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AN INTERVENTIONAL STUDY TO ASSESS KNOWLEDGE REGARDING CERVICAL CANCER AND ASSOCIATED PREVENTIVE MEASURES AMONG ADOLESCENT GIRLS OF AN URBAN AREA IN WESTERN INDIA

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Abstract: Cervical Cancer is one of the frequently occurring cancers among Indian women, next only to breast cancer. The prime causative agent, Human Papilloma Virus (HPV), strikes young women in reproductive age group. Although screening test (Pap smear) for early diagnosis is available, HPV vaccine provides prevention which is better than cure. Objectives were to assess the awareness regarding cervical cancer and its preventive measures among the adolescent girls and to ascertain the changes in knowledge and vaccine acceptance as result of educational intervention. Interventional study was done in schools, selected as per convenient sampling technique. Sample size, estimated using 14% prevalence and 10% allowable relative error came at 1092. Total 1105 participants belonging to age group 10-19 years were surveyed. We found that most of the participants attained menarche between 13-15 years (52.7%) while 123 (11.1%) had not attained menarche. Only 279 (25.2%) participants had awareness about cervical cancer and only 5.4% knew about HPV vaccines as its preventive strategy. Assessment of post educational intervention knowledge showed an increase in cervical cancer awareness to 1080 (97.7%) and similar for vaccine acceptability. Still 46 (4.2%) girls are hesitant to take vaccine due to various reasons. Strong statistical association was found between education of mother and acceptability of vaccines. To conclude, adolescents and their parents had poor knowledge about the subject. Strengthening of grass root workers (Accredited Social Health Activists & Anganwadi Workers) of public health regarding the same will help to raise the acceptance. This knowledge can be spread by teachers through interaction & co curricular activities.

Keywords: adolescent, cervical cancer, HPV vaccine, knowledge

Introduction

Every year, the 4th of February is celebrated as the World Cancer Day. Since the incidence of cancer is increasing rapidly in India, it is important to raise the cancer literacy and knowledge amongst the population. The Indian Cancer Society has been doing commendable work in this field since the year 1951.[1]It started a campaign in 2019 to spread awareness about the importance of healthy lifestyle, avoiding risk factors, dispelling myths and taboos, early detection and vaccines. Their focus includes cervical cancer too. Human Papilloma Virus (HPV) is the causative agent of this cancer, the fourth

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most common cancer among women all over the world.[2]There are around 100 serotypes of HPV with 15 to 20 types being oncogenic. High-risk types HPV-16 and 18 contribute over 70% of all cervical cancer cases. [3]

HPV is spread by skin-to-skin contact, including sexual contact. Cervical cancer, unlike many other cancers, strikes young women during her reproductive years.[4]

The worldwide incidence of cervical cancer is about 570,000 new cases per year, with approximately 311,000 deaths. Every year, in India, around 132,000 new cases are diagnosed and 74,000 deaths occur, accounting to nearly 1/3rd of the global mortality due to this cancer.[5] Indian women face a 2.5% cumulative lifetime risk and 1.4% cumulative death risk from it. [6]

According to WHO Director-General's global call for action, 2018, strong and targeted political will along with a team effort by all the stakeholders can make elimination of cervical cancer a reality. World Health Assembly, in 2020, set a goal for all countries to reach and maintain an incidence rate of below 4 per 100 000 women by 2030. Its achievement is based on three key pillars and their corresponding targets, one of which is full vaccination of at least 90% of girls by the age of 15.[7]

Serum Institute of India's made-in-India HPV vaccine Cervavac, a quadrivalent vaccine, was launched on January 24, 2023. [8] It is a joint venture by Serum Institute Of India (SII), Department of Biotechnology (DBT) and the Biotechnology Industry Research Assistance Council (BIRAC) along with the Bill and Melinda Gates Foundation.[9]In January 2023, the Ministry of Health and Family Welfare started the phased introduction of the HPV vaccine for subsequent inculcation into routine immunization programmes.[10]

The production without its adequate consumption would be of no use. So, parallel to the increasing the availability of the vaccine, it is necessary to increase its acceptance. A targeted approach to achieve it can be used once the obstacles are clearly identified. This study will help in finding those obstacles and will guide future researches about the ways to overcome it.

Therefore, objectives of our study were to assess the awareness regarding cervical cancer and its preventive measures among the adolescent girls and to ascertain the changes in knowledge and vaccine acceptance as a result of educational intervention.

