Original Research Paper

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Preventive Medicine

KNOWLEDGE, ATTITUDE, AND PRACTICE REGARDING HUMAN PAPILLOMAVIRUS (HPV) VACCINE AMONG SCHOOL STUDENTS, PARENTS, AND TEACHERS IN CENTRAL KERALA: A CROSS-SECTIONAL STUDY PROTOCOL

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ABSTRACT **Introduction:** Human Papillomavirus (HPV) remains a leading cause of cervical cancer and is a major public health concern, especially in low- and middle-income countries like India. While effective vaccines exist, awareness and acceptance remain low. In Kerala, where literacy is high, little is known about the knowledge, attitudes, and practices (KAP) surrounding the HPV vaccine among adolescents, their parents, and teachers. **Methods And Analysis:** This cross-sectional study will include school children aged 11–15 years, their parents, and teachers in Thiruvalla Municipality, Kerala. Stratified random sampling will be used for student selection from four schools representing government, aided, and private sectors. Census sampling will include all eligible teachers, and parents will be recruited via convenience sampling. A structured, validated questionnaire will be used. Data will be analyzed using descriptive statistics, t-tests, chi-square tests, and logistic regression to explore associations and predictors of KAP. **Ethics And Dissemination:** Ethical clearance has been obtained. Permissions from school authorities are being secured. When participant data will be collected, consent to participate will be taken from each participant. Findings will be disseminated through scientific publications, presentations, and community outreach. **Clinical Trial Registration :** Not applicable (observational study). Strengths and Limitations of This Study First study in Kerala examining HPV vaccine KAP among all three key stakeholder groups.Multistakeholder approach offers a comprehensive understanding of barriers and enablers. Data will inform tailored health education programs in schools. Cross-sectional design limits causal inference. Parent participation through convenience sampling may introduce selection bias.

KEYWORDS : Human Papilloma Virus, Vaccine, HPV, Cervical Cancer, School Students, KAP study, protocol

INTRODUCTION

Human Papilloma Virus (HPV) is the most common sexually transmitted infection globally, with around 40 strains affecting the anogenital region. Though most of these infections are self-limiting, some high-risk strains are associated with cancers such as cervical, anal, oropharyngeal, and penile cancer.(1) Despite the availability of effective vaccines, HPV-related diseases remain a significant public health concern, particularly in low- and middle-income countries where screening and vaccination coverage may be low. Understanding public knowledge, attitudes, and practices (KAP)regarding HPV and its vaccine is crucial in developing effective prevention strategies.(2-5)

Public Health Problems Due To The HPV Virus

On a global scale, cervical cancer is the fourth most common cancer among women. In 2023, it was estimated that there were 604,000 new cervical cancer cases, causing around 342,000 deaths worldwide. Projections indicate an annual increase of nearly 100,000 cases between 2018 and 2030. Illiteracy and early sexual activity are risk factors for over 85% of cervical cancer cases.(6) The disease not only affects women's health but also endangers the survival and well-being of their children when mothers succumb to cervical cancer.(7)

Disparities In Health Care Around The World

Cervical cancer is a preventable and curable disease. Despite the availability of the HPV vaccine for the prevention of cervical cancer , and effective treatment measures- much of the world has limited access to these services. Statistics show that deaths due to cervical cancer are three times higher in low- or lower- middle- income countries, demonstrating the widespread disparities in the availability, accessibility, and adaptability of health care services in regions with the highest disease burden.(8)

HPV vaccination, cervical cancer screening, and management of precancerous lesions/cervical cancer must be integrated in strategic ways into the health care system. Till such time, it will continue to wreak havoc as one of the most common cause of cancer death in women.(9)Involving people in their own health care can help reduce the incidence, mortality, and healthcare burden related to HPV-related conditions. (10) The demonstrated success of these vaccines has driven a global commitment to eliminate cervical cancer as a public health problem.(11)

