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Original Research Article

A study to assess the knowledge of human papillomavirus vaccine among school girls of Bhopal city

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ABSTRACT

Background: Objectives of the study were to assess the existing knowledge of the human Papillomavirus (HPV) vaccine and the impact of educational intervention among school girls.
Methods: This study is a Quasi-experimental study conducted on 150 girls of 9th to 12th standard studying in a school. A pre-test questionnaire was used to assess the baseline knowledge, following which an interactive educational session was held and a post-test questionnaire was used to collect data. The impact of the intervention was analysed using a paired t-test. A Chi-square test was used to assess the willingness towards HPV vaccine pre and post-test.
Results: Lack of awareness (96.67%) was the primary barrier to knowledge regarding HPV vaccine. There was a significant increase in the mean knowledge scores from the pre-test (2.4±0.5) to the post-test (18.66±1.83) and the difference was statistically highly significant ($p<0.0001$).
Conclusions: After the educational intervention, the mean knowledge of the study participants improved drastically with the majority of them showing willingness regarding the HPV vaccination.

Keywords: HPV vaccine, HPV infection, Quasi-experimental study, Educational intervention

INTRODUCTION

India has a population of 511.4 million women aged 15 years and older who are at risk of developing cervical cancer.[1] It ranks as the second most frequently observed cancer among women of reproductive age and accounts for around 9% of deaths in India. Nearly all cervical cancers are caused by human Papillomavirus (HPV) infection, contributing more than one-fourth of infection-related cancers globally.[2,3] The projected incidence of HPV-related cancers is expected to increase by 2025.[3] Although there is a vaccine against this infection, which is not cost effective to the general population, a debate is still ongoing regarding this.

There are many vaccines available against this deadly infection, such as Gardasil, Gardasil 9, and Cervavac and effective for high-risk strains like HPV 16 and 18. In our country, the Ministry of Health and Family Welfare (MoHfW) is likely to implement the Cervavac vaccine under the national immunization schedule very soon. It is administered as a two-dose schedule (0, 6 months) for age group 9–14 years, which is the preferred target age group, whereas three doses (0,1,6 months) for 15–26 years are considered as catch-up vaccinations.[4] These recommendations are thoroughly supported by Federation of Obstetric and Gynaecological Societies of India (FOGSI).[5]

World Health Organization (WHO) recommends that boosting awareness and access to proper information is the key to preventing and controlling the infection.[6] So, there should be knowledge and awareness about this vaccine, as a form of preventive approach in the community. Girls of 9 years and above are also primary beneficiaries of this vaccine.[7] Although, the major decision for the vaccination to the girlchild lies with her parents or legal guardians but,

simultaneously it becomes easy to impart knowledge to students within the school premises as they are in the phase of active learning. Therefore, the present study is an attempt to assess the existing knowledge regarding the HPV vaccine among school girls of Bhopal city and to know the impact of a carefully designed educational intervention, keeping in mind the sensitivity of the topic.

METHODS

The present study is a quasi-experimental study conducted from November 2024 to December 2024. The participants included were all schoolgirls of 9th to 12th standard studying in a girls' senior higher secondary school near the Urban Health and Training Centre, Department of Community Medicine, Chirayu Medical College, Bhopal, Madhya Pradesh.

The study received approval from the Institutional Ethics Committee (CMCH/IEC/2025/08) of Chirayu Medical College and Hospital, Bhopal, M.P, after which a meeting was planned with the school principal, during which the study objectives and procedures were explained in detail. As the majority of the study participants were under 18 years of age, assent forms were distributed to them with the assistance of their class teachers to obtain permission from their parents. After receiving permission from the school management and the parents of the study participants, data collection was initiated. Students who were absent on the day of data collection and whose parents denied consent for the study were excluded.

On the day of data collection, study participants were assembled in a common hall according to the school's arrangements, and a structured, pre-tested questionnaire was distributed to them (pre-test). This questionnaire was developed by reviewing previous literature[7], guidelines of the World Health Organization (WHO), guidelines of the Ministry of Health and Family Welfare (MoHFW), India and guidelines from Federation of Obstetric and Gynaecological Societies of India (FOGSI). It consists of three domains: HPV infection, cervical cancer, and the HPV vaccine.

