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Impact of a health education session on the knowledge of Human Papillomavirus Vaccination (HPV) among the school teachers

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***Abstract*---Introduction:** Cervical cancer is the second most common cancer in women worldwide and the most common cancer cause of death in developing countries. Cervical cancer can be detected through cytology alone or in combination with the Human Papilloma Virus (HPV) test. However, the asymptomatic nature of cervical cancer makes early detection challenging. Therefore, prevention, particularly through the HPV vaccine, is crucial in reducing the incidence of cervical cancer. Unfortunately, there is limited awareness about the availability of the HPV vaccine in India. **Method:** School teachers were recruited to participate in the study. Data was collected from 5/08/2022 to 15/09/2022. HPV knowledge was assessed using a questionnaire that included 7 questions related to HPV and 8 questions related to the HPV vaccine. Following this, the principal investigator conducted a brief health education session on HPV and its vaccination using a PowerPoint presentation. Knowledge was reassessed after the intervention using a repeat Google form. **Results:** A total of 155 teachers participated in the research (comprising 152

female teachers and 3 male teachers) from 5 schools. There was a significant negative association ($r = -0.186$) ($p<0.05$) between the age and pre-test score of the participants. The mean of pre intervention score (7.03 ± 3.35) was less than the mean of post intervention score (12.64 ± 2.41). Paired t-Test was performed and the difference was found to be statistically highly significant ($p<0.01$). **Conclusion:** The pre-test results from this study revealed a clear gap in knowledge about the HPV vaccine among school teachers. However, the substantial increase in understanding following just one health education session highlights the effectiveness of basic educational interventions in closing the knowledge gap regarding vaccination among teachers.Put your abstract here. Use single spacing and don't exceed 200 words. Put your abstract here. Use single spacing and don't exceed 200 words. Put your abstract here. Use single spacing and don't exceed 200 words. Put your abstract here. Use single spacing and don't exceed 200 words. Put your abstract here. Use single spacing and don't exceed 200 words. Put your abstract here. Use single spacing and don't exceed 200 words. Put your abstract here. Use single spacing and don't exceed 200 words. Put your abstract here. Use single spacing and don't exceed 200 words.

***Keywords*---**cervical cancer, human papillomavirus (HPV), vaccine, health, education, knowledge.

Introduction

Cervical cancer is a malignant tumor of the cervix, the lowermost part of the uterus[1]. It is the second most common cancer among women worldwide and the leading cause of cancer-related deaths in developing countries[2]. In 2018, China and India together accounted for more than a third of the global cervical cancer burden, with India alone reporting 97,000 cases and 60,000 deaths[3]

Detection of cervical cancer can be done through cytology or Human Papillomavirus (HPV) testing alone or in combination[4]. However, its asymptomatic nature makes early detection challenging, highlighting the importance of prevention[5]. The HPV vaccine is a key preventive measure. According to the World Health Organization (WHO), the vaccine is recommended for two age groups: 9 to 14 years, where it is administered in two doses (at 0 and 6 months), and 15 to 26 years, where it is given in three doses (at 0, 2, and 6 months). The 9-14 age group is the primary target for vaccination awareness, as they are most accessible through school programs, making teacher awareness crucial.

The HPV virus consists of more than 200 related viruses, with types 6 and 11 accounting for about 90% of genital warts[6], while types 16 and 18 lead to approximately 70% of cervical cancers[7,8,9]. Besides this, the types 31,33,45,52,and 58 amount to between 10-20% of total cases. Most cervical cancer patients get infected as a result of these strains. There are three vaccines widely approved: Gardasil, Gardasil 9, and Cervarix. Gardasil protects against

HPV types 6, 11, 16, and 18, while Cervarix targets types 16 and 18. Despite the bivalent and quadrivalent HPV vaccines being licensed in India since 2008 and 2018, respectively, a significant portion of the population remains unvaccinated, largely due to a lack of awareness. This study aims to assess the knowledge of teachers in India about the HPV vaccine before and after attending a health education session.

Review of literature:

Cervical cancer is the second most prevalent cancer in women worldwide, the fifth most common cancer in humans, and the leading cause of cancer-related death in developing nations[1]. A study conducted in Korea on health teachers' familiarity with HPV highlighted the need for greater emphasis on HPV vaccination, as well as variations in attitudes and intentions regarding HPV. It is crucial for health educators to receive ongoing training on HPV vaccination for both boys and girls. (10). A comparable study that involved teachers in Kitui County, Kenya, suggested that instructors have adopted the school-based strategy to administer the HPV vaccine to teenage girls (11). Future campaigns ought to take advantage of this teacher backing. The study draws attention to the knowledge gaps between HPV vaccines and cervical cancer that have been highlighted by other investigations.