Global Strategy For The Elimination Of Cervical Cancer

Public health microbiology is at the threshold of a rare but doable feat- the elimination of a non-communicable disease- cervical cancer. Through the Global Strategy to eliminate cervical cancer adopted in 2020, countries have been given a 90-70-90 target strategy towards elimination of cervical cancer, as a public health problem by 2030. This strategy aims to vaccinate 90% of girls less than 15 years of age with the HPV vaccine. By 35 years of age and again by 45 years of age, 70% of women must be screened with a high-performance test to detect cervical cancer. Further, 90% of women identified with cervical disease should receive treatment. (10)

HPV Virus In India

India is a lower middle-income country. The vastness of the country and the diversity of its population are responsible for the lack of proper documentation of the epidemiology and patterns of HPV virus strains. Thus, as in other lower income countries, the implementation of prevention and control programs has been difficult. In India, annually, about 1,32,000 new cervical cancer cases and 80,000 deaths occur, and the prevalence of HPV type 16 was found to be extremely high.(12) At present India has the highest burden of cervical cancer in the world. (13)The importance of the HPV vaccination cannot be overstated in this context.

Vaccine Coverage In India

Since 80% of cancers caused by HPV can be effectively prevented by the vaccine, it offers a window of opportunity for controlling this disease. India has two HPV vaccines licensed for use since 2008. (13, 14) Both the quadrivalent and the bivalent vaccines offer considerable protection against HPV induced cancer and for a long duration (about 10 years).

The vaccine was first introduced in the State of Sikkim, in 2018 as part of a state-wide school-based immunization program targeting adolescent girls. The initiative achieved high vaccination coverage due to strong governmental support, school-based delivery, effective collaboration between health and education departments, robust social mobilization strategies, and effective awareness campaigns. The state achieved over 95% vaccination coverage among targeted girls for both doses through two campaigns, with no severe adverse events reported. The vaccine was well accepted by all stakeholders, with minimal

refusal observed.(15)

The indigenously developed quadrivalent vaccine was recommended for use in the UIP as a two-dose regimen for girls. The National Technical Advisory Committee on Immunization in 2022 (16) recommended the introduction of the HPV vaccine as part of the Universal Immunization (UIP) program with the first dose at 9 years of age and a onetime catch- up immunization at 9-14 years for girls.

Boys will be immunized once 80% coverage for girls is achieved. The vaccine was planned to be rolled out for use free of charge in the second half of 2024.(17) And, two districts of Kerala, Wayanad and Alappuzha were planned to be included in the pilot phase of the launch of this vaccine. (18)Though the nationwide implementation of the HPV vaccine in India under the UIP is facing technical delays, efforts are on.(19)

Vaccine Coverage In Kerala

The exact statistics on the voluntary use of the HPV vaccine in Kerala are not available. The prevalence of cervical cancer has shown a declining trend according to some studies with rates as low as 7-9 cases per 100, 000 per year. This is used sometimes as an argument against the introduction of the HPV vaccine in the state and to increase the use of cervical cancer screening techniques rather than vaccination. (20) One study has shown an 8% coverage of HPV vaccine among medical students in Kerala in 2018.(21)

The Happy Noolpuzha Initiative, launched by Noolpuzha Gram Panchayat in Wayanad in March 2024, provided free HPV vaccination to girls aged nine and above, making it the first such program in a tribal panchayat in India. With an initial vaccination of 53 girls and plans to expand, the initiative aims to combat cervical cancer by ensuring widespread immunization, highlighting the community's proactive commitment to women's health.(22)

The knowledge, attitude, and practice towards acceptance of these vaccines in India is not well studied. (9, 23)

Research Hypothesis

Knowledge, attitudes, and uptake of the HPV vaccine are expected to be suboptimal among school-going adolescents, their parents, and teachers in Tiruvalla Municipality. There is a critical need for increased awareness and acceptance, especially among the vaccine-eligible adolescent population.

Research Question

What are the levels of knowledge, attitudes, and practices related to HPV vaccination among school-going adolescents, their parents, and teachers in Tiruvalla Municipality?

