



ASSESSMENT OF KNOWLEDGE AND VACCINATION STATUS FOR RUBELLA AND HUMAN PAPILLOMAVIRUS AMONG HEALTHCARE STUDENTS

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ABSTRACT

Background: Rubella infection during pregnancy may result in congenital rubella syndrome (CRS), leading to serious birth defects. Human papillomavirus (HPV) infection is the major cause of cervical cancer worldwide. Vaccination is the most effective preventive measure against both diseases. Assessing knowledge and vaccine uptake among future healthcare professionals is important for strengthening preventive strategies.

Methods: A cross-sectional study was conducted among 475 female medical and nursing students at Place of study Government Tertiary Care Hospital and College, Salem. Data were collected using a structured questionnaire that included demographic characteristics, knowledge regarding rubella and HPV infections, awareness of vaccines, and vaccination status. Descriptive statistics were used to summarize the data, and associations between knowledge variables and vaccine uptake were analyzed.

Results: Among the participants, 42.5% were aged ≤ 20 years and 57.5% were > 20 years. Awareness of rubella vaccine was reported by 90.3% of students, but only 29.7% had received the vaccine. Knowledge regarding rubella as a viral infection was observed in 98.1% of students. Awareness of HPV infection was reported by 68.8% of participants; however, HPV vaccine coverage was only 3.4%. Significant associations were observed between vaccine uptake and factors such as age, education level, and knowledge regarding vaccination.

Conclusion: Although awareness regarding rubella and HPV infections was relatively high, vaccination coverage among medical and nursing students was low. Educational interventions and institutional vaccination programs are necessary to improve vaccine uptake and prevent CRS and cervical cancer.

Keywords: Rubella, Human Papillomavirus, Cervical Cancer, Vaccination, Medical Students, Knowledge Assessment.

INTRODUCTION

Rubella is an acute viral infection caused by the rubella virus and is transmitted primarily through respiratory droplets. The disease usually presents as a mild febrile illness with rash, lymphadenopathy, and joint symptoms, particularly in children and young adults. However, its public health importance lies in its teratogenic effects when infection occurs during pregnancy, especially in the first trimester. Maternal infection can result in miscarriage, stillbirth, or congenital rubella syndrome (CRS), a

Condition characterized by multiple birth defects such as congenital heart disease, cataracts, hearing impairment, and developmental disabilities. Globally, rubella remains one of the leading vaccine-preventable causes of congenital abnormalities, with an estimated 100,000 infants born with CRS each year [1].

The introduction of rubella vaccination has significantly reduced the incidence of CRS in many countries. Rubella vaccine is a live attenuated vaccine, commonly administered as part of the measles-rubella (MR) or measles-mumps-rubella (MMR) combination vaccine. A single dose provides more than 95% long-lasting immunity, similar to immunity acquired after natural infection. Global immunization initiatives led by the World Health Organization (WHO) have aimed to eliminate rubella and CRS through widespread



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vaccination and improved surveillance. Despite these efforts, rubella remains a concern in regions with low vaccination coverage, particularly in low- and middle-income countries [2].

Human papillomavirus (HPV) infection is another major public health concern worldwide. HPV is a group of more than 100 related viruses, of which at least 13 are classified as high-risk oncogenic types. Persistent infection with high-risk HPV types, particularly HPV-16 and HPV-18, is responsible for approximately 70% of cervical cancer cases globally. Cervical cancer remains the fourth most common cancer among women worldwide, with an estimated 660,000 new cases and 350,000 deaths reported in 2022, with the majority occurring in low- and middle-income countries [3].

HPV infection is primarily transmitted through sexual contact and is most commonly acquired shortly after the onset of sexual activity. In addition to cervical cancer, HPV infection is associated with several other malignancies, including cancers of the anus, vulva, vagina, penis, and oropharynx [4]. Preventive strategies include vaccination, regular cervical cancer screening, and health education. Prophylactic HPV vaccines have been shown to be highly effective in preventing infections caused by high-risk HPV types and reducing the incidence of cervical cancer and other HPV-related diseases. WHO recommends routine HPV vaccination for girls aged 9–13 years as the most cost-effective public health intervention for cervical cancer prevention [5].