It also demonstrates how teachers' desire to enable their daughters to receive the HPV vaccine or advocate for others may be hindered by a lack of awareness about the vaccine. Concerns about vaccination safety must be addressed, and the public must be made aware that HPV is a sexually transmitted infection that affects both men and women. As the nation prepares to start a nationwide HPV vaccination programme for adolescent girls, a key focus should be to the spread knowledge on HPV, the HPV vaccine, and cervical cancer. Therefore, there is a need for efficient strategies for educating parents, teachers, and girls. The first stage should be the recruitment and training of teachers to act as vaccination ambassadors to educate their colleagues, parents, and targeted girls because schools are likely to be the preferred venues for vaccine administration.

Additionally, community mobilisation techniques including focusing on audiences at social and religious events along with the usage of social media could be effective ways to convey knowledge about the HPV vaccine and cervical cancer to assist successful implementation.

With this background, the objectives of the current study were to assess the knowledge about HPV vaccination among school teachers, the association of socio-demographic factors and knowledge regarding HPV vaccination among the school teachers and to assess the impact of health education sessions on the knowledge of HPV vaccination among the school teachers.

Methods and Materials

The study was carried out at Department of Pathology, Dr. Vasantrao Pawar Medical College, Hospital and Research Centre, Nashik after the approval from institutional ethics committee.

Study Design**:** Quasi-experimental study design.
Sample Size Calculation:

$$\text{Sample Size} = n \geq Z^2\ 1-\alpha/2 \times \frac{p(1-p)}{d^2}$$

Where Z= 1.96
P= proportion of people with good knowledge regarding HPV (Here it is assumed to be 50%) d= 8%
Therefore, a sample size of minimum 150 teachers was required.

School teachers were recruited to participate in the study, with participants included if they were currently working at the schools. Individuals were excluded if they did not complete either the questionnaire or the informed consent form. Data collection took place from 05/08/2022 to 15/08/2022. Access to the participants was accomplished via assistance from the management of respective schools. A structured questionnaire, specifically designed for this study, was used to collect data and was circulated via Google Forms. The constructs and contents of the questionnaire were validated by the Institutional Scientific Research Committee. HPV knowledge was assessed through 15 knowledge questions, with 7 related to HPV and 8 related to the HPV vaccine. The Google Form included the informed consent form, socio-demographic information (such as age, gender, marital status, subject taught by the participant, duration of career as a teacher, and vaccination status), and knowledge questions about HPV and HPV vaccination.

For the knowledge questionnaire, a scoring system was used where a score of 1 was assigned for each correct answer and a score of 0 for an incorrect or “do not know” answer. As an intervention, a brief health education session regarding HPV and HPV vaccination was conducted by the principal investigator using a PowerPoint presentation, which was reviewed and validated by the Institutional Scientific Research Committee. Knowledge was reassessed post-intervention using a repeat Google Form.

The data was transferred to MS Excel for statistical analysis, which was performed using SPSS (Version 26) software. Means of different groups were compared using one-way ANOVA, and a paired t-test was conducted, with $p<0.05$ considered significant.

Results

1) Socio-demographic characteristics and variables:

A total of 155 teachers participated in the research (comprising 152 female teachers and 3 male teachers) from 5 schools. Participants aged between the ages of 24 - 57 (40.3 ± 6.3). 93.54%
participants were married. The duration as a teacher ranged from 0 - 30 years (13.1 ± 5.11). A total of 1.97% participants (female) reported that they have taken the HPV vaccine. **(Table 1)**

2) HPV Knowledge:
The results indicated that the average pre-test score among teachers was 7.03 ± 3.35. As shown in **Table 2**, Question 1 ("HPV is the most common cause of which of the following?") had the highest correct response rate, with 75.3% of teachers answering correctly. In contrast, Question 5 ("Which of the following is true regarding HPV in most cases?") had the lowest correct response rate, with only 8.4% of teachers correctly identifying that HPV infection will resolve on its own. Notably, 41.9% of respondents incorrectly believed that HPV infection would most likely cause cervical cancer.

Regarding the question about the name of the vaccine, 31.6% of participants correctly identified Gardasil as a vaccine against HPV. Additionally, only 27.7% of participants correctly understood that the HPV vaccine is prophylactic and should be administered before infection occurs.

