RESEARCH ARTICLE

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Between Belief and Biology: Cervical Cancer's Occurrence and Health Literacy among India's Muslim Women

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Abstract

Purpose: Despite evidence indicating a comparatively lower incidence of cervical cancer and HPV infection, there is a significant gap in research on their understanding and preventive behaviours. This study aims to reduce the risk of cervical cancer among Muslim women and to bridge existing gaps in cancer prevention strategies. **Methods:** A descriptive, cross-sectional study was conducted using an online questionnaire to collect information from participants. The research aimed to explore socio-demographic characteristics, perceived health concerns, and knowledge, attitudes, and practices related to cervical cancer prevention and screening. **Results:** The incidence of cervical cancer increases with age. Eight percent of participants reported being diagnosed with cervical cancer. There is a noticeable correlation between age, education level, and cervical cancer diagnosis. All risk factors for cervical cancer were statistically significant ($p < 0.001$), indicating highly significant differences in awareness levels across the groups. Differences in sources of information were also highly significant ($p < 0.001$). Additionally, age, marital status, and education were found to be significantly associated with women's understanding and attitudes towards cervical cancer. **Conclusion:** The study found that educated Muslim women generally have a positive understanding and attitude towards cervical cancer. However, there remains a significant gap that limits women's overall understanding, attitudes, and practices related to the disease. Targeted educational interventions, involving community leaders and health workers, are essential to enhance awareness and improve health practices.

Keywords: Rate of detection- Comprehension- Behavioural inclination- Educational attainment- Population attributes

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Introduction

Cervical cancer is the fourth most common cancer among women globally, with approximately 90% of new cases and deaths in 2020 occurring in low- and middle-income countries [1, 2]. In India, cervical cancer ranks as the second most common cancer in terms of both incidence (18.3%) and cancer mortality (18.7%) among women in 2020, with a 5-year occurrence rate of 18.8% [3]. However, Muslim women are known to have lower incidences of cervical cancer and/or human papillomavirus (HPV) infection [4]. Fortunately, cervical cancer is a preventable disease that has a pre-malignant stage, which usually occurs in younger women under the age of 40. Around 80% of cervical cancers can be prevented through screening, leading to early diagnosis [5].

The reduction in cervical cancer incidence in India can be attributed to several contributing factors. These include higher literacy levels, healthier lifestyles, delayed marriage age, later onset of sexual activity and childbearing, fewer children, greater adoption of contraceptive methods, better menstrual hygiene practices, and a decrease in tobacco consumption among women. All these factors have played a vital role in reducing the burden of cervical cancer across the country.

Developed countries have successfully implemented primary (human papillomavirus vaccination) and secondary (cervical screening methods such as the Pap test, HPV test, cotest, and visual inspection by acetic acid) preventive strategies to significantly reduce the incidence of cervical cancer. However, such strategies are lacking in many developing countries like India. To enhance the effectiveness of these preventive measures, it is essential to increase the acceptability of these methods across all segments of society [6]. Most studies on HPV vaccination in India have focused on the general population or specific groups such as adolescent girls or urban women, often overlooking the unique socio-cultural context of Muslim women, a group that has received limited attention in public health research [7,8].

Understanding the level of awareness and attitudes towards cervical cancer among Muslim women provides valuable insights for public health practitioners and policymakers. By focusing on this specific population, the study aims to provide meaningful information that can inform healthcare delivery and community

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education initiatives, ultimately leading to a reduction in cervical cancer incidence and improved health equity. This study aims to address these gaps by evaluating the occurrence, understanding, and attitudes toward cervical cancer among Muslim women in India. By gaining a deeper understanding of the challenges and opportunities related to cervical cancer prevention in this population, the research seeks to contribute to the development of more effective and culturally sensitive public health interventions.

This study aims to reduce the risk of cervical cancer among Muslim women and to bridge existing gaps in cancer prevention strategies.

