure 4). Based on figure

5, the majority of the women (222) were unaware of the method of screening cervical cancer. Only 110 women correctly responded with “Pap smear test”. Only 138 correctly identified “all females of any age” as being able to undergo screening (Figure 6). 54.8% among them agreed that “carcinoma of the cervix cannot be transmitted from one person to another” (Figure 7). They mostly agreed that screening helps the prevention of cervical cancer”, while 317 disagreed with this opinion. 67.4% said” it is embarrassing to undergo the screening procedure. “The majority of the women agreed that” screening will not cause harm. “However, when asked about the

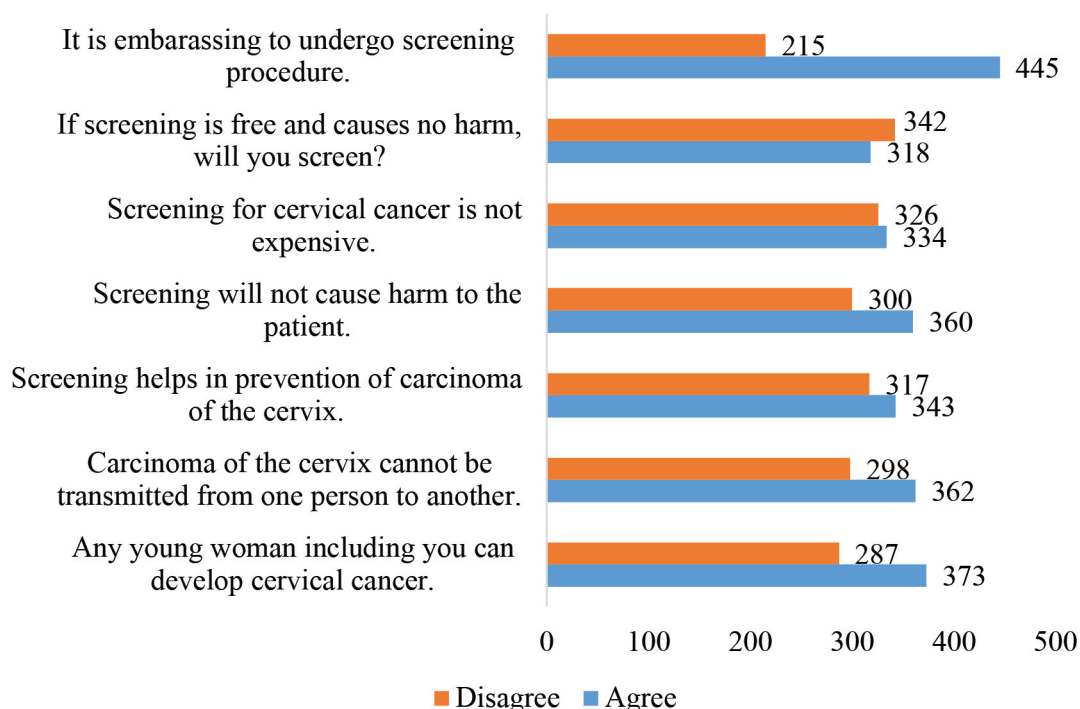


Figure 7. This figure shows the women’s attitude regarding screening and transmission of cervical cancer.

Agree: The participants having same opinions; Disagree: Participants having different opinions

Table 7. Association between education status and the level of attitude

Education status	Level of attitude towards cervical cancer										
	Strongly negative		Mildly negative		Neutral		Mildly positive		Strongly positive		
	f	%	f	%	f	%	f	%	f	%	
Diploma/Master's	82	41.8%	43	46.7%	35	70%	76	69.7%	150	70.4%	
High school	76	38.8%	35	38%	8	16%	15	13.8%	36	16.9%	
Primary school	20	10.2%	13	14.1%	6	12%	13	11.9%	24	11.3%	
No formal education	18	9.2%	1	1.1%	1	2%	5	4.6%	3	1.4%	
Pearson chi-square = 71.82;				df = 12;				P < 0.001*			
f: Frequency; df: Degree of freedom											

willingness to screen, if it was free and caused no harm, most of them said they would not undergo screening, which shows a negative attitude (Figure 7). 396 women had not heard of Pap smear test for cervical cancer. Only 91 women had undergone the Pap smear test (Figures 8 and 9). Among the 660 participants, only 86 were vaccinated for human papillomavirus. They mostly did not know the age at which Pap smear test should be done, whereas 0.5% of them believed that the test can be started from birth (Figure 10). The correct answer for it was “from the age of 20”. Most of the women were not sure about the benefits of the Pap smear test, while 94 believed that it will help the detection of any early abnormal changes in the cervix (Figure 11). 63.3% were