3) Socio-demographic Variance:
Participants under 40 years of age demonstrated significantly higher knowledge ($p<0.05$) compared to those over 40 years. **Table 3** displays the knowledge levels among participants from different age groups. **Table 4** shows that there is significant negative association ($r = -0.186$) ($p<0.05$) between the age and pre-test score of the participants. Significant knowledge difference ($p<0.05$) was not found in the participants according to the subject they teach. **Table 5** shows knowledge of the participants according to the subject they teach.

4) Impact of Health Education Session:
Mean of pre intervention score (7.03 ± 3.35) was less than the mean of post intervention score (12.64 ± 2.41). Paired t-Test was performed and the difference was found to be statistically highly significant ($p<0.01$) (Table 6)

Discussion

Bivalent and quadrivalent HPV vaccines were licensed in India in the year 2008 while the nonavalent vaccine was licensed in the year 2018. The broadly assumed reason for less popularity of both the vaccines in India even after almost 14 years of introduction of bivalent and quadrivalent vaccines include high cost, reluctance to invest in healthcare of female children along with fear and stigma [12]. However, our analysis of the pre-test taken by the school teachers suggested that the largest reason for the extremely low levels of HPV vaccination in India is due to lack of knowledge. In the current study, the knowledge related questions on the HPV vaccine were among the least scored questions (Question 9 and 13). The problem of the aforementioned factors like high cost, reluctance to put efforts for the healthcare of female children, fear and stigma may arise after the public gets aware of the vaccine [13]. We strongly suggest working towards reducing the effect of the above factors, however, we also believe that these factors will come into the picture only after the general public becomes aware of the existence and use of the HPV vaccine. Our request to take a health education session was taken with positivity and enthusiasm by the teachers irrespective of their age, experience in the teaching field and the subject they taught. The involvement of teachers during the session was clearly indicated by the questions that were raised by them. This implies that the teachers and the school management are eager to have health

duration sessions like this in order to educate their students and parents regarding the same. The launch of the newly developed, low-cost HPV vaccine in India can be a breakthrough for India and its rising number of deaths due to cervical cancer [14]. It is essential for the government and non-governmental organizations to support and fund educational initiatives to boost HPV vaccination rates [15]. Further studies with a comparatively larger sample size should be conducted with the consideration of other socio demographic factors that could not be incorporated in this study.

Conclusion

The results of pre-test in the present study showed that there is an evident lack of knowledge about the HPV vaccine among school teachers. However, the significant increase in their knowledge after a single health education session demonstrates the major impact that educational measures can have. Additionally, the higher level of knowledge observed among younger teachers may be attributed to increased awareness campaigns about HPV vaccination on various social media platforms.

Summary

We conducted research to check the knowledge of school teachers regarding the HPV vaccine. The results as discussed above suggested that the knowledge of teachers was low and not updated. Hence to overcome this, we conducted a Health Education Session for these teachers and asked them to fill the same forms again. This time there was a statistically significant increase in the knowledge of the teachers. This shows the importance of awareness drives and the impact that such sessions can create. The results also indicate that there is an urgent need to increase awareness regarding Cervical cancer and its prevention as India is launching its own cost-effective cervical cancer vaccine. The study can be extended to see how many teachers that attended the session actually pass on the information to students and parents. Further, how many women actually take the vaccine as a direct or indirect result of this research and the Health Education Session has to be assessed. Cervical cancer remains a leading cause of death among women, with significant social and economic repercussions, as it predominantly affects women of working age. The vaccine has the potential to prevent this disease, but its success depends on widespread dissemination of information. Achieving a cervical cancer-free India requires ensuring that vaccine information reaches the general public.

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List of Tables

Table 1			
Socio-demographic Variables		**Number of Teachers**	**Percentage of Teachers (%)**
Gender	Female	152	98.1
	Male	3	1.9
Age (in years)	30 years or less	14	9
	31 - 40 years	59	38.1
	41 - 50 years	68	43.9
	51 years and above	14	9
Subject	Language	55	35.5
	Mathematics	27	17.4
	Science	30	19.4
	Social sciences	20	12.9
	Others	23	14.8
Duration of career as a teacher (in years)	Less than or equal to 10	57	36.8
	11 - 20	81	52.3
	21 or above	17	10.9
Vaccination Status (Females only) (n = 152)	Received HPV vaccine	3	1.97
	Not received HPV vaccine	149	98.03