Materials and Methods

The study utilized an online close ended questionnaire, targeting educated women from various states across India. The survey was administered through Google Forms, with the link being shared via WhatsApp to reach all eligible participants. Additionally, written informed consent was obtained from each participant before their inclusion in the study. The women in the age group 18-65 years were included in the study. The patients were asked to return the self-reported questionnaires using snowball sampling methods. The sample size was calculated by taken prevalence 50% for maximum sample size as the eligible criteria population has been treated as not gradable. Margin of error has been obtained ±3% at 95 percent confidence level, the required sample size was calculated on the basis of awareness, practice of previous studies and the higher sample size calculated is 1077. We distributed more than 2000 links among the eligible women participants by snow ball sampling and receive 1299 complete responses and enrolled for the present study. The questionnaires included self-reported questionnaires to state the choices of understanding as of knowledge is concerned with respect to education and attitude towards cervical cancer. The nature and purpose of the study was explained to the participants and their consent sought by accepting the link. It was made clear that participation in study is voluntary.

The filled questionnaire from the participants were exported to Microsoft excel 2016 to manage and visualise the data. The data was analysed using the Statistical Package for Social Sciences (SPSS) version 26.0. since the questions has been framed on nominal scale for better understanding to the participants. The assessment of participant characteristics was displayed as frequency and percentages in accordance their age group to assess the occurrence of the disease in respect of age is concerned. The variables of interest to know the knowledge as regard as education is concerned were analysed by chi-square test. P'< 0.05 was considered to be significant. Multiple logistic regression for the strength of association with respect to level of education regarding the attitude among the participants has been assessed as a risk factor. All methods and study results were reviewed and reported following the STROBE reporting guidelines for cross-sectional studies (27)

Results

A total of 1,299 respondents participated in the online survey, which specifically included Muslim women from India. The socio-behavioural characteristics of the respondents are detailed in Table 1. Among these women, the majority of married participants (93.5%) fell within the 29–38 age range. In the 18–28 age group, 64% were married, while 80.6% of the 39–48 age group were married. For the 48–58 and >58 age groups, the proportions of married participants were 89.5% and 87.5%, respectively.

On the other hand, the majority of single women (24.9%) belonged to the 18–28 age group. Among the single respondents, 6.4% were in the 29–38 age group, 19.3% in the 39–48 age group, 10.4% in the 48–58 age group, and 12.4% in the >58 age group. Regarding the age of marriage, about 65.4% of the participants had married before reaching the age of 30.

The occurrence of cervical cancer showed a significant increase with age. The highest proportion of cervical cancer cases was observed in the 39–48 age group (16%), while the lowest proportion was found in the 18–28 group (0.9%). Overall, 8% of the respondents reported being diagnosed with cervical cancer. Conversely, the

Table 1. Age Wise Social Characteristics and Disease Status of the Participants

Socio-economical charateristics	Group	18 - 28	29 - 38	39 - 48	48 - 58	>58	Total N=1,299
Marital statuS	Married	333 (64)	405 (93.5)	100 (80.6)	128 (89.5)	120 (87.5)	1086 (83.6)
	Single	129 (24.9)	28 (6.4)	24 (19.3)	15 (10.4)	17 (12.4)	213 (16.3)
Age of Marriage	< 25	48 (9.7)	35 (8.2)	10 (9)	15 (12)	10 (7)	118 (9.0)
	25 - 30	155 (31.5)	262 (61.6)	72 (65.4)	58 (46)	45 (31)	592 (45.5)
	>30	288 (58.6)	128 (30.1)	28 (25.4)	56 (44)	89 (43.4)	589 (45.3)
Diagnosed with cervical cancer	Yes	05 (0.9)	53 (12.2)	16 (16)	12 (9.3)	17 (14.6)	103 (8)
	No	513 (99.1)	380 (87.8)	84 (84)	116 (90.7)	103 (85.4)	1196 (92)
Level of education	Graduate level	59 (11.7)	287 (70.5)	95 (67.3)	72 (56.2)	49 (41.1)	562 (43.2)
	Less than Graduate	445 (88.2)	120 (29.4)	46 (32.6)	56 (43.7)	70 (58.8)	737 (56.7)
Occupation	Working	314 (84.8)	202 (57.3)	56 (37)	120 (51)	83 (43.4)	775 (59.6)
	Home maker	56 (15.1)	150 (42.6)	95 (62.9)	115 (48.9)	108 (56.5)	524(40.3)