not sure about the method of doing Pap smear test, whereas only 124 (18.8%) responded with “vaginal brushing” (Figure 12). Only 73 participants (11.1%) had a good knowledge which shows us the great need to raise awareness regarding this cancer among women (Figure 13). The majority of the women (32.3%) had a strong positive attitude towards cervical cancer. Nevertheless, it was found that 29.7% women had a strongly negative attitude (Figure 14). Only two subjects had an appropriate practice for prevention of cervical cancer (Figure 15). Marital status, location, and occupation were found to be statistically significant in comparison with the level of knowledge and practice (Tables 4 and 5). The participants who were well educated had

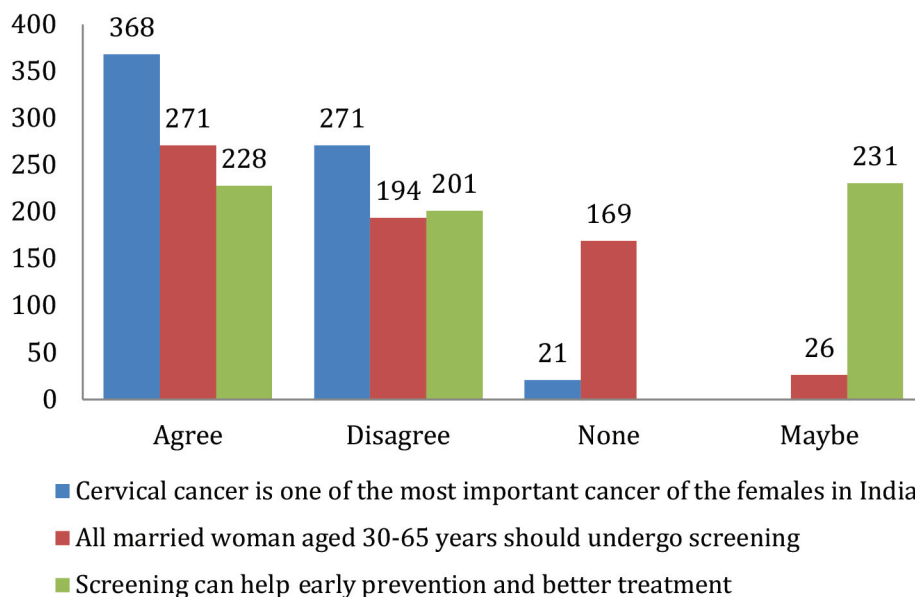


Figure 8. This figure shows the women’s attitude regarding the importance and diagnosis of cervical cancer. Agree: Women who agreed with the statement, Disagree: Women who disagreed with the statement, None: Women who are not sure of any statements

Table 8. Association between education status and the level of practice

Education status	Level of practice of cervical cancer					
	Poor		Average		Good	
	f	%	F	%	f	%
Diploma/Master's	260	54.9%	124	67.4%	2	100%
High school	137	28.9%	33	17.9%	0	0%
Primary school	54	11.4%	22	12.0%	0	0%
No formal education	23	4.9%	5	2.7%	0	0%

Pearson chi-square = 12.64;

df = 6;

P= 0.049*

f: Frequency; df: Degree of freedom

better knowledge, attitude, and practice regarding cervical cancer (Tables 6-8). A positive correlation was found between the KAP sections of cervical cancer with a *P*-value less than 0.001 (Table 9).

Discussion

A total of 660 cases were monitored prospectively during the study period. In our study, women aged 21-30 who were single and living in urban had better knowledge regarding cervical cancer (*P*-value <0.001) compared with other women. The obtained findings showed that women below 30 years of age had better knowledge, which is in line with a study conducted in Zimbabwe.¹⁴

Most of our subjects were unaware of the signs and symptoms of cervical cancer as they responded "do not know" (35%). This was found to be consistent with a study conducted in Tamil

Nadu,⁸ where there was poor knowledge regarding cervical cancer among all the age groups.