Despite the availability of effective vaccines for both rubella and HPV infections, vaccination coverage remains suboptimal in many countries due to lack of awareness, misconceptions about vaccine safety, and limited access to vaccination services. Future healthcare professionals, particularly medical and nursing students, play a crucial role in promoting vaccination and educating the community about vaccine-preventable diseases. Their knowledge, attitudes, and vaccination practices significantly influence public acceptance of immunization programs.

Therefore, assessing awareness and vaccine uptake among medical and nursing students is essential to identify knowledge gaps and barriers to vaccination. This study was conducted among female medical and nursing students at Government Tertiary Care Hospital and College, Salem, to evaluate their knowledge regarding rubella and HPV infections and to assess the coverage of rubella and HPV vaccination among them.

MATERIALS AND METHODS

Study Design

A cross-sectional descriptive study was conducted to assess the knowledge regarding rubella infection, human papillomavirus (HPV) infection, and vaccine coverage among female medical and nursing

students. The study aimed to evaluate awareness levels and identify factors associated with vaccination uptake among future healthcare professionals.

Study Setting

The study was conducted at Government Tertiary Care Hospital and College, Salem, Tamil Nadu, India, which is a tertiary care teaching institution that provides undergraduate and postgraduate medical education and nursing training.

Study Population

The study population consisted of female students enrolled in the MBBS and nursing courses at the institution. Students from different academic years were included in the study to obtain a comprehensive understanding of awareness and vaccination practices across various stages of medical and nursing education.

Sample Size

A total of 475 female students participated in the study.

Study Period

The study was conducted during the year 2024 at Government Tertiary Care Hospital and College, Salem.

Inclusion Criteria

The following participants were included in the study:

- Female students studying in MBBS and nursing programs
- Students present during the data collection period
- Students willing to participate and who provided consent

Exclusion Criteria

The following participants were excluded:

- Students who did not consent to participate
- Students who submitted incomplete questionnaires

Data Collection Tool

Data were collected using a pre-tested structured questionnaire. The questionnaire included sections on:

1. Sociodemographic characteristics

- Age
- Marital status
- Educational status (MBBS and nursing year of study)

2. Knowledge regarding Rubella infection

- Cause of rubella
- Mode of transmission
- Symptoms and complications
- Awareness of rubella vaccine
- Knowledge regarding prevention of congenital rubella syndrome

3. Knowledge regarding HPV infection

- Awareness of HPV infection
- Association with cervical cancer
- Risk groups for cervical cancer
- Mode of transmission

- Awareness of cervical cancer screening methods (Pap smear and VIA)

4. Vaccination status

- Rubella vaccination status
- HPV vaccination status
- Age at vaccination

Data Collection Procedure

Before the commencement of the study, the purpose and objectives of the study were explained to the participants. Participation was voluntary. Students who agreed to participate were provided with the questionnaire and were asked to complete it independently.

The questionnaires were collected and reviewed for completion. The subjects' anonymity and confidentiality were scrupulously safeguarded throughout the study.

Study Variables

The primary variables assessed in the study included:

- Knowledge regarding rubella infection
- Knowledge regarding HPV infection
- Awareness of vaccination
- Vaccination coverage for rubella and HPV

Statistical Analysis

The collected data were entered into a database and analyzed using statistical software (such as SPSS).

The following statistical methods were used:

- Descriptive statistics: Frequency and percentage were calculated to summarize demographic characteristics, knowledge levels, and vaccination coverage.

- Inferential statistics: Associations between vaccination status and various knowledge variables were analyzed using appropriate statistical tests.

- Level of significance: A p-value less than 0.05 was considered statistically significant.

Ethical Considerations

Participation in the study was voluntary, and informed consent was obtained from all participants before data collection. Confidentiality of participants' personal information was ensured, and the data collected were used only for research purposes. The study was conducted in accordance with standard ethical guidelines for research involving human participants.

RESULTS

A total of 475 female medical and nursing students participated in the study. The results are presented under the following sections: demographic characteristics, knowledge regarding rubella infection, rubella vaccine coverage, knowledge regarding HPV infection, HPV vaccine coverage, and association between knowledge and vaccination status.

1. Demographic Characteristics of Study Participants

Among the 475 participants, 273 (57.5%) students were aged more than 20 years, while 202 (42.5%) were aged ≤ 20 years. Most of the students were unmarried (84.8%), and 15.2% were married.