Materials and Methods

An interventional study was conducted using,

- *Study area*: Surat, a city in Gujarat, India

- *Study population*: school going adolescent girls within the age group of 10 to 19 years
- Study period: 2 months
- Sample size: According to the estimated prevalence of cervical cancer in India being 14%[2] and keeping allowable relative error at 15%, the sample size was calculated as follows:

  In our study after taking Z= 1.96 at 95 % confidence interval, sample size will be:

  $n= Z^2pq/l^2$

  p= 14 % (prevalence of cervical cancer in India)

  q = 100-14 =86

  l (allowable error) = 15% of p i.e. 2.1

  n= 3.84 * 14* 86/ 2.1*2.1

  n= 1048

  (1105 girls were a part of my study)

- *Sampling technique*: Random selection of a government and a private school of Surat were done.
- *Data collection method*: Target population was asked to fill a predesigned pretested semi-structured pre-sensitization questionnaire which enquired about their personal details including sociodemographic factors like education and occupation of parents, religion, type of school/college they study in, age at menarche, knowledge about the cervical cancer and its vaccine.

  With the help of a multimedia presentation enriched with relevant, easy to understand, precise and authentic information, the participants were sensitized regarding the epidemiological situation of cervical cancer worldwide and in India, its causative organism, mode of transmission, high risk behaviors, myths and taboos regarding it, the vaccines available for protection against it, ideal age and place for getting vaccinated, cost of vaccines, side-effects of vaccination and its efficacy. The help of language experts was used to make the presentation material in local language as well.

The participants were asked to fill the predesigned pretested semi-structured post-sensitization questionnaire after the event to determine the change in knowledge and behavioral perspective towards the cervical cancer as objectified by the study, willingness or denial to accept the vaccine and reasons for the same. Attempts were made to eradicate the apprehensions of the participants against the vaccine administration through counseling.

- *Data analysis*: The collected data was uploaded to Microsoft Excel Sheet. It was converted into percentages and tabulated. The mean and standard deviation of relevant data was calculated. The association between the variables and vaccine acceptance was assessed using chi square and p values. Suitable pictorial representation was also done.

- *Ethical considerations*: Clearance from Ethics Committee of B.J.Medical College and Civil Hospital, Ahmedabad was obtained before executing the study (Reference Number: EC/Approval/44/2022/23/04/2022). The permission from the Principal of the both the schools was also taken after discussing with them the nature and purpose of study. The assent of the minors with the consent of their class teacher as their guardian was taken. The consent of the adult girls was obtained. Privacy of the participants was maintained and their responses kept confidential. The entire data is preserved, both as soft copy as well as hard copy, in a secure and retrievable manner.

Results and Discussion

Table 1.Sociodemographic distribution of the study population

Attributes		Frequency (in %)
Age	10 to 14 years	520 (47)
	15 to 19 years	585(53)
Standard of study	6^{th}	69(6.2)
	7^{th}	81(7.3)
	8^{th}	90(8.1)
	9^{th}	286(26)
	10^{th}	251(22.7)
	11^{th}	258(16.1)

	12th	150(13.6)
School	Private	472(42.7)
	Government	633(57.3)
Education of father	<12th	599(54.2)
	12th pass	223(20.2)
	NA	13(1.2)
	Graduate	213(19.3)
	Postgraduate	57(5.1)
Education of mother	<12th	633(57.3)
	12th pass	221(20)
	NA	8(0.8)
	Graduate	196(17.7)
	Postgraduate	47(4.2)

According to National Institute of Health, menarche typically occurs between the ages of 10 and 16 years, with the average age of onset being 12.4 years.[13]Onset of menarche amongst the study population is by 13-15 years age group except 8 girls who began menstruating at around 16-18 years age. The mean age of onset of menarche of the 982 girls who had started menstruating was found to be 12.8 (±1.52) years. A study done by Balraj Ramraj et al in New Delhi in 2021, found it to be 12.5 (±1.42) years in his study population .[14]

Table3. Responses of students to pre-sensitization questionnaire (n=1105)

Awareness about any cancer occurring in human beings	Yes	240(21.7%)
	No	865(78.3%)
Awareness about any cancer occurring only in females	Yes	227(20.5%)
	No	878(79.5%)
Knowledge about cervical cancer	Yes	278(25.2%)
	No	827(74.8%)