The students were first briefed on "how to fill the forms," and a duration of 30 minutes was allotted for the participants to complete the pre-test form. After the collection of pre-test forms, an interactive education session was delivered by the principal investigator with a female professor from the Department of Community Medicine. It was taken special consideration in respect of age group of study participants with maintaining cultural boundaries. A PowerPoint presentation was used to deliver the session covering general awareness about HPV infection, its mode of transmission, high-risk groups, signs and symptoms of cervical cancer, preventive measures and HPV vaccination. A special care was also taken to frame the presentation to avoid fear, stigma or misinformation of the study participants. The principal investigator (PI) also tried to determine the willingness of participants to take the HPV vaccine. During the whole session emphasis was given to create awareness among study participants, that indirectly acts as a boost to the knowledge of their parents/guardians regarding HPV vaccine.

The education intervention session was conducted under the supervision of senior female faculty members from the department, with the help and coordination of the female teaching staff of the school. This 45-minute intervention was followed by an interactive session where the doubts and queries were resolved.

After the intervention, the same questionnaire was re-administered for the same duration to fill out the post-test forms. In both forms, for the correct response, one mark and for the incorrect response, zero marks were allotted.

The data were entered into Microsoft Excel and analysed using the statistical package for the social sciences (SPSS 26) software (trial version). The data was presented in tabular and graphical formats, and frequency and percentages were calculated. The paired t-test was used to determine the difference in the mean knowledge scores of the participants before and after the intervention. The chi-square test was also used to assess the changes in study participants regarding willingness for the HPV vaccine in pre-test and post-test.

RESULTS

The present study was conducted among 150 schoolgirls studying in a Government higher senior secondary school in Bhopal city. Most of the study participants were in the 16–17-year age group, with the majority being in the 11th standard (Table 1).

Table 1: Sociodemographic distribution of the study participants (n=150).

Variables	Frequency (%)
Age (years)	
≤13	4 (2.7)
14-15	26 (17.3)
16-17	114 (76)
≥18	6 (4)
Religion	
Muslim	105 (70)
Hindu	41 (27.4)
Others	4 (2.6)
Grades	
9th	26 (17.3)
10th	34 (22.7)
11th	55 (36.7)
12th	35 (23.3)

Table 2 depicts the pre-test and post-test responses of study participants. The present study assessed the baseline knowledge of study participants before the intervention. It was observed that most school girls (56.7%) were unaware

of the Human papillomavirus. Only 2 participants out of 150 (1.4%) recognised HPV infection as a risk factor for cervical cancer, and only 5 (3.4%) had heard about the HPV vaccine. In post-test results, it was revealed that all 150 study participants could correctly answer that HPV is transmitted through sexual contact, which strains of HPV infection can lead to cervical cancer, and that vaccinated individuals are better protected against cervical cancer.

The average pre- and post-test scores of the study participants are shown in Table 3, where the mean pre-test score was 2.27±1.19 and the mean post-test score was 18.42±1.83. This difference was found to be highly statistically significant (t=57.76, p<0.0001), indicating a substantial improvement in the knowledge of the study participants following the educational intervention.

None of the study participants was vaccinated with the HPV vaccine. A lack of knowledge was reported as a primary barrier to vaccination uptake to date (145, 96.67%) (Figure 1).

Before the intervention, only 4 out of 150 participants (2.6%) were willing to take the HPV vaccine, whereas after the intervention, 120 (80%) expressed their willingness to take the vaccine, and this difference was found statistically significant (p<0.0001) (Table 4).

Table 2: Percent-wise distribution of knowledge of study participants between pre-test and post-test (n=150).

