



# Knowledge and Practice of Pap Smear and Vaccination Regarding Human Papillomavirus Among Female Medical Students in Karachi, Pakistan

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Received 2021 September 10; Revised 2021 October 13; Accepted 2021 October 15.

## Abstract

**Background:** Cervical cancer is the leading cause of women's death in developing countries. The change in the epidemiological trends has been attributed to mass screening with the help of a Pap smear.

**Objectives:** This study aimed to determine the knowledge level and practice regarding a Pap smear and human papillomavirus (HPV) vaccination among female medical students in Karachi, Pakistan.

**Methods:** In this cross-sectional study, 147 participants were selected through multistage stratified random sampling. The knowledge level was categorized as adequate if the participants answered 60% of the items. Questionnaire validity was determined through Cronbach's alpha value ( $\alpha = 0.69$ ). Binary logistic regression was applied to determine the factors associated with the knowledge level among the students. A confidence interval (CI) of 95% was considered with a margin of error of 5% and a P-value of 0.05 as statistically significant.

**Results:** Most students (60.5%) had adequate knowledge regarding a Pap smear and HPV vaccination. Only 3.4% of the students underwent a Pap smear test. The most common factors contributing to the knowledge level were marriage (OR = 2.98; 95% CI: 1.23 - 11.09; P = 0.003), first academic year of students (OR = 10.78; 95% CI: 1.03 - 12.01; P = 0.046), family history of cancer (OR = 2.76; 95% CI: 1.34 - 7.90; P = 0.004), and family income less than < 100000 Pakistani Rupee (OR = 5.45; 95% CI: 2.09 - 9.06; P = 0.005).

**Conclusions:** Being medical students studying in the first academic year, family history of cancer, and family income less than 100000 Pakistani Rupee had significant effect on knowledge gap about a Pap smear and HPV vaccination. There is a need for an increased level of knowledge in this regard by addressing the risk factors contributing to the knowledge level.

**Keywords:** Cervical Cancer, Knowledge, Pap Smear, Students, Vaccination

## 1. Background

Cervical cancer is the leading cause of women's death in developing countries (1). Cervical cancer is caused by human papillomavirus (HPV), and the important determinant of this cancer was a low level of awareness among females regarding this cancer (2). The most important factor which early detects cervical cancer is the screening method, such as a Pap smear, which helps manage the cancer at an early stage (3). The HPV is sexually transmitted and causes all cervical cancers. The adult females' knowledge level is the key to the prevention of this type of cancer (4).

Previous studies regarding the knowledge level of HPV vaccination and a Pap smear obtained different results (4, 5). A study demonstrated that females with more knowl-

edge regarding cervical cancer had a high level of HPV vaccination coverage (6). The aforementioned study also showed that the cost of HPV vaccination is the main barrier among females. A high level of awareness regarding cervical cancer correlated with the high vaccination coverage of HPV (6).

Cervical cancer screening is reported with a poor level of practice among females in society (7). The most effective screening method for cervical cancer is a Pap smear test which is cost-effective and easy to access in every health center (8, 9). In Pakistan, cervical cancer screening practice at governmental and private health centers is very poor (10). Surveys from different areas of Pakistan showed that cervical cancer is the third most malignant tumor (10, 11).

## 2. Objectives

This study aimed to determine the knowledge level of cervical cancer, a Pap smear, and HPV vaccination among female students. The findings of this study will help increase the awareness level among health professionals regarding HPV vaccination and cervical cancer. In addition, the results of this study help with policymaking regarding cervical cancer screening programs at the government level.

## 3. Methods

This cross-sectional study was carried out at a medical school in Karachi, Pakistan. The medical school works at the government level with 300 students every year. The students were within the age group of 18 - 27 years. Only female students were included in the study. The study sample size was 147 calculated through software developed by the World Health Organization. The calculation parameter was a knowledge level of 10.7% from a previous study (12), using a 95% confidence interval (CI) and a 5% margin of error. The participants were selected through multistage stratified random sampling. An average of 29 participants was selected from each academic year.

The included participants were all undergraduate college students and those willing to give consent. The participants with any chronic disorder were excluded from the study. Age, marital status, academic year, family history, family income, Pap smear test status, and vaccination status were the variables of the study.