In our research, those who held diploma/master's had good knowledge (86.3%), strong positive attitude (70.4%), and good practice (100%). Hence, given *P*-value <0.001, there is a significant association between educational status and knowledge of cervical cancer. This result is in agreement with that of a cross sectional study conducted on health care professionals.¹⁵

Foul smelling vaginal discharge (32.42%) and vaginal bleeding between periods (18.48%) were commonly identified as symptoms by the participants. This outcome was in line with that reported by a previous paper conducted in Eastern Uganda.¹⁰ In another study on students in Saudi Arabia,⁷ they identified vaginal bleeding between periods as a warning symptom.

The current study shed light on the fact that

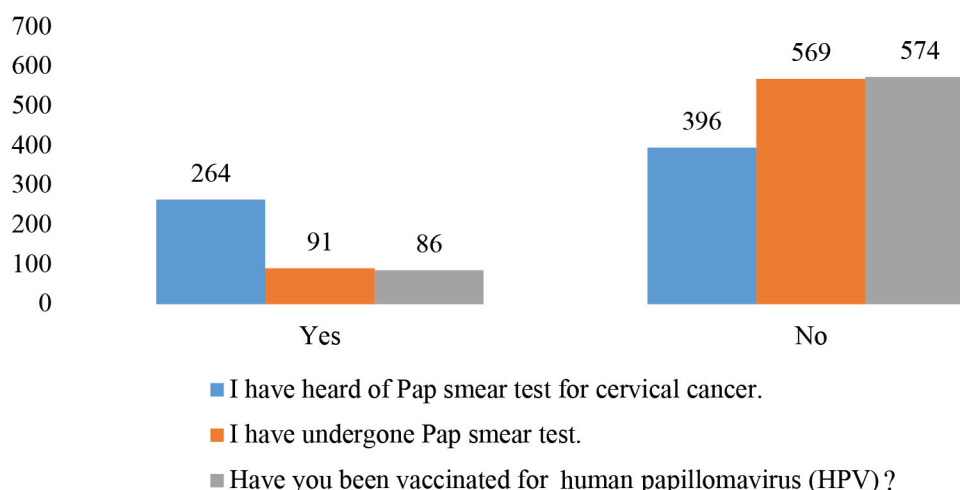


Figure 9. This figure shows the distribution of the participants based on their awareness and undertaking of Pap test and vaccination status.

Yes: Women who were aware about Pap test and vaccination, No: Women who were not aware about Pap test and vaccination; Pap: Papanicolaou

Table 9. Correlation between KAP of cervical cancer

Variables	n	Pearson correlation	Significance (P-value)
Knowledge and attitude	660	+0.601	<0.001*
Knowledge and practice	660	+0.37	<0.001*
Attitude and practice	660	+0.368	<0.001*

n: Number of subjects; KAP: Knowledge, attitude, and practice; *: Statistically significant

most of the women were unaware of important risk factors, such as HPV infection (14.80%), use of contraceptives (16.36%), and multiple sexual partners (18.63%), which was found to be similar to the study conducted by Krishnaveni et al.⁸

The results also showed that knowledge and attitude on cervical cancer were positively correlated (Pearson coefficient +0.601, *P*-value < 0.001). Comparable results were found among midwives and nurses in Rwanda, East Africa.¹¹

We also found that KAP on cervical cancer were positively correlated. Similar results were reported among midwives and nurses in Rwanda, East Africa.¹¹

We also indicated that the majority of the women felt that “reproductive-aged women” (43%) are more vulnerable to cervical cancer. Among Indian women; however, HPV infection is common at 26-35 years of age and cancer occurs between the ages of 45-59 years of age.⁸ Only about 37.9% (250) women responded correctly that both reproductive-aged and women

aged >50 years are more prone to have cervical cancer.

Furthermore, our study revealed that 36.10% (238) of the women were unaware of the age requirement for undergoing cervical cancer screening (Pap test). Only about 138 participants (20.90%) felt the need of doing cervical cancer screening among all the married females irrespective of any age. This finding was in contrast to KAP study conducted in TamilNadu,⁸ where 45.3% of women suggested that screening should start from a younger age, between 20-50 years.

In our survey, 342 participants disagreed to undergo screening for cervical cancer, even if it was provided for free. It was consistent with the study conducted in Saudi Arabia, where 86.6% disagreed to undergo screening.¹⁵ This contradicted with another work conducted by Divya Khanna et al.,¹³ where most of the women strongly agreed to be screened.