Aim Of The Research

The study seeks to evaluate the knowledge, attitudes, and current practices related to the HPV vaccine among adolescent school-going children(aged 11-15 years), their parents, and teachers in Tiruvalla Municipality, in order to understand the preparedness of key stakeholders in supporting HPV vaccine uptake.

Rationale

There is limited information on the knowledge, attitudes, or the current practices related to the HPV vaccine among school-aged adolescents, parents, and their teachers from Kerala. This knowledge gap impedes the effective rollout of preventive interventions. Understanding these stakeholder perspectives is essential for identifying barriers, designing context-specific health education strategies, and improving vaccination coverage.

Relevance

Cervical cancer is a significant global health concern especially in low- and middle-income countries. The WHO Global Strategy to eliminate cervical cancer as a public health problem, emphasizes the need for achieving adequate knowledge, and ensuring that at least 90% of girls receive the HPV vaccine by 15 years of age. The successful implementation of the WHO goal and the Sustainable Development Goal(SDG) that advocates that no one be left behind can prevent 74 million new cases of cervical cancer and avert 62 million deaths from cervical cancer. It is essential that the beneficiaries of the vaccine- school children and their caregivers- be aware of the HPV virus, the disease and its vaccine, in order to reduce future disease burden. (24) Findings from this study will contribute to policy and practice by guiding targeted interventions in school-based vaccination programs.

Objectives

The primary objective of this study is to assess the levels of knowledge, attitudes, and practices (KAP) related to HPV and HPV vaccination among school-going children aged 11–15 years in the Tiruvalla Municipality. Additionally, the study aims to explore the perspectives of parents and teachers, who play a pivotal role in influencing vaccine-related decisions. By identifying gaps and barriers in understanding or acceptance, the study seeks to generate evidence that can inform the design of targeted health education interventions to promote awareness and improve HPV vaccine uptake among adolescents and their immediate support systems.

Review Of Literature:

Several studies highlight the low levels of awareness and uptake of HPV vaccination in India. A study conducted by Backer et al among college students in Kollam, Kerala in 2024, found that while 85.6% of students were aware that HPV causes cervical cancer, only 48.6% had heard of the HPV vaccine, and vaccination rates remained low (11.6% in medical students, 4.9% in non-medical students). (23)Similarly, research by Basu et al. (25) among adolescent girls in North India found that vaccine uptake was hindered by lack of knowledge, financial constraints, and cultural hesitancy.

HPV vaccination programs in schools have been identified as an effective way to increase vaccine awareness and acceptance. (26) Studies emphasize that improving vaccine uptake requires comprehensive health education initiatives targeting students, teachers, and parents. (27) Health campaigns incorporating school-based awareness programs, parental counseling, and teacher training have been found effective in improving HPV vaccination rates.(28)

However, studies indicate that many school-going children lack adequate knowledge about HPV and its vaccine. Research from Maharashtra revealed that only 2.5% of school students had heard of the vaccine, and this improved after an awareness class was conducted.(29)Teachers play a crucial role in disseminating vaccine-related information, yet studies suggest that many lack adequate training on HPV and its prevention.(30)Parental attitudes also significantly influence vaccination rates, with concerns over vaccine safety and cultural stigma acting as major barriers.(31)

Given the gaps in knowledge and vaccine uptake in Kerala, a targeted educational intervention could significantly enhance awareness and acceptance of HPV vaccination.

Methods And Analysis

Study Design: This study will employ a cross-sectional study design to assess the knowledge, attitude, and practices (KAP) related to HPV vaccination among school-going children (aged 11-15 years), their teachers, and parents in Tiruvalla Municipality. A cross-sectional study is appropriate for this research as it allows insights into the current state of HPV vaccine awareness and uptake among different target groups. It is cost-effective and requires fewer resources compared to longitudinal studies while still providing valuable data for planning health interventions.