percentage of participants not diagnosed with cervical cancer decreased with age. Among the total participants, 92% had not been diagnosed with the condition.

When considering educational qualifications, about 70.5% of women in the 29–38 age group had graduated. Among the 18–28 age group, 11.7% had graduated, while 67.3% of participants in the 39–48 age group were graduates. For the 48–58 and >58 age groups, the percentages of graduated participants were 56.2% and 41.1%, respectively. Conversely, 88.2% of participants in the 18–28 age group were at less than the graduate level. Among the 29–38 age group, 29.4% were less than graduates, while 32.6% of those in the 39–48 group fell into this category. For the 48–58 and >58 groups, the percentages of participants at less than the graduate level were 43.7% and 58.8%, respectively.

The highest proportion of working women was observed in the 18–28 age group (84.8%), while the lowest was in the >58 age group (43.4%). In total, 59.6% of the respondents were working. In contrast, the percentage of homemakers increased with age, with the highest percentage (56.5%) found in the >58 age group. The overall proportion of homemakers among the respondents was 40.3%.

Table 2 presents the distribution of responses related to understanding cervical cancer. Among all respondents, slightly more than half of the study population (52.6%/737) with less than a graduate-level education demonstrated poor understanding of the symptoms for early detection of cervical cancer. In comparison, only 3.5% (562) of graduates showed poor understanding. This difference between the two groups is highly significant ($p < 0.001$), indicating that the higher-educated group had a much better understanding of the symptoms.

Similarly, the less-educated group showed poor understanding (56.8%/737) of the causes of cervical cancer compared to the higher-educated group (28.4%/562). This difference was also highly significant ($p < 0.001$), with the higher-educated group displaying much greater awareness of the causes. When considering various risk factors, understanding ranged from early sexual intercourse, with 37.4% (737) of the less-educated group demonstrating poor knowledge, compared to 33.4% (562) among graduates, to poor genital/menstrual hygiene, with 41.5% (737) of the less-educated group showing poor understanding compared to 26.6% (562) among graduates. The lowest proportion of women (16.9%) who believed that early sexual intercourse could lead

Table 2. Level of Knowledge and Practice Aspects towards CC, in a Muslim Community India Graded by Education

knowledge of risk factors of cervical cancer	Answer choices	Graduate & above, n=562	Less than graduate level n=737	statistic	P value
Symptoms of cervical ca can be recognised at an early stage	Poor Knowledge	20 (3.5)	388 (52.6)	1299.1	<0.001
	Satisfactory	320 (56.9)	75 (10)		
	Good	210 (37.3)	85 (11.5)		
	Not at al	12 (2)	189 (25.6)		
Cervical ca is caused by virus infection	Poor Knowledge	160 (28.4)	419 (56.8)	731.3	<0.001
	Satisfactory	103 (18.3)	45 (6)		
	Good	243 (43.2)	73 (9.9)		
	Not at al	56 (9.9)	200 (27)		
knowledge of risk factors of cervical cancer	Poor menstrual/genital hygine	150 (26.6)	306 (41.5)	1187.6	<0.001
	Multiple sexual partners	187(33.2)	175 (23.7)		
	Oral conceptrives	130 (23)	107 (14.5)		
	Early sexual intercourse	95 (16.9)	149 (20.2)		
The presence of cancer in the family increases the risk of cervical cancer	Poor Knowledge	188 (33.4)	276 (37.4)	218.6	<0.001
	Satisfactory	132 (23.4)	76 (10.3)		
	Good	186 (33)	205 (27.8)		
	Not at al	56 (9.9)	180 (24.4)		
How did you hear about Cervical cancer	Family/relatives	150 (26.6)	463 (62.8)	1096.5	<0.001
	Television	249 (44.3)	46 (6.2)		
	Social media	135 (24)	28 (3.7)		
	Doctor	28 (4.9)	200 (27)		
One in 3 women has Human Papillomavirus (HPV) infection	Poor Knowledge	370 (65.8)	305 (41.3)	1098.3	<0.001
	Satisfactory	88 (15.6)	58 (7.8)		
	Good	74 (13)	84 (11.3)		
	Not at al	30 (5.3)	290 (39.3)		
The mode of transmission of HPV infection is	Sexual transmitted	418 (74.3)	56 (7.5)	613.5	<0.001
	Genetic transmitted	144 (25.6)	681 (92.4)		
Cervical cancer can be prevented by	Medication	552 (98.2)	296 (40)	509.1	<0.001
	Do not Know	10 (1.7)	441 (59.8)		