Regarding the HPV vaccination status in our

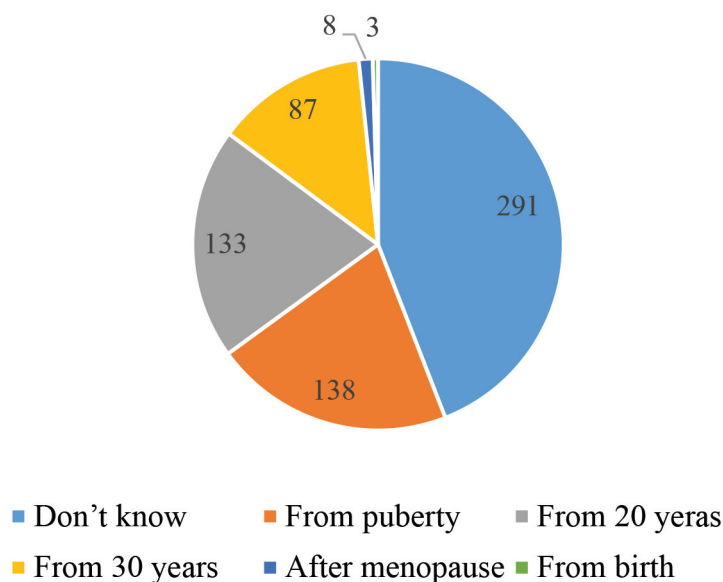
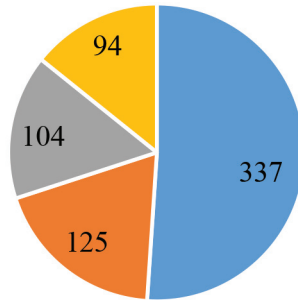


Figure 10. This figure shows the knowledge regarding age requirement for Pap smear test among the participants.

Pap: Papanicolaou



- Not sure
- Early detection of cervical cancer
- Above two
- Detection of any early abnormal changes in the cervix

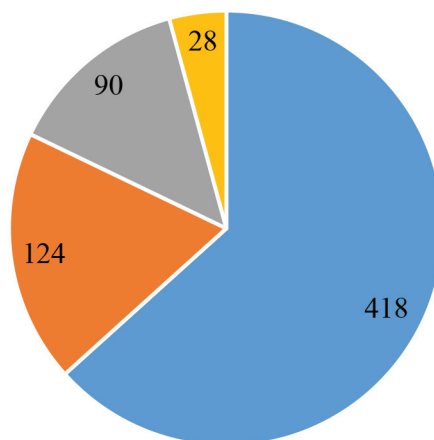
Figure 11. This figure shows the awareness about benefits of Pap test among the study participants.
Pap: Papanicolaou

study, only 13% of the participants were vaccinated. This finding was similar with another study conducted in Bahrain. This information should encourage health policy officials to promote HPV vaccination.⁶

Herein, the majority of the subjects (362) agreed with the opinion that “Carcinoma of the cervix cannot be transmitted”, whereas 54.80% disagreed with it. These findings are in accordance with those reported by Narayana G et al., in South India.¹⁷

The study findings implied that the majority of the women (343) agreed that “early screening helps the prevention of cervical cancer”, while 317 disagreed with it, which is consistent with the study conducted by Narayana G et al, in South India.¹⁷

As the study was conducted online, there was a major limitation; we should consider the fact that the participants’ true understanding of the questions as well as the genuineness of their answers might have been impaired. 40.6% of the



- Not sure
- Vaginal brushing
- Transvaginal ultrasound
- Others

Figure 12. This figure shows the knowledge among the study participants regarding the method used for Pap test collection.
Pap: Papanicolaou

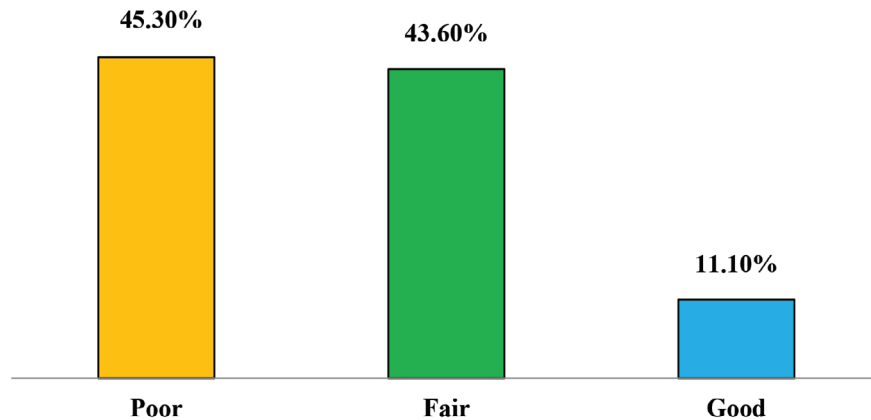


Figure 13. This figure shows the participants' level of knowledge about cervical cancer.