Study Setting:

The study will be conducted in higher secondary schools within Tiruvalla Municipality, specifically targeting students aged 11-15 years, their teachers, and parents. Schools will be randomly selected from different administrative zones of the municipality to ensure representation of various demographic groups.

Tiruvalla is a prominent municipality in Pathanamthitta district, Kerala, India, known for its high literacy rates, well-established educational institutions, and strong healthcare infrastructure. The municipality is home to several higher secondary schools that cater to students from diverse socio-economic and cultural backgrounds. These schools are affiliated with different educational boards, including the Kerala State Education Board, CBSE (Central Board of Secondary Education), and ICSE (Indian Certificate of Secondary Education).

The Sample Frame Will Include:

1. Government and government-aided schools.

2. Private and unaided schools.
3. Schools affiliated with different educational boards (State Board, CBSE, ICSE).

A mix of urban and semi-urban schools will be included to capture variations in awareness, attitudes, and practices regarding HPV vaccination.

Study Period: The study will be conducted over a 12-month period following the receipt of institutional ethical clearance(which has been obtained). The timeline will be structured to allow for the phased, timely, and systematic implementation of the study.

Study Participants

Inclusion Criteria

- All school students aged 11-15 years enrolled in the schools of Tiruvalla Municipality and providing assent/consent to participate in the study.
- All teachers who teach students aged 11-15 years and are willing to participate in the study.
- Parents of students aged 11-15 years above enrolled in the schools. willing to participate in the study

Exclusion Criteria

The Study Will Exclude:

- Students absent on the day of data collection.
- Teachers who are absent on the day of data collection.
- Parents who would not return the questionnaire

A total of 4 schools were selected from the list of schools in Tiruvalla Municipality provided above. The schools are chosen using a random selection method from different educational categories: government, government-aided, and private schools, ensuring representation across different types of institutions. The schools selected will be as follows:

- BL School
- BC Res School
- MT Res School
- C Cen School

A universal sampling approach will be employed for schoolchildren aged 11–15 years in the selected schools. All students within this age group will be invited to participate voluntarily in the study. All eligible students who are present on the day of data collection and who provide assent (along with parental consent, if required) will be included. This inclusive approach aims to maximize participation, ensure representativeness across all age groups (11–15 years), and align with ethical standards of voluntary participation in research involving minors. This helps ensure that the sample includes students from different backgrounds, school subjects, or language/ethnicities.

Students' whose parents have provided consent will be enrolled in the study.

Sampling Method For Teachers

A census sampling approach will be adopted for teachers. All teachers responsible for students in the 11–15-year age group in the selected schools will be invited to participate. This method ensures comprehensive inclusion of teachers who have direct pedagogical or supervisory interaction with the target student group. Participation will be voluntary, and informed consent will be obtained.

Sampling Method For Parents

For the parents or guardians of students aged 11–15 years, a convenience sampling strategy will be used. Parents will be approached during scheduled parent-teacher meetings or through existing school communication platforms, such as WhatsApp groups, school apps, or Google Forms. Parents will be selected based on their availability and willingness to participate in the study.

While this method does not ensure randomization, it facilitates real-world feasibility and timely data collection, particularly in school settings with limited access to parental contact data.

Sample Size: Sample size was calculated using the proportion of students with awareness of HPV vaccine (p= 20.65%) from previous study (32), confidence level (1-α) as 95%, absolute precision (d) as 5%. The sample size obtained was 252 using the formula:

$n= (Z_{1-\alpha/2})^2 p(1-p) /d^2$

n0=(0.05)2(1.96)2×0.2065×(1−0.2065)≈252

This sample size was multiplied with a design effect (DEFF) of 1.5.
n1=252×1.5=378
Thus, the sample size is **378** (i.e., 252*DEFF).
Final sample size = n=378/0.9 ≈420(non- response rate of 10%)

The parent study (32) which included adolescents in the school-going age group (11–15 years) although conducted in a different country, the target population is comparable in terms of age, school environment, and HPV vaccination eligibility. This provides a more appropriate estimate than studies conducted among older or highly-educated populations such as medical or college students from Kerala. (21, 23)

The assumptions used for sample size estimation included a 95% confidence level (Z = 1.96), an absolute precision of 5%, and a design effect of 1.5 to account for cluster sampling across schools. Additionally, a 10% non-response rate was factored in to address potential dropouts or incomplete responses.