S. no.	Questions		Answered correctly	
			Pre-test, N (%)	Post-test, N (%)
1	What is HPV?	Type of bacteria	20 (13.3)	0
		Virus that can cause skin warts	35 (23.3)	0
		Virus that can lead to cervical cancer	85 (56.7)	150 (100)
		Fungal infection	10 (6.7)	0
2	How is HPV infection transmitted?	Through close contact	59 (39.4)	0
		By sharing food or drink	45 (30)	0
		Through sexual contact	9 (6)	150 (100)
		Through the air	37 (24.6)	0
3	How many strains are there of the HPV virus?	1	47 (31.3)	0
		2	25 (16.7)	0
		3	23 (15.3)	0
		>200	55 (36.7)	150 (100)
4	Cervical cancer affects which organ?	Head and neck	45 (30)	0
		Cervix	8 (5.3)	150 (100)
		Lungs	65 (43.4)	0
		Stomach	32 (21.3)	0
5	Which HPV strain causes cervical cancer?	14,15	0	0
		14,16	78 (52)	0
		16,18	20 (13.4)	150 (100)
		10,11	52 (34.6)	0
6	Risk factors for cervical cancer?	HPV infection	2 (1.4)	20 (13.4)
		Low socioeconomic status	1 (0.7)	20 (13.4)
		Illiteracy	10 (6.6)	26 (17.4)
		Poor genital hygiene	35 (23.4)	10 (6.6)
		Heavy smoking	4 (2.7)	18 (12)
		Early marriage (<18 years)	16 (10.6)	44 (29.3)
		Early pregnancy (<19 years)	27 (18)	2 (1.3)
		Multiple sexual partners	25 (16.6)	4 (2.6)
		Sexual intercourse before the age of 16 years	30 (20)	6 (4)
7	What is/are the symptoms related to cervical cancer?	Irregular vaginal bleeding	45 (30)	94 (62.7)
		Abnormal vaginal bleeding	16 (10.6)	19 (12.7)
		Abnormal vaginal bleeding after menopause	22 (14.6)	24 (16)
		Pelvic pain (lower abdominal pain)	5 (3.3)	7 (4.6)
		offensive vaginal discharge	62 (41.5)	6 (4)
8	Can HPV infection and cancer be prevented?	Yes, through vaccination	33 (22)	150 (100)
		No, it cannot be prevented	45 (30)	0
		I don't know	72 (48)	0

Continued.

S. no.	Questions		Answered correctly	
			Pre-test, N (%)	Post-test, N (%)
9	Have you heard about the HPV vaccine?	Yes	5 (3.4)	150 (100)
		No	145 (96.6)	0
10	Who will be more protected against cervical cancer?	Vaccinated	25 (16.6)	150 (100)
		Not vaccinated	7 (4.7)	0
		Don't know	118 (78.7)	0

Table 3: Standard-wise difference in knowledge of study participants between pre-test and post-test (n=150).

S. no.	Standard	Number of study participants	Pre-test results (mean±SD)	Post-test results (mean±SD)	t value	P value
1	9	26	2.27±1.34	19.46±2.63	31.96	<0.0001
2	10	34	2.65±1.35	18.47±2.12	38.97	<0.0001
3	11	55	1.95±1.28	17.75±4.53	24.56	<0.0001
4	12	35	2.4±0.5	18.66±1.83	54.29	<0.0001
Total			2.27±1.19	18.42±1.83	57.76	<0.0001

Table 4: Willingness of study participants for HPV vaccine before and after intervention (n=150).

S. no.	Willingness for HPV vaccine	Pre-test N (%)	Post-test N (%)	Total	χ^2	P value
1	Yes	4 (2.6)	120 (80)	124	184.97	0.00001
2	No	146 (97.4)	30 (20)	176		0.00001