Knowledge about HPV	Yes	176(15.9%)
	No	929(84.1%)
Those who were aware of cervical cancers, were asked the following questions (n=278)		
Source of information	Doctor	136(49%)
	Family	67(24%)
	Social Media	44(15.7%)
	Friends	30(10.7%)
	Newspaper	1(0.6%)
Awareness regarding prevention of cervical cancer	Yes, vaccine	133(47.8%)
	Yes, surgery	56(20.4%)
	Yes, medicine	1(0.4%)
	Yes, don't know how	2(0.7%)
	No	86(31%)
They are vaccinated against HPV	Yes	46(16.5%)
	No	232(83.5%)

Only 21.7% girls could enumerate any cancers affecting human beings. Similarly 20.5% girls could name a cancer occurring only in females. Olufunmilola Abraham et al conducted a research in Wisconsin in 2021 among participants belonging to a similar age group as this study. Better awareness was found in his study population. Participants identified a wide variety of cancers.[15] In our study, 25.2% girls could recall having heard about cervical cancer while 15.9% knew about HPV. A study by Pooja Ahlawat in Northern India shows that 52% of adolescent girls in her study had heard about it.[16]

A majority of the adolescents in our study were educated about by their doctors or by family members. This is in contrast to a study done in Malaysia which identified Internet (78.1%) as the main source of knowedge.[17]

To check their existing knowledge about the prevention of Cervical cancer, those who had heard about it, were asked whether they thought it was preventable or not. If answered positively, they were asked to write about the means by which it was possible. 47.8% of those aware about Cervical Cancer (12% of the total sample size) could enumerate about HPV vaccine. In a study conducted in 2019 by Kritika Poudel et al. among High School Students along with their Mothers in Nepal, it was found that the HPV vaccine was the preventive measure least considered by the students (14.6%), comparable

with our finding.[18] We found that 46 (4.2% of the total sample size) girls had taken the vaccine which forms only 34.6% of the girls who were aware that it is a preventive measure for Cervical Cancer. Globally too, there is a decline in the coverage of HPV vaccination as 3.5 million more girls missed out on HPV vaccination in 2021 compared to 2019.[12]

All these were the pre-sensitization questions, which were administered to them before they were sensitized through a short interactive session on cervical cancer and its prevention. To check its effectiveness, the post-sensitization questionnaire had been formulated which provide the following promising results.