Table 1: Demographic Characteristics of Study Participants (N=475)

Variable	Category	Frequency	Percentage (%)
Age	≤ 20 years	202	42.5
	> 20 years	273	57.5
Marital status	Married	72	15.2
	Unmarried	403	84.8

Educational Distribution

Education	Frequency	Percentage (%)
First MBBS	71	14.9
Second MBBS	56	11.8
Third MBBS	46	9.7
Final MBBS	49	10.3
CRR	79	16.6
Basic Nursing 1st year	41	8.6
Basic Nursing 2nd year	42	8.8
Post Basic Nursing 1st year	42	8.8
Post Basic Nursing 2nd year	49	10.3
Total	475	100

2. Knowledge Regarding Rubella Infection

Most students correctly identified rubella as a viral infection (98.1%). Regarding transmission, 58.9% correctly identified the respiratory route as the primary mode of transmission.

The majority of students (72%) were aware of the common symptoms of rubella, including rash, fever, lymph node enlargement, and joint pain.

Table 2: Knowledge Regarding Rubella Infection (N=475)

Variable	Response	Frequency	Percentage (%)
Cause of rubella	Viral	466	98.1
	Bacterial	6	1.5
	Fungal	2	0.4
Mode of transmission	Respiratory	280	58.9
	Others	95	19.8
	Skin contact	23	4.8
	Faecal route	19	4.0
Symptoms of rubella	All symptoms	342	72.0
	Rash only	56	11.8
Rubella preventable	Yes	454	95.6
Congenital rubella preventable	Yes	339	71.4
Awareness of rubella vaccine	Yes	429	90.3

3. Rubella Vaccine Coverage

Despite high awareness levels, rubella vaccination coverage was only 29.7% among the participants.

Out of 475 students:

- 141 students (29.7%) had received the rubella vaccine

- 334 students (70.3%) had not received the vaccine
- Among vaccinated students:

- 134 (70.7%) received the vaccine before 20 years of age
- 7 students received it after 20 years

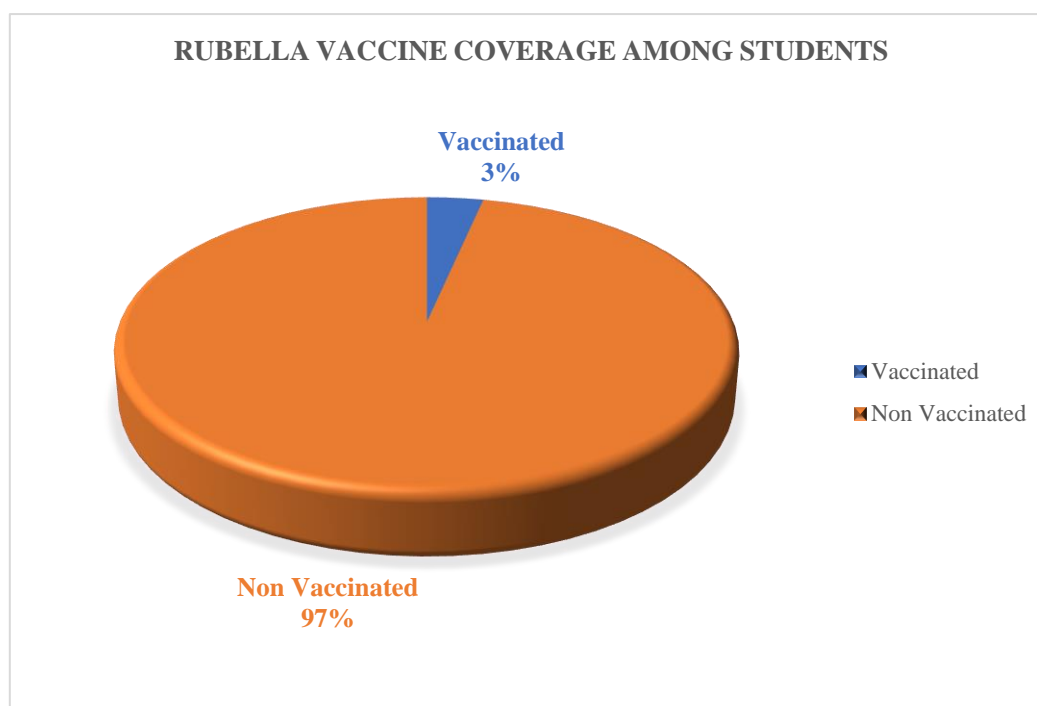


Figure 1: Rubella Vaccine Coverage among Students

The pie chart illustrates that a large proportion of students had not received rubella vaccination despite awareness about the vaccine.