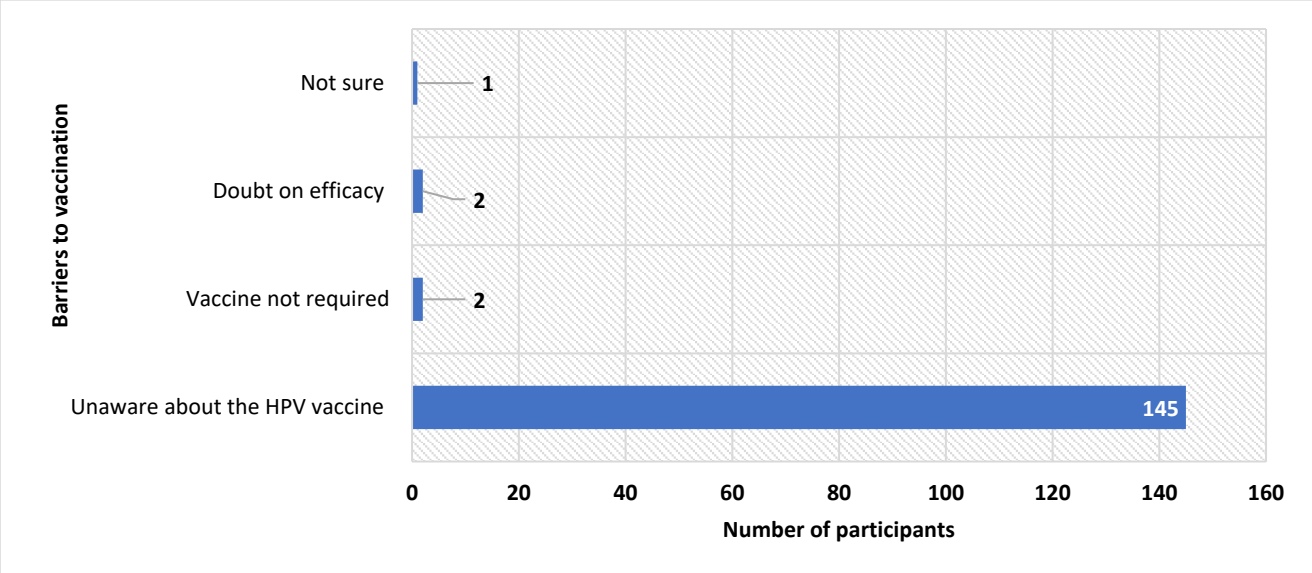

Figure 1: Barriers to HPV vaccination reported by study participants (pre-test) (n=150).

DISCUSSION

In our study, a drastic 92% improvement in knowledge about HIV infection, cervical cancer, and the HPV vaccine was observed after the educational session. In contrast, a study by Verma et al, 1 found a significant improvement in knowledge, increasing from 60% to 100%, after the intervention. It is somewhat different from our findings, as the study participants in the Verma study were female healthcare students and were presumed to have pre-existing knowledge due to their medical background.

Regarding knowledge of the HPV vaccine among study participants, a remarkable increase from 3.3% to 100% was found after an educational intervention (Table 2). This finding is nearly identical to a study conducted by Apurva et al in Maharashtra among schoolgirls, in which only 2.5% were aware of the HPV vaccine, with 94% of responses being correct regarding the vaccine, yielding highly statistically significant results.[9]

In the present study, when assessing knowledge based on questions regarding cervical cancer affecting organs, it was

found that the knowledge increased from 5.3% to 100%. In contrast, a study by Verma et al found a range of 89% to 99.7%, as shown in Table 1. On analysing knowledge about cervical cancer risk factors, it was increased from 11.3% to 100% and Verma et al observed 15% to 48%. By asking questions regarding symptoms of cervical cancer in the pre-test, 45.3% responded correctly, whereas almost all participants had correct knowledge after the post-test. This finding is similar to the study done by Verma et al in Bhopal, in which it was reported that 21% to 67%.[1]

In our study, during the pre-test, only 6% of study participants knew about the route of transmission of HPV. However, after the educational intervention, all study participants were able to identify the route of transmission of HPV correctly. This observation is similar to the Verma et al. study, in which 54% of participants were unaware in the pre-test, whereas 99% knew after the post-test. It is again because the study participants belong to a medical background.[1] A previous study have reported that knowledge and awareness of HPV-related risk factors among medical students were 15% to 48%, that likely reflects curricular gaps and sociocultural barriers rather than individual shortcomings. In our study, awareness improved from 11.3% at baseline to 100% after intervention, reflecting a positive impact of structured, age-appropriate educational efforts.[1] In a cross-sectional study done by Kumari et al among adolescent girls at UP in 2021, it was observed that only 2.08% of study participants responded in favour of the HPV vaccine against HPV infection and cancer prevention. In our study, after the education session, there was an increment of 22% to 100% in favour of the HPV vaccine as the best preventive measure.[11]

In a multi-centric study done by Ramavath et al, among adolescent girls in schools and colleges in the year 2013, 74.4% showed their willingness to get the HPV vaccine, and even after 12 years in our study, 80% of the participants showed interest in taking the HPV vaccine after the session.[7] That depicts there should be conduction of more frequent and aggregated efforts in the community.

In 2024, a quasi-experimental study done in Manipur by Dhinu et al observed that the willingness of parents to get their daughter's vaccine as a preventive measure was 61.4% after the education session. That suggests that along with the target age group, their parents should also be considered for health education intervention.[10]

In our study, the primary barrier to the HPV vaccine identified was a lack of awareness (96.67%), while only 1.3% expressed doubt regarding its efficacy, and 1.3% thought it was not necessary for them (Figure 1). These findings are precisely similar to the study done in Bhopal by Verma et al in which lack of awareness was reported as a significant barrier to getting the vaccine.[1] In another study conducted among the parents of adolescent girls at Manipur, it was found that side effects, safety issues and cost of the vaccine were primary barriers. These observations are contrary to our study. This might be due to the anxiety issue of parents about their daughters, and they also want cost-effectiveness to incorporate this.[10]