Responses of the students to post sensitization questionnaire

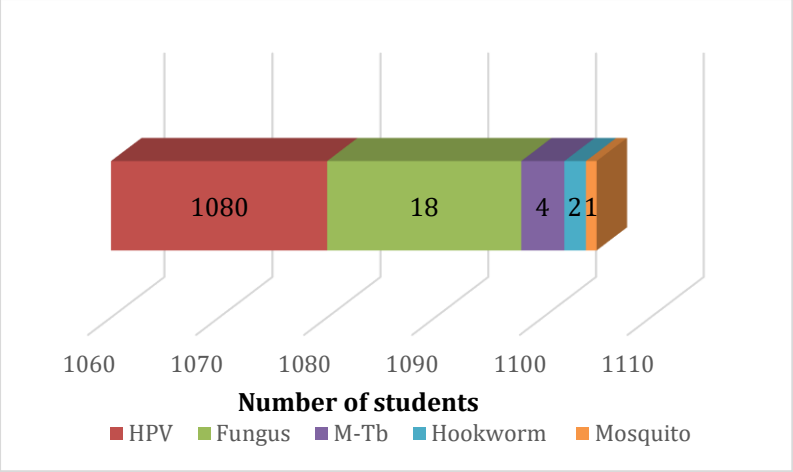

Figure 1.Knowledge of students regarding cause of cervical cancer

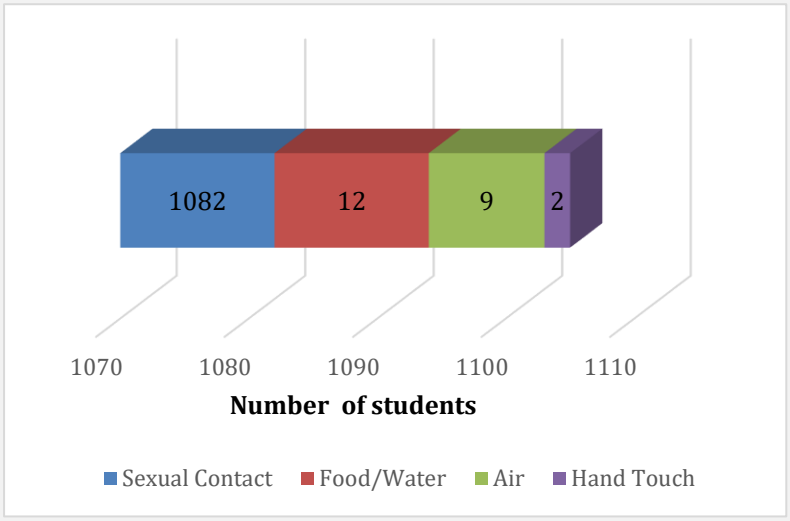

Figure 2.Knowledge of students regarding mode of spread of cervical ***cancer***

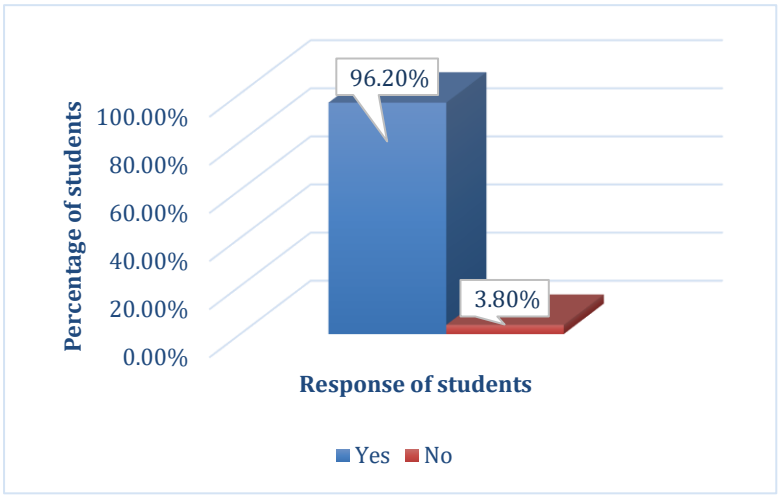

Figure 3. Knowledge of students about preventability of cervical cancer

Responses of students to post-sensitization questionnaire (n=1105)