4. Knowledge Regarding HPV Infection

Among the study participants, 327 students (68.8%) were aware of HPV infection.

Most participants (76.6%) recognized that HPV infection is associated with carcinoma cervix.

Regarding cervical cancer screening methods:

- 49.3% were aware of both Pap smear and VIA
- 28.8% knew about Pap smear alone
- 20.2% knew about VIA

Table 3: Knowledge Regarding HPV Infection (N=475)

Variable	Response	Frequency	Percentage (%)
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Awareness of HPV infection	Yes	327	68.8
	No	141	29.7
Complication of HPV	Cervical cancer	364	76.6
Cervical cancer preventable	Yes	334	70.3
Screening methods	Pap smear	137	28.8
	VIA	96	20.2
	Both	234	49.3

5. HPV Vaccine Coverage

HPV vaccine coverage among participants was very low.

Out of 475 students:

- 16 students (3.4%) had received the HPV vaccine

- 459 students (96.6%) had not received the vaccine

Among vaccinated students:

- 12 received vaccination before 20 years
- 4 received vaccination after 20 years

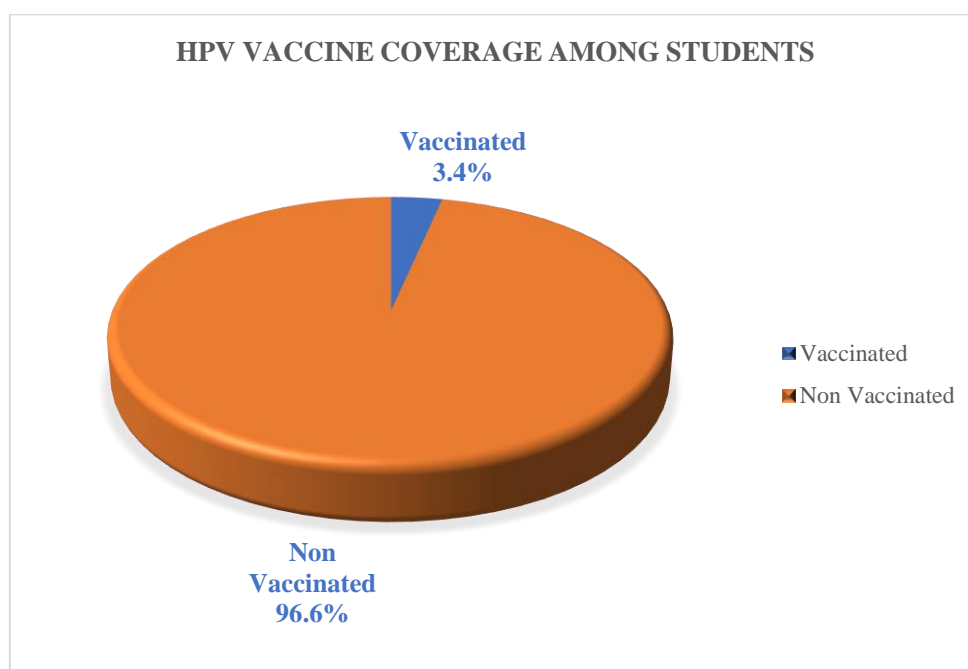


Figure 2: HPV vaccine coverage among students

The pie chart demonstrates that HPV vaccine uptake was extremely low among the study population.

6. Association between Knowledge and Vaccine Coverage

Statistical analysis revealed several significant associations between vaccination status and knowledge variables.

Significant factors associated with Rubella vaccination

- Education level ($p = 0.0085$)
- Marital status ($p = 0.00$)
- Knowledge regarding prevention of congenital rubella ($p = 0.003$)

Significant factors associated with HPV vaccination

- Education level ($p = 0.0417$)
- Age ($p = 0.031$)
- Knowledge regarding ideal age for vaccination ($p = 0.004$)

Students who had better knowledge regarding vaccination and disease prevention were more likely to receive vaccination.