Table 3. Level of Attitude and Practice Aspects towards CC, in a Muslim Community India Graded by Education

		Graduate & above, n=562	Less than graduate level n=737	Chi square	P-value	Odds ratio	95% CI	
Cervical cancer is a serious disease	Agree	262 (46.6)	424 (57.5)	15.23	0.01	0.645	0.517	0.804
	Disagree	300 (53.3)	313 (42.4)					
Cervical cancer causes physical problems	Agree	276 (49.1)	362 (49.1)	28.9	0.01	1.01	0.803	1.245
	Disagree	286 (50.8)	375 (50.8)					
Cervical cancer is a burden to family members	Agree	378 (67.2)	405 (54.9)	20.171	0.01	1.684	1.34	2.116
	Disagree	184 (32.7)	332 (45)					
Willing to do HPV vaccination/ screening of cervical cancer	Agree	406 (72.2)	188 (25.5)	280.6	0.01	7.6	5.931	9.739
	Disagree	156 (27.7)	549 (74.4)					
Preventing cervical cancer is better than treating it	Agree	434 (77.2)	129 (17.5)	463.104	0.01	15.981	12.153	21.013
	Disagree	128 (22.7)	608 (82.4)					
HPV vaccination/screening is inexpensive	Agree	434 (77.2)	303 (41.1)	169.396	0.01	4.857	3.798	6.209
	Disagree	128 (22.7)	434 (58.8)					
Screening for cervical cancer is very important for a woman	Agree	462 (82.2)	116 (15.7)	570.376	0.01	24.733	18.446	33.163
	Disagree	100 (17.7)	621 (84.2)					
Encourage your daughter/relatives to take HPV vaccine	Agree	506 (90)	562 (76.2)	41.415	0.01	2.814	2.035	3.89
	Disagree	56 (9.9)	175 (23.7)					

Percentage of the total column; significant if $p<0.05$.

to cervical cancer was found among graduates. All risk factors showed statistically significant differences ($p < 0.001$), highlighting a substantial disparity in awareness levels between the two groups. In terms of sources of information about cervical cancer, the majority of participants with less than a graduate-level education (> 60%/737) relied on family or relatives as their primary source. Conversely, approximately 44.3% (562) of graduates identified television as their main source of information. These differences in sources of information were highly significant ($p < 0.001$), indicating distinct patterns in how each group accessed information, with the higher-educated group relying more on formal media. Regarding understanding of Human Papillomavirus (HPV) occurrence, the majority of graduates (65.8%/562) had poor understanding, compared to 41.3% (737) of the less-educated group. A significant portion (39.3%/737) of the less-educated group admitted they were unaware of HPV occurrence. This difference is highly significant ($p < 0.001$), with the higher-educated group demonstrating greater awareness of HPV infection. The modes of HPV transmission, 74.3% (562) of graduates correctly identified sexual transmission, while 25.6% (562) incorrectly believed it to be genetic. Among the less-educated group, a substantial 92.4% (737) incorrectly believed HPV transmission was genetic, with only 7.5% (737) correctly identifying it as sexually transmitted. The difference in understanding the transmission modes of HPV was highly significant ($p < 0.001$), with graduates exhibiting better knowledge in this area.