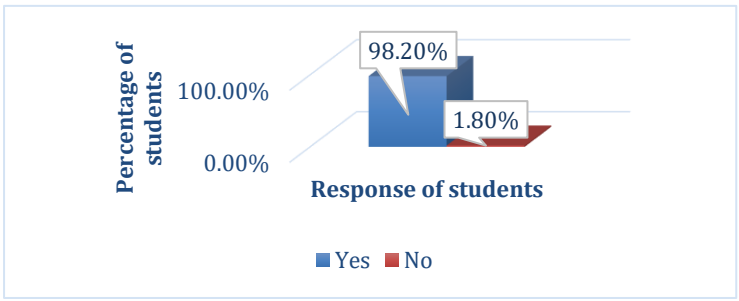

Figure 4. Knowledge of students about vaccine availability

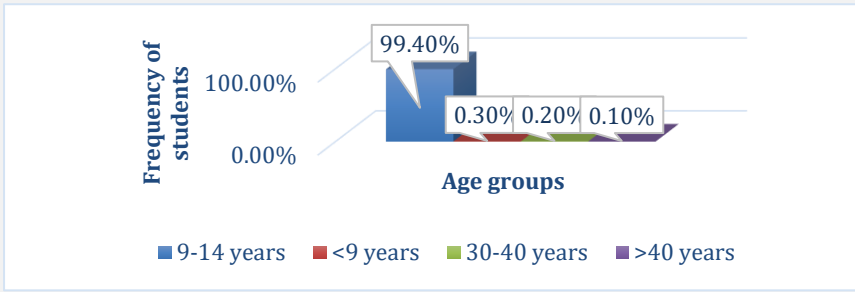

Figure 5. Knowledge regarding ideal age of vaccination

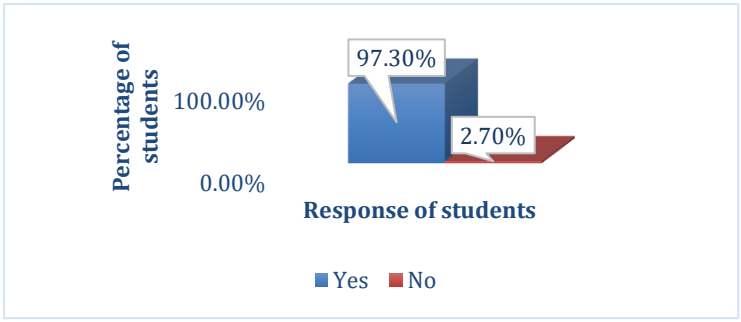

Figure 6. Practice of advising vaccination to others among students

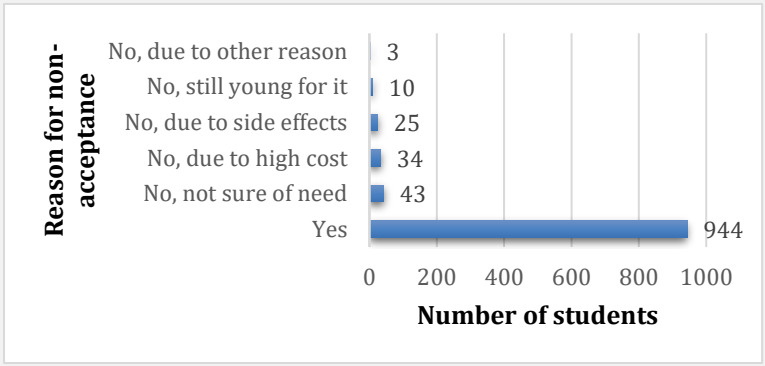

Figure 7. Acceptance of vaccine and reasons for non-acceptance

There was a positive impact found among the students after interactive session given to them regarding cervical cancer and its preventive measures. 97.7% students answered correctly as HPV being its causative organism. 97.9% students could appropriately recognize sexual contact the mode of spread of HPV. 96.2% girls said that cervical cancer was preventable while 98.2% girls now knew about the availability of vaccines against it. A similar study conducted in Greece observed that in the second phase of their study, the percentage of students (95.6%) who could identify the etiological agent of cervical cancer was significantly higher than the first phase (52.4%). During the second phase, the response to the questionnaires were collected immediately after the interactive seminars.

38.3% girls answered 'sexual intercourse' as the mode of transmission of HPV infection before the seminar, which escalated in the second phase (86%).[19]

In our study, all the students, except 6 were able to enumerate ideal age for vaccination i.e. 9 to 14 years as stated by the WHO.[12]This would sensitize them as well as enable them to encourage others to take the vaccine at the ideal time.

To analyse the impact of the session on the attitude of girls towards vaccination against cervical cancer, a few more questions were asked.

97.3% of the students were convinced that vaccine should be taken by all girls for protection against not just one cancer, but many other problems too caused by HPV infection. Seemitha Shetty et al conducted a study in South India in 2019 where in they found that 68.3% of the undergraduate medical, dental and nursing students were willing to recommend the vaccine to others.[20]

Out of the girls who had not taken the vaccine, 89.1% said that they were actively planning to get themselves vaccinated.

In the South Indian study, 65.2% of the students intended to receive the vaccine after a similar educational event.[20] In Greece too, this percentage rose to 89.1%.[19]

Among the 10.9% population who was not inclined towards vaccination, the major reason was uncertainty regarding the need and effectiveness of the vaccine (37.5%). A few others also found it to be costly (29.8%) as it was not being provided by government under the immunization schedule and only had to be purchased from a private setup at the time of study. Involvement of factors in addition to knowledge was also found in a study done among medical and non-medical students at the University of Hong Kong.[21]

The Venice 2 HPV vaccination survey also found that in 11 out of 29 countries who participated in the survey, financial constraints was the major reason for non-acceptance of vaccination as it was not yet included in their immunization schedule.[22]

Table4. Association between acceptance of vaccine and sociodemographic factors

Categories of the variable	Number of students who have taken the vaccine or are willing to take (%)	Number of students who are not willing to take vaccine (%)	Total number of girls
Education of mother (n=1097)			
12^{th} or less than 12^{th} standard	753(88.2)	101(11.8)	854
Graduate/Post Graduate	221(95.1)	12(4.9)	243
Chi square value is 8.16, degree of freedom 1 and p value is 0.003			
Type of school (n=1105)			
Government	547(86.4)	86(13.6)	633
Private	443(93.9)	29(6.1)	472
Chi square value is 16.06, degree of freedom 1 and p value is 0.00006			
Standard of study(n=1105)			
Primary	135(90)	15(10)	150
Secondary	558(89)	69(11)	627
Higher Secondary	297(90.6)	31(9.4)	328
Chi square value is 0.588, degree of freedom 1 and p value is 0.7			

After these preliminary findings, we tried to investigate if there was any relation between the sociodemographic factors and the acceptability of the vaccine. Following results were found.