Table 2

Question	Number of Correct Response	Number of Incorrect Response	Percentage of Correct Response (%)
1. Human Papillomavirus (HPV) is the most common cause for which of the following?	116	39	75.3
2. Which of the following is caused by HPV?	95	60	61.3
3. What does it mean to have genital warts?	66	89	42.6
4. Which of the following can increase the risk of getting HPV?	109	46	70.3
5. Which of the following is true regarding HPV in most cases?	13	142	8.4
6. Vaccine is recommended for which age group?	57	98	36.8
7. Which following decreases the risk of getting HPV?	99	56	63.9
8. Which of the following can pass HPV from one person to another?	97	58	62.6
9. Which of the following is a vaccine against HPV?	49	106	31.6
10. Who is eligible for vaccination in India?	70	85	45.2
11. Select the condition in which the vaccine cannot be given.	71	84	45.8
12. Select the correct statement regarding HPV vaccination during pregnancy.	83	72	53.5
13. Choose the correct statement regarding HPV vaccine	43	112	27.7
14. Role of periodic screening after HPV vaccination?	47	108	30.3
15. Choose the correct statement regarding side effects of HPV vaccine.	74	81	47.7

Table 3

Knowledge among participants belonging to different age groups

Age	N	Mean ± SD
30 years or less	14	8.36 ± 3.478
31 - 40 years	59	7.66 ± 3.507
41 - 50 years	68	6.44 ± 3.197 *$
51 years or above	14	5.86 ± 2.656 *$
Total	155	7.03 ± 3.359

*p<0.05 as compared to participants of age 30 years or less.

$p<0.05 as compared to the participants of age 31 - 40 years.

Multiple Comparisons

Dependent Variable: Age wise distribution

LSD

Age		Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
30 years or less	31 - 40 years	.696	.982	.479	-1.24	2.64
	41 - 50 years	**1.916***	.969	**.050**	.00	3.83
	51 years or above	**2.500***	1.248	**.047**	.03	4.97
31 - 40 years	30 years or less	-.696	.982	.479	-2.64	1.24
	41 - 50 years	**1.220***	.588	**.040**	.06	2.38
	51 years or above	1.804	.982	.068	-.14	3.74
41 - 50 years	30 years or less	**-1.916***	.969	**.050**	-3.83	.00
	31 - 40 years	**-1.220***	.588	**.040**	-2.38	-.06
	51 years or above	.584	.969	.548	-1.33	2.50
51 years or above	30 years or less	**-2.500***	1.248	**.047**	-4.97	-.03
	31 - 40 years	-1.804	.982	.068	-3.74	.14
	41 - 50 years	-.584	.969	.548	-2.50	1.33

*. The mean difference is significant at the 0.05 level.

Table 4

Correlation between Age and Pre-test Score

		Age	pretest
Age	Pearson Correlation	1	-.186*
	Sig. (2-tailed)		.020
	N	155	155
pretest	Pearson Correlation (r)	**-.186***	1
	Sig. (2-tailed)	**.020**	
	N	155	155

*. Correlation is significant at the 0.05 level (2-tailed).

Table 5

Knowledge among the participants according to the subject they teach.

Subject	Mean	N	Std. Deviation
Language	7.04	55	3.377
Maths	7.30	27	3.361
Others	6.43	23	3.342
Science	7.80	30	3.089
SST	6.15	20	3.717
Total	7.03	155	3.359

Multiple Comparisons

Dependent Variable: subject wise distribution

LSD

(I) Subject	(J) Subject	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Language	Maths	-.260	.790	.743	-1.82	1.30
	Others	.602	.835	.472	-1.05	2.25
	Science	-.764	.763	.318	-2.27	.74
	Social Sciences	.886	.878	.314	-.85	2.62
Maths	Language	.260	.790	.743	-1.30	1.82
	Others	.862	.954	.368	-1.02	2.75
	Science	-.504	.892	.573	-2.27	1.26
	Social Sciences	1.146	.992	.250	-.81	3.11
Others	Language	-.602	.835	.472	-2.25	1.05
	Maths	-.862	.954	.368	-2.75	1.02
	Science	-1.365	.932	.145	-3.21	.48
	Social Sciences	.285	1.028	.782	-1.75	2.32
Science	Language	.764	.763	.318	-.74	2.27
	Maths	.504	.892	.573	-1.26	2.27
	Others	1.365	.932	.145	-.48	3.21
	Social Sciences	1.650	.970	.091	-.27	3.57
Social Sciences	Language	-.886	.878	.314	-2.62	.85
	Maths	-1.146	.992	.250	-3.11	.81
	Others	-.285	1.028	.782	-2.32	1.75
	Science	-1.650	.970	.091	-3.57	.27

Table 6

Paired t-Test

	N	Mean	Std. Deviation
Pretest	155	7.03	3.359
Post Test	155	12.63	2.407

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
	Equal variances assumed	26.926	.000	-16.890	308	**.000**	-5.606	.332	-6.260	-4.953
	Equal variances not assumed			-16.890	279.126	.000	-5.606	.332	-6.260	-4.953