Additionally, 98.2% (562) of graduates recognized that medication could prevent cervical cancer, compared to only 40% (737) of the less-educated group. Among the less-educated group, 59.8% (737) stated that they "do not know" how cervical cancer can be prevented, while only 1.7% (562) of graduates expressed the same lack of knowledge. This stark contrast underscores a significant difference in understanding preventive measures between the two groups.

As presented in Table 3, the adjusted odds of attitudes toward cervical cancer indicate a significant relationship with education level. The perception of cervical cancer as a serious disease was notably higher among women with less than a graduate-level education (57.5%/737) compared to 46.6% (562) of graduates. The adjusted odds show that graduates perceived cervical cancer as less serious compared to their less educated counterparts. This established an association between perceiving cervical cancer as a serious disease and education level (Chi-square = 15.23, OR = 0.645, 95% CI: 0.517–0.804). Similarly, the proportion of agreement on the belief that cervical cancer causes physical problems was identical in both groups (49.1% in each), showing no significant difference in perception. However, an association was identified between education level and the belief in cervical cancer causing physical problems (Chi-square = 28.9, $p = 0.01$, OR = 1.01, 95% CI: 0.803–1.245). A higher percentage of graduates (67.2%/562) agreed that cervical cancer is a burden to family members, compared to 54.9% (737) of the less-educated group. Hence, graduates were more likely to agree with this statement (Chi-square = 20.171, $p = 0.01$, OR = 1.684, 95% CI: 1.34–2.116).

Willingness to undergo vaccination or cervical cancer screening was also significantly associated with education level, with graduates more likely to agree with this statement (Chi-square = 280.6, OR = 7.6, 95% CI: 5.931–9.739). This highlights a strong relationship between education and willingness to undertake preventive measures. The majority of graduates (77.2%/562) believed that preventing cervical cancer is better than treating it, whereas only 17.5% (737) of the less-educated group held the same belief. Graduates were thus far more likely to

favor prevention over treatment (Chi-square = 463.104, p = 0.001, OR = 15.981, 95% CI: 12.153–21.013).

Moreover, a greater proportion of graduates (77.2%/562) considered HPV vaccination and screening to be inexpensive, compared to 41.1% (737) of the less-educated group. Graduates were therefore more likely to agree with this statement (Chi-square = 169.396, OR = 4.857, 95% CI: 3.798–6.209). Furthermore, the importance of cervical cancer screening was strongly associated with the higher-educated group, as 82.2% (562) of graduates recognized its importance, compared to only 15.7% (737) of the less-educated group (Chi-square = 570.376, OR = 24.733, 95% CI: 18.446–33.163). Finally, a larger proportion of graduates (90%/562) expressed willingness to encourage their daughters or relatives to take the HPV vaccine, compared to 76.2% (737) of the less-educated group. Graduates were thus more likely to promote vaccination (Chi-square = 41.415, OR = 2.814, 95% CI: 2.035–3.89).

The findings demonstrate a significant relationship between higher education levels and positive attitudes toward cervical cancer prevention, HPV vaccination, and screening. Women with graduate-level education were more likely to perceive cervical cancer as a burden to families, place greater importance on prevention over treatment, and recognize the significance of screening. Additionally, they exhibited a higher willingness to undergo HPV vaccination and screening and actively encouraged others to do the same. These results underscore the pivotal role of education in influencing attitudes toward cervical cancer awareness and preventive measures.