Poor: Women having less knowledge, Fair: Women having moderate knowledge, Good: Women having good knowledge

women population in our study were of the 20-30 age group; thus, the results cannot be generalized. Moreover, the sample size was small compared with the Indian population. The current study provided insight into KAP towards cervical cancer, which are important for designing appropriate interventions for fostering awareness concerning the disease. This is the first study which employed C-CAM in order to test the knowledge of cervical cancer among Indian women.

Conclusion

The current study provided some data on KAP on cervical cancer. Most of the participants were

not aware of the screening techniques and preventive measures of cervical cancer. Educational status had a significant association with KAP of the disease. The participants holding diploma/master's had more KAP, and good practice towards cervical cancer.

Hence, these results put further emphasis on the need for effective awareness-boosting programs about cervical cancer screening. It is essential to develop customized educational interventions through various approaches, such as social media, leaflets, television/radio broadcasts, and proper counselling, as tools for improving knowledge and understanding in this regard. Promotion of free regular health check-

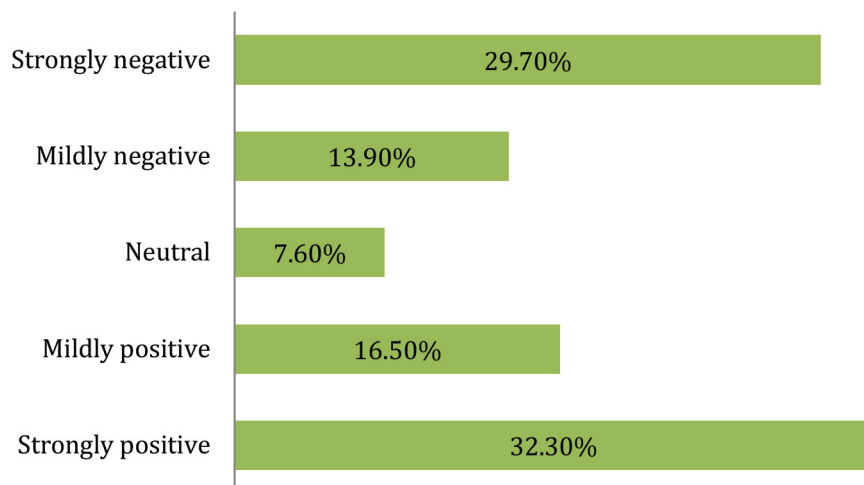


Figure 14. This figure shows the participants' level of attitude towards cervical cancer.

Positive attitude: Women who had good and strong attitude, Neutral attitude: Women having mild attitude, Negative attitude: Women having negative attitude about cervical cancer

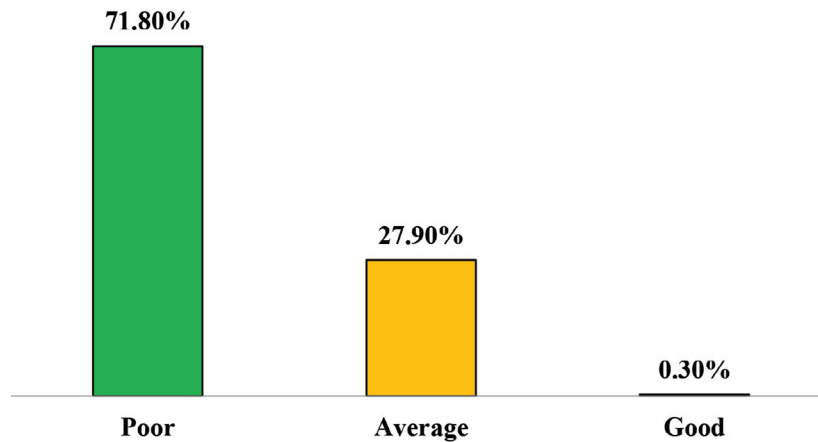


Figure 15. This figure shows the participants' level of practice towards cervical cancer.

Poor: Women having less practice, Average: Women having a moderate level of practice, Good: Women having a good level of practice

ups as well as vaccination for cervical cancer among the public will foster the awareness in addition to minimizing the disease burden.

Acknowledgement

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Conflict of Interest

None declared.

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