The vaccine acceptance among the girls with more educated mother was around 7% higher than those with less educated mother. Their association was found to be significant. The vaccine acceptance among the private school students was also around 7% more than the government school students. The association was found to be highly significant. No significant effect of the standard of study was seen on vaccine acceptance.

A study published online on 2016 Sep 20 and done by Stefanie Schülein et al found education level of the mother affected the vaccination of daughters significantly. [23]

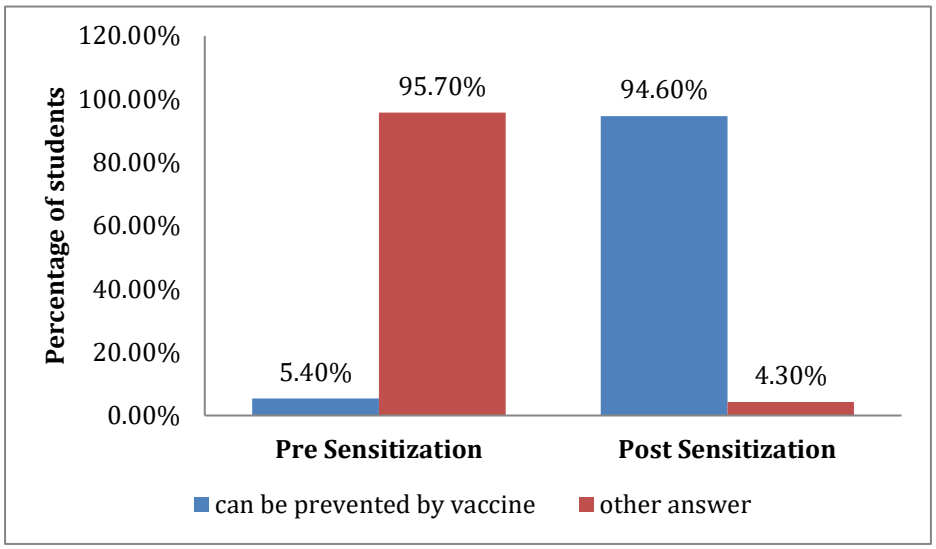

Figure 8. Comparison of knowledge about prevention of cervical cancer before and after sensitization

Overall, the session was highly impactful as evident by this almost reversal of the percentage of the students who were aware about cervical cancer being preventable by vaccine administration before (5.4%) and after the session (95.7%).

The Greece study also emphasizes on the impact of educational interventions, at the level of school. Significant rise in the level of knowledge about HPV and the vaccine acceptance rate testifies it.[21]

We believe that strengthening of grass root workers (Accredited Social Health Activists & Anganwadi Workers) of public health regarding the same will help to raise the acceptance. This knowledge can be spread by teachers through interaction & co curricular activities. Other studies also highlight this like a study done in Central Division of Kitui County. The teachers who are aware about the vaccine and its effects are more likely to encourage students than those who are themselves unaware .[24]

Conclusion

The interventional study conducted among the adolescent girls shed light on some aspects regarding cervical cancer and its prevention. The awareness regarding it is alarmingly low among the adolescent girls and so is the vaccination status especially among government school students. Impact of imparting proper knowledge regarding HPV and cervical cancer to appropriate age group will increase the awareness and acceptance of vaccination. An educated mother is more likely to make an informed decision regarding the vaccination of her daughter. Political will to introduce this vaccine in a National Immunization Schedule at lower costing can be seen as one of the solutions to improve affordability, acceptance and accessibility.

Limitations

The sample size is relatively small which may affect its applicability universally. A multi-centric study can help overcome it. Also, it can't be assumed with certainty that the girls who expressed their willingness to get vaccinated could actually achieve it. There would be factors, other than awareness, affecting it. This study falls short on throwing light over it. Although this could be overcome by revisiting the students, learning about their experiences and looking for a way ahead.

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Declaration of Interest Statement

The authors declare that they have no conflict of interests.

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