Discussion

This study is the first of its kind in India to identify a significant gap in the knowledge, understanding, and awareness of cervical cancer risk factors, prevention, and transmission between Muslim women with higher and lower levels of education. The findings emphasize that education is a critical factor in shaping women's understanding of cervical cancer, influencing their perception of risk, and increasing their willingness to adopt preventive measures such as HPV vaccination and screening. These results have crucial implications for designing effective public health interventions aimed at bridging the knowledge gap, particularly among less-educated women.

The most effective way to reduce cervical cancer-related morbidity and mortality is by preventing the chronic persistence of its causative agent, the Human Papillomavirus (HPV), in the uterine cervix. This can be achieved through HPV vaccination at the appropriate age, ideally before the initiation of sexual activity [9]

Researchers have observed that cervical cancer incidence increases with age. Specifically, 3% of cases are reported among women aged 30–39 years, 23% in the 40–49 age group, and over half of the cases are found in women aged 50–59 years. The incidence then declines to 19% among women aged 60–69 years and 3% in those above 69, reflecting the low survival rate of cervical cancer patients in India [10]. These findings are consistent with the present study, which shows that cervical cancer occurrence significantly increases with age. The highest proportion of cases was observed in the 39–48 age group (16%), while the lowest was in the 18–28 age group (0.9%). In total, 8% of individuals have been diagnosed with cervical cancer, while the percentage of non-diagnosed individuals decreases with age. Overall, 92% of the study population has not been diagnosed with cervical cancer.

Previous studies in India have highlighted the low prevalence of cervical cancer screening, estimated at just 2% nationwide. Screening rates are particularly low among Muslim women. Educational attainment plays a pivotal role in improving cervical cancer screening rates and awareness of risk factors [10, 11] aligning with the findings of this study. The most commonly recognized risk factors among graduates and undergraduates were as follows: poor menstrual/genital hygiene (26.6% vs. 41.5%), multiple sexual partners (33.2% vs. 23.7%), use of oral contraceptives (23% vs. 14.5%), and early sexual intercourse (16.9% vs. 20.2%).

Other researchers have reported a low level of awareness and understanding among Muslim women in Tamil Nadu compared to women of other religions [12]. Similarly, a 2011 study conducted among educated youth in India, Nepal, and Sri Lanka found limited understanding of cervical cancer and its risk factors [13]. Another study from Tamil Nadu revealed that a fundamental lack of awareness among educated women is a major contributor to the prevalence of cervical cancer [14]. Additionally, several studies have demonstrated low awareness and understanding of cervical cancer among young undergraduate and postgraduate students from rural and urban areas [14-17].

A community-based study from Tamil Nadu found that rural women, despite a high literacy level, had complete ignorance about HPV [18]. Numerous international studies have explored understanding, attitudes, and awareness of cervical malignancy and HPV vaccines. These studies report higher awareness levels in developed countries such as Australia, Belgium, and the USA, but lower levels in countries such as China, Turkey, and Thailand [19-22]. The findings of these studies differ from the present study, which demonstrates that higher education significantly enhances knowledge about cervical cancer and its risk factors.

A 2014 study of 2,500 school and undergraduate students, along with their parents, from North India found that only 15% of participants were aware of cervical cancer, and an even lower percentage (13%) knew about HPV or accepted the HPV vaccine [16]. These findings align with the present study, which indicates that women with lower literacy levels lack awareness—a concerning issue, as early recognition of symptoms is essential for timely diagnosis and treatment. Delays in symptom recognition are among the leading causes of late-stage cervical cancer diagnosis.

A separate study from India found that the majority of educated women had a favorable attitude toward cervical cancer and its screening, consistent with the present

study's findings. This study demonstrated that education significantly influences women's attitudes toward cervical cancer [22]. Women with higher educational attainment were more likely to have positive attitudes toward cervical cancer and were more likely to utilize screening services. This association has been repeatedly confirmed in other studies [23-27].