In 2013, a similar multi-centric study was conducted by Ramvath et al, which found that the majority of study participants (56.7%) expressed concern regarding the cost of the HPV vaccine. Only 24.8% showed a lack of awareness, 2.9% expressed fear of needle pricks, and 15.6% were concerned about side effects and safety. These findings differ from our results. It is because our study is focused on a targeted age group and educational intervention type, so, before the intervention, naturally, study participants were not aware of the vaccine.[7]

Limitations

As the study was conducted in a single school among 150 adolescent girls, these findings cannot be generalized to others.

CONCLUSION

This study revealed a lack of knowledge as a primary barrier to getting the HPV vaccine. After the intervention, 92% participants reported an increase in knowledge. Simultaneously, 80% also expressed their willingness to opt for the vaccine once it becomes available at government health centres. Therefore, educational intervention played a crucial role in enhancing both knowledge and awareness among study participants. As vaccination is a key strategy to fight against infection, the implementation of the HPV vaccine will play a breakthrough role in reducing the burden of cervical cancer.

Recommendations

This study recommends to the policymakers that this sensitive but important topic need to be incorporated in the syllabus of schools to create more awareness.

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REFERENCES

1. Verma I, Bajpai R, Arjaria V, Garg L, Mungad A, Singh D, et al. A Study to Assess the Impact of Education on the Knowledge and Attitude Toward Cervical Cancer and HPV (Human Papillomavirus)

Vaccination Among Female Healthcare Students. Cureus. 2024;16(5):e59856.
2. ICO/IARC Information Centre on HPV and Cancer. India: Human Papillomavirus and Related Cancers, Fact Sheet 2023. Barcelona, Spain: ICO/IARC Information Centre on HPV and Cancer. 2023. Available at: https://hpvcentre.net/statistics/reports/IND_FS.pdf. Accessed on 12 January 2026.
3. Ramamoorthy T, Sathishkumar K, Das P, Sudarshan KL, Mathur P. Epidemiology of human papillomavirus related cancers in India: findings from the National Cancer Registry Programme. Ecancermedicalscience. 2022;16:1444.
4. Sharma M, Kaur E, Sandhu R, Kaur S. Human papillomavirus vaccine for cervical cancer prevention in India: new improvement and way forward. Int J Community Med Public Health. 2024;11(11):4554-8.
5. Bhatla N, Meena J, Gupta K, Pal B, Divakar H, Bhalerao S, et al; FOGSI Expert Group. Human papillomavirus vaccination: Good clinical practice recommendations from the Federation of Obstetric and Gynecological Societies of India. J Obstet Gynaecol Res. 2020;46(9):1651-60.
6. Silva HM. The Impact of Cervical Cancer on the Health of Elderly Women and the Relevance of HPV Vaccination: Challenges and Strategies for Public Health. JM Med Stud. 2024;1(1):1-5.
7. Ramavath KK, Olyai R. Knowledge and Awareness of HPV Infection and Vaccination Among Urban Adolescents in India: A Cross-Sectional Study. J Obstet Gynaecol India. 2013;63(6):399-404.
8. Mayo M, Potugari B, Bzeih R, Scheidel C, Carrera C, Shellenberger RA. Cancer Screening During the COVID-19 Pandemic: A Systematic Review and Meta-analysis. Mayo Clin Proc Innov Qual Outcomes. 2021;5(6):1109-17.
9. Apurva UT, Muralidhar PT, Malangori AP, Poonam VS, Pradip SB. Effect of Health Education on the Knowledge and Attitude Regarding the Human Papillomavirus Vaccine among Adolescent School Girls of a City in Western Maharashtra. Indian J Community Health. 2024;36(4):549-55.
10. Dhinu K, Fernandez S, Gupta A, Elangbam V. Effect of health education on acceptance of human papilloma virus vaccine among parents of adolescent girls of Bishnupur, Manipur: A quasi-experimental study. Indian J Med Res. 2024;160(3&4):346-53.
11. Kumari S, Singh A, Sangal R, Sharma NR. KAP study on cervical cancer and human papillomavirus vaccine acceptability among adolescent girls of Eastern UP: a cross-sectional study. Int J Reprod Contracept Obstet Gynaecol. 2021;10(5):2031-6.

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