Data Collection Plan :

A structured questionnaire was developed and pilot-tested to ensure reliability before implementation in the main study. Following tool validation, the next phase involves obtaining permissions from selected schools. For government schools, approval will be sought from the District Chief Education Officer (DCDS), while in private schools, permission will be obtained directly from the respective school authorities. Once approvals are secured, the study will be explained to school representatives, and their formal consent will be documented.

Given that the participants include minors, written informed consent will be obtained from parents or legal guardians, along with assent from the students themselves. Parents play a key role in influencing health decisions, including those related to vaccination. In this study, all parents of students aged 11–15 years will be invited to participate, regardless of whether they consent to their child's participation. Parent involvement will be facilitated through existing school communication channels such as parent-teacher meetings, WhatsApp groups, or Google Forms. Those who voluntarily agree will be requested to complete a structured questionnaire assessing their knowledge, attitudes, and practices related to HPV and its vaccine.

Questionnaires will be administered in English or Malayalam, depending on the participant's language preference, to ensure comprehension and improve response accuracy. Teachers of the selected classes will also be invited to take part in the study, and those who consent will complete a separate questionnaire.

Data will be collected using paper forms, ensuring confidentiality throughout the process. The information will then be entered into a Google Sheet or Excel spreadsheet for data analysis. These files will be password-protected, and only authorized study investigators will have access to the data.

Patient and Public Involvement : It was not appropriate or possible to involve patients or the public in the design, or conduct, or reporting, or dissemination plans of our research

Potential Biases And Mitigation Strategies

Social Desirability Bias:

This may arise when respondents, particularly teachers and parents, provide answers they believe are socially acceptable. They may overreport positive attitudes toward HPV vaccination or falsely claim that they or their children are vaccinated. To mitigate this, the study will ensure complete anonymity by avoiding the collection of names or personally identifiable information. Self-administered questionnaires will be used wherever feasible, allowing respondents to answer privately. Participants will also be explicitly informed that there are no right or wrong answers, and their responses will not affect them in any way.

Recall Bias:

There is a risk that parents or older students may not accurately recall past discussions with healthcare providers. This bias will be minimized by using specific questions, such as "Has your child received any vaccine in the last six months?" The questionnaire will also employ simple and time-bound phrasing to enhance accuracy and

reduce cognitive burden.

Response Bias / Acquiescence Bias:
Participants may have a tendency to agree with statements. This could lead to inflated scores for attitudes or practices. To address this, the questionnaire will include a mix of positively and negatively worded items. Additionally, all items will be pretested for neutrality and clarity during the pilot phase to ensure balance and reduce suggestive wording.

Sampling Bias:
Bias may be introduced if only schools or classes that are easier to access are selected, which might limit the representativeness of the sample. Although universal sampling is used for students and teachers, any purposive or convenience-based selection (such as for parents) may still introduce bias. To mitigate this, schools will be selected to represent varied management types (government, aided, and private), and clear inclusion and exclusion criteria will be applied. Refusals and non-responses will be documented and reported to maintain transparency.

Language And Comprehension Bias:
Participants may misunderstand questions due to language limitations or varied literacy levels. To reduce this, the questionnaire will be prepared in simple Malayalam, using everyday terms familiar to the local population. A forward and backward translation process will ensure conceptual equivalence with the original English version. The translated version will be pilot-tested, and feedback will be incorporated to improve clarity and cultural appropriateness.