DISCUSSION

The present study assessed the knowledge and vaccination coverage of rubella and human papillomavirus (HPV) infection among female medical and nursing students at a Government Tertiary Care Hospital and College Salem, Tamil Nadu. Medical and nursing students represent future healthcare professionals who play an essential role in health education, disease prevention, and vaccination promotion. Therefore, assessing their awareness and vaccination status is important for strengthening public health strategies.

In the present study, 98.1% of participants correctly identified rubella as a viral infection, and 90.3% were aware of the rubella vaccine. Similar findings were reported by Basu et al., who observed that the majority of medical students had adequate knowledge regarding rubella infection and its prevention [6]. However, despite adequate awareness, vaccination coverage remains low in many settings. This discrepancy between knowledge

and practice highlights the need for improved vaccination campaigns among healthcare students. The present study showed that rubella vaccine coverage among participants was only 29.7%, despite high awareness. A comparable study conducted by Gupta et al. among medical students in North India also reported relatively low vaccination coverage, even though most students had adequate knowledge regarding rubella infection and its prevention [7]. This indicates that awareness alone may not necessarily translate into vaccine uptake, and institutional vaccination programs may be required to improve coverage.

Regarding HPV infection, 68.8% of students in the present study were aware of HPV infection, and 76.6% correctly identified cervical cancer as a complication associated with HPV infection. Similar findings were reported by Pandey et al., who found that approximately two-thirds of healthcare students were aware of HPV infection and its association with cervical cancer [8]. However, knowledge regarding HPV transmission, screening, and vaccination often remains incomplete.

Despite moderate awareness, the HPV vaccination coverage in the present study was extremely low (3.4%). This finding is consistent with studies conducted in other developing countries. For example, Liu et al. reported low HPV vaccine uptake among university students despite reasonable awareness levels [9]. Similarly, Patel et al. observed that HPV vaccination coverage among medical students remained low due to factors such as limited awareness about vaccine availability, cost concerns, and lack of institutional vaccination programs [10]. In the present study, 49.3% of participants were aware of both Pap smear and VIA as cervical cancer screening methods, indicating moderate awareness regarding cervical cancer screening. Comparable findings were reported by Shah et al., who observed that medical students had moderate knowledge regarding cervical cancer screening but lacked comprehensive awareness about HPV vaccination and screening guidelines [11].

The study also found significant associations between vaccination status and certain factors. Rubella vaccination was significantly associated with educational status, marital status, and knowledge regarding prevention of congenital rubella syndrome. Similarly, HPV vaccination showed significant association with age, education level, and knowledge regarding the ideal age for vaccination. Previous studies have also highlighted that educational level and awareness significantly influence vaccine acceptance among healthcare students [8,10].

Globally, rubella and HPV infections remain important public health concerns. The World Health Organization emphasizes vaccination as the most effective preventive strategy for both rubella and HPV-related diseases [12,13]. HPV infection is

responsible for a substantial proportion of cervical cancer cases worldwide, particularly in low- and middle-income countries [14,15].

Overall, the findings of the present study demonstrate that although awareness regarding rubella and HPV infection is relatively good among medical and nursing students, vaccination coverage remains low. Similar trends have been reported in several national and international studies. This highlights the need for increased awareness programs, institutional vaccination initiatives, and improved access to vaccines within medical and nursing educational institutions.

CONCLUSION

The present study demonstrates that although female medical and nursing students had good awareness regarding rubella infection, HPV infection, and their associated complications, vaccination coverage for both diseases was inadequate. While most participants were aware of the availability of the rubella vaccine, only a limited proportion had actually received it. Similarly, despite moderate knowledge about HPV infection and cervical cancer prevention, HPV vaccine uptake among the study population was extremely low.

These findings highlight a clear gap between knowledge and preventive practices among future healthcare professionals. As medical and nursing students play an important role in promoting immunization and educating the community about vaccine-preventable diseases, improving their vaccination status is essential.

Institution-based vaccination programs, regular educational interventions, and increased awareness regarding vaccine benefits and safety may help improve vaccine uptake among healthcare students and contribute to the prevention of congenital rubella syndrome and cervical cancer.

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