Public Health Implications

1. Tailored Educational Campaigns

Developing targeted interventions is crucial to improving cervical cancer awareness among less-educated women. Utilizing simple, visual, and culturally appropriate materials can significantly enhance their understanding and engagement. These campaigns can address gaps in knowledge while respecting the cultural and linguistic diversity of the audience. Qualitative observations indicate that one of the key reasons misconceptions persist is the lack of access to health-related information in a format that is easy to understand. Many women rely on oral communication, and complex medical terminology often leads to confusion or mistrust. In addition, some women associate female reproductive cancers with shame or moral judgment, which further discourages them from seeking information.

2. Community-Based Health Initiatives

To address the reliance on informal sources of information among less-educated women, involving community leaders, health workers, and local media can be a highly effective strategy. These trusted figures and platforms can help bridge the information gap by disseminating accurate, culturally appropriate, and accessible knowledge about cervical cancer prevention, HPV vaccination, and screening. Their involvement ensures that awareness campaigns reach deeper into underserved communities, fostering a greater impact. Qualitative insights highlight that women are more willing to receive information from familiar and trusted sources, as they fear being stigmatized or judged when discussing reproductive health matters with outsiders. A general hesitancy to speak openly about women's health issues also allows traditional beliefs and myths to remain unchallenged.

3. Subsidized Vaccination and Screening Programs

Expanding free or low-cost cervical cancer screening and HPV vaccination programs, particularly in underserved communities, can play a vital role in addressing financial barriers. Ensuring these services are accessible and affordable will encourage greater participation, ultimately helping to reduce cervical cancer-related morbidity and mortality in vulnerable populations. According to qualitative reports, many women believe that screening procedures may affect fertility or violate modesty norms, which leads to resistance despite financial support. These perceptions are often reinforced by peers or family members, who themselves may not have adequate knowledge and experience.

4. Involvement of Healthcare Professionals

Healthcare professionals such as doctors, nurses, and midwives play a pivotal role in combating cervical cancer. They should take proactive steps to dispel myths and misconceptions surrounding the disease, HPV vaccination, and screening. By fostering trust, providing clear and accurate information, and encouraging women to adopt preventive measures, these professionals can significantly enhance awareness and participation in early detection and prevention programs. Their guidance is crucial in shaping community attitudes and improving health outcomes. Qualitative feedback suggests that many women feel uncomfortable discussing reproductive health issues with male healthcare providers. In some cases, negative past experiences also lead to distrust toward the healthcare system. Hence, the availability of female healthcare workers and culturally sensitive counselling is necessary to overcome deeply ingrained socio-cultural barriers.

In conclusion, this study highlights the profound impact of educational disparities on attitudes toward cervical cancer prevention. Women with higher education levels show enhanced awareness, a proactive approach to prevention, and greater willingness to engage in screening and vaccination programs. In contrast, less-educated women encounter numerous challenges, such as misinformation, financial difficulties, and a diminished sense of urgency for preventive measures. Bridging these gaps through tailored educational initiatives, active community involvement, and readily accessible healthcare services is crucial for advancing cervical cancer prevention efforts across India.

Author Contribution Statement

Arif Habib contributed approximately the overall work, including study conception, data analysis and manuscript preparation. Saba Amin and Arjumand Shah, Huma Rafiq contributed the concept, data collection and handling the data. Arsheed Iqbal and Huma Rafiq each contributed to assisting with literature review, interpretation of findings and critical revision of the manuscript. All authors read and approved the final version of the manuscript.

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Ethics approval and consent to participate

The study was approved by the Institutional Ethics Committee. Informed consent was implied through voluntary completion of the online questionnaire, and participants were free to decline participation by not submitting the form.

Data availability statement

The data supporting the findings of this study are provided in the supplementary files and are also available in Excel format from the corresponding author upon reasonable request.

Consent for publication

All participants provided consent for publication of anonymized data prior to their inclusion in the study.

Competing interests

The authors declare that they have no competing interests.

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