Non-response Bias:
This bias may occur if individuals who choose not to participate are systematically different from those who do, potentially skewing results. To reduce this risk, the questionnaire will be kept short, simple, and engaging. The study will collaborate with school authorities and health educators to explain the importance of participation to both students and parents. Response rates will be monitored and reported.

Ethical Considerations
The virus and vaccine related questions can be of a sensitive nature and potentially embarrassing for students in the adolescent age group to answer. Special care will be taken to address any concerns. Since it is important to obtain this information, parental permission and consent will be obtained to ensure adequate protection for minors involved as study participants. Study investigators will be on hand to answer questions that may come up during the study. This will help ensure that participants feel comfortable and informed throughout their involvement.

Data will be stored in password protected files and the privacy of the participants will be protected to the extent possible. Only authorized study investigators will have access to the data. Every effort will be made to ensure the privacy of the participants is maintained throughout the study, and personal information will not be disclosed without explicit consent.

Data Analysis
The data analysis for this study will be performed in a systematic and rigorous manner, ensuring that the findings are reliable. The analysis will address the research objectives related to the knowledge, attitudes, and practices (KAP) regarding HPV vaccination among school children, teachers, and parents in Tiruvalla Municipality. The following steps outline the planned data analysis process:

I. Data Cleaning And Preparation
Data Entry: The data collected through the structured questionnaires will be entered into a Google Sheet or Excel spreadsheet. All personal identifiers will be removed to ensure confidentiality.

Validation And Cleaning: The data will be thoroughly checked for completeness, accuracy, and consistency. Any incomplete or erroneous data will be flagged and cleaned by reviewing the original responses.

Managing Missing Data: Missing data will be managed using appropriate methods, such as imputation or exclusion based on the extent of missingness (e.g., excluding cases with more than 20% missing data).

Appropriate statistical software will be used for the data entry and analysis.

Outcome Measurements: The knowledge, attitude, and vaccine practices related to the HPV vaccine will be obtained from both teachers and students. The primary outcome measures for this study will assess the knowledge, attitude, and practice (KAP) related to HPV vaccination among the selected participants (school children, teachers, and parents) in Tiruvalla Municipality. The following specific outcome measures will be evaluated:

Knowledge:
- Awareness about HPV and its association with cervical cancer.
- Knowledge of the availability and benefits of the HPV vaccine.
- Understanding of the target age group and vaccination schedule.

Attitude:
- Willingness to get vaccinated or recommend the vaccine.
- Perceptions of the vaccine's safety and efficacy.
- Cultural, social, or personal beliefs regarding vaccination.

Practice:
- Uptake of the HPV vaccine (for students, teachers, and parents).
- Barriers to vaccine uptake (e.g., cost, accessibility, stigma).
- Sources of information about the vaccine (e.g., school programs, health workers, media).

II. Descriptive Analysis
Demographics: Descriptive statistics (frequencies, percentages, means, and standard deviations) will be used to summarize demographic variables, including age, gender, socio economic status, and school type(private vs. government)

Knowledge: The responses regarding knowledge about HPV and the HPV vaccine will be summarized using:
- Percentages of participants who correctly identify HPV as the cause of cervical cancer.
- Percentages of participants who know about the vaccine's target age group, schedule, and benefits.

Attitude: Descriptive statistics will be used to summarize attitudes toward the HPV vaccine, such as:
- Willingness to get vaccinated.
- Willingness to recommend the vaccine to others.
- Perceived barriers to vaccination.

Practice: Data regarding vaccination practices will be summarized, including:
- Percentage of participants who have been vaccinated.
- Reasons for not getting vaccinated (e.g., lack of knowledge, cultural beliefs, cost).

Comparative Analysis
Comparison of Knowledge, Attitude, and Practice (KAP) between Groups:
- **By Gender:** to compare knowledge, attitudes, and practices between male and female students, teachers, and parents.
- **By Age Group:** Analysis will be performed to compare KAP across different age subgroups within the 11-15 years group.
- **By School Type (Private vs. Government):**to compare knowledge, attitude, and practice between students, teachers, and parents from private and government schools.

Knowledge, Attitude, And Practice Will Also Be Compared Among:
- Schoolchildren vs. teachers vs. parents.
- Participants who have had prior health education vs. those who have not.

Multivariable Analysis
Logistic Regression: To identify predictors of HPV vaccination knowledge, attitude, and practice, multivariable logistic regression analysis will be performed. The following factors will be considered as potential predictors:
- Socioeconomic status of students.
- Gender.
- Prior exposure to health education on HPV and cervical cancer.
- Parental influence on vaccination decisions.
- Teacher's knowledge and attitude toward the HPV vaccine.

Effect Modifiers and Confounders: Analysis will adjust for potential confounders (e.g., age, gender, socioeconomic status) and effect modifiers (e.g., school type, previous exposure to health education) to assess their influence on the outcomes.

Confounders: Variables that may influence the relationship between independent and dependent variables could include:

- **Socioeconomic Status:** Students from different socioeconomic backgrounds may have varied access to healthcare and educational resources, affecting their knowledge and attitude toward vaccination.
- **Gender:** Gender differences might influence attitudes and practices related to HPV vaccination, as some cultural factors may affect vaccine uptake among boys and girls differently.
- Previous Exposure to Health Education : Prior educational interventions or awareness programs may influence knowledge levels and attitudes toward the HPV vaccine.
- **Parental Influence:** Parental approval or opposition to vaccination could significantly influence children's attitudes and practices regarding HPV vaccination.

Effect Modifiers: Variables that may alter the strength or direction of the relationship between the independent and dependent variables could include:

- **Age:**

Different age groups within the 11-15 years age range may have varying levels of understanding and acceptance of the HPV vaccine, which could modify the observed outcomes.

- **Type of School (Private vs. Government):**

The school type (private vs. government) may influence the level of access to health education resources and the degree of parental involvement, which could modify the knowledge, attitudes, and practices related to HPV vaccination.

- **Teacher Influence:**

Teachers' attitudes toward HPV vaccination may modify students' perceptions and behaviors, as teachers play an important role in influencing students' health decisions.

- **Cultural And Religious Beliefs:**

Cultural or religious beliefs may modify how the HPV vaccine is perceived and whether it is accepted, potentially influencing the willingness to vaccinate.

Predictors: Variables That Are Expected To Influence Or Predict The Outcome Measures Include:

- **Educational Level Of Parents:**

Parents with higher levels of education may be more knowledgeable and open to the HPV vaccine, influencing their children's awareness and vaccine uptake.

- **Health Information Sources:**

The source of health information (e.g., schools, healthcare professionals, media) could predict the level of knowledge, attitudes, and practices toward the HPV vaccine.

- **Peer Influence:**

Peer recommendations or discussions about the HPV vaccine could predict students' willingness to get vaccinated or recommend the vaccine to others.

- **Teacher Knowledge And Attitude:**

Teachers who have a good understanding of HPV and the vaccine are likely to influence students' knowledge and attitudes toward vaccination, thus acting as predictors for students' knowledge and practices.

- **Prior Vaccination Experience:**

Previous experiences with vaccinations (either personal or through family) may function as a predictor for HPV vaccine acceptance, as students and parents who have had positive experiences with vaccines may be more likely to adopt the HPV vaccine.

Sensitivity Analysis

Missing Data: Sensitivity analysis will be performed to assess the impact of missing data on the results. This will involve comparing the findings with different methods of handling missing data, such as imputation or exclusion.

III. Interpretation Of Knowledge Scores

Knowledge Assessment: A knowledge score will be calculated based on correct responses to key questions regarding HPV and its vaccine. The total score will be divided into categories such as:

- Low knowledge
- Moderate knowledge
- High knowledge

These categories will then be analyzed to identify factors associated with higher or lower levels of knowledge, using chi-square tests or logistic regression as appropriate.

Data Presentation

Tables And Figures: Data will be presented using tables and bar graphs, with clear labels for each variable. The descriptive statistics for knowledge, attitudes, and practices will be displayed to give a comprehensive overview of the data.

Statistical Significance: A p-value of <0.05 will be considered statistically significant for all hypothesis tests.

IV. Data Storage, Access, And Monitoring Procedures

All data collected during the study will be securely stored in both physical and electronic formats. Paper-based questionnaires will be kept in locked filing cabinets accessible only to the principal investigator and designated research staff. Electronic data will be entered into password-protected databases stored on encrypted, secure servers, with access restricted to authorized members of the research team. Data will be anonymized prior to entry by assigning unique identification codes to each participant to ensure confidentiality. A regular data monitoring process will be established, with periodic cross-checks for accuracy and completeness by the data management team. Any inconsistencies or missing data will be flagged and resolved through a verification process. The database will be backed up regularly, and access logs will be maintained to track data access and changes. At the end of the study, data will be archived securely for a period of five years, following institutional and ethical guidelines, after which it will be securely destroyed.

V. Dissemination Policy : Reporting And Interpretation Of Results

The Findings Will Be Summarized In A Final Report, Which Will Include:

a. Descriptive statistics and comparisons between different demographic groups.
b. Identification of significant predictors and barriers to HPV vaccine knowledge, attitudes, and practices.
c. Key recommendations for health education programs targeting school children, teachers, and parents based on the results as feedback.

Operational Definitions

HPV: Human papilloma virus is a virus that belongs to the papilloma viridae family and is a double stranded DNA virus. About 30 of these HPV types are known to cause anogenital and oral infections. They can be of the high and low risk categories of viruses.

Cervical Cancer: is a cancer of the cervix caused by a high-risk category of the HPV virus.

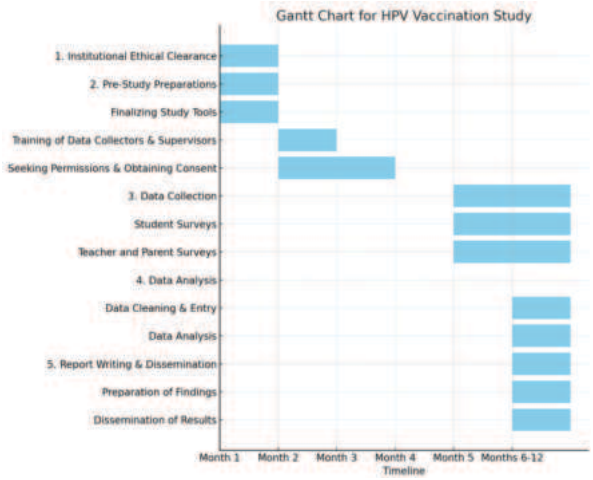
HPV Vaccine: The HPV vaccine is a recombinant vaccine, and two types are licensed for use in India, with a third indigenously produced one, soon to be available in the vaccination program.

HPV Vaccination: The vaccine is given intramuscularly and the dosage for children less than 15 years of age is two intramuscular doses at an interval of six months. Those who are above 15 years of age and the immunocompromised are recommended 3 doses of the vaccine, over 6 months.

Funding

This study has not received external funding to date. Institutional support is being explored to initiate preliminary data collection, which will inform future funding applications.

Timeline : Gantt Chart



Authors' Contributions

TP: Protocol writing, tool development, ethical submission AJ: Conceptualization, supervision, manuscript review MJ: Methodological review, microbiological insights MJI: Supervise the conduct of the project and has offered expert advise in writing and reviewing the protocol. RR: Pilot study design, testing of tool for reliability and validity, writing.

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Data Statement: After data is collected, it will be published in a repository and can be accessed.

Competing Interests Statement

The authors declare no competing interests.

Appendices (See Supplementary File)

- SPIRIT Checklist (for internal reference; not applicable to this observational study)
- Questionnaires (Students, Teachers, Parents)
- Consent and Assent Forms
- Awareness Class Materials

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