The study instruments were divided into two sections, including sociodemographic characteristics and knowledge questions. There were 10 items in the knowledge section. Each item marked 1 and 0 for correct and incorrect answers, respectively. The knowledge level was determined through a setting cut of 60% correct answer, based on a previous study (13). The validity of the questionnaire was determined through the Cronbach's alpha ( $\alpha = 0.70$ ), based on a previous study (14).

Informed consent was obtained from each participant before starting data collection. The data were analyzed using SPSS software (version 22; SPSS is a software package used for interactive or batched statistical analysis). The data were coded by data encoder, and each questionnaire was double-checked for missing and errors values. The quantitative variables, such as age measure of central tendency, were calculated. Moreover, the qualitative variables, such as marital status, year of education, family history and income, frequencies, and percentages, were calculated. Regression analysis was used to determine the association between the knowledge level and associated risk

factors. In univariate analysis, the variables with a P-value  $\leq 0.05$  were included in the multivariate analysis.

## 4. Results

The mean age of students was  $25 \pm 0.623$  years. Most students (53.7%) were within the age group of 22 - 27 years, and 52.39% of the students were married. In addition, 30.61% of the participants had a family history of cancer. Only 6.8% of the subjects were vaccinated for HPV, and 3.4% of the subjects underwent a Pap smear test (Table 1).

**Table 1.** Sociodemographic Characteristics of Study Participants (N = 147)

Characteristics	Values <sup>a</sup>
<b>Mean age (y)</b>	25 $\pm$ 0.623
18 - 21	68 (46.3)
22 - 27	79 (53.7)
<b>Marital status</b>	
Single	70 (47.61)
Married	77 (52.39)
<b>Year of study</b>	
First	14 (9.5)
Second	3 (2)
Third	34 (23.10)
Forth	59 (40.10)
Final	37 (25.2)
<b>Family history of cancer</b>	
Yes	45 (30.61)
No	102 (69.39)
<b>Family income (PKR)*</b>	
$\leq 100000$ PKR/month	97 (65.91)
$> 100000$ PKR/month	50 (34.09)
<b>HPV vaccinated</b>	
Yes	10 (6.8)
No	137 (93.2)
<b>Pap smear test done</b>	
Yes	5 (3.4)
No	142 (96.6)

Abbreviations: PKR, Pakistani Rupee; HPV, human papillomavirus.

<sup>a</sup> Values are presented as No. (%) or mean  $\pm$  SD.

The percentage of the participants expressing "Knows about HPV and a Pap smear" was 93.9%; they only heard the term. Moreover, 68.7% of the study participants were aware of the fact that HPV vaccination prevents cervical cancer. Additionally, 60.5% of the study participants had adequate knowledge of HPV vaccination and a Pap smear (Table 2).

**Table 2.** Knowledge Regarding a Pap Smear and Human Papillomavirus Vaccination Among Study Participants (N = 147)

Knowledge Items (Correctly Answered)	No. (%)
Knows about HPV	138 (93.9)
Knows about a Pap smear	137 (93.2)
Knows about cervical cancer	69 (46.9)
Does the HPV vaccine prevent cervical cancer?	101 (68.7)
Does the HPV vaccine prevent cervical cancer in the older age group?	91 (61.9)
Does a Pap smear can early detect cervical cancer and lead to a better prognosis?	117 (79.6)
Is a Pap smear required for age of married females?	72 (49)
Can the HPV vaccine cause HPV infection?	47 (47)
Is the HPV vaccine provided by the government?	120 (81.63)
Adequate knowledge regarding a Pap smear and HPV vaccination	89 (60.5)
Inadequate knowledge regarding a Pap smear and HPV vaccination	58 (39.5)

Abbreviation: HPV, human papillomavirus.

Among the study variables, marriage (OR=2.98; 95% CI: 1.23 - 11.09; P = 0.003), first- (OR = 10.78; 95% CI: 1.03 - 12.01; P = 0.046) and third- (OR = 7.61; 95% CI: 2.03 - 18.47; P = 0.005) year academic students, family history of cancer (OR = 2.76; 95% CI: 1.34 - 7.90; P = 0.004), family income less than < 100000 Pakistani Rupee (AOR = 5.45; 95% CI: 2.09 - 9.06; P = 0.005), no Pap smear (AOR = 1.98; 95% CI: 1.03-7.86; P = 0.004), and no vaccination for HPV (AOR= 6.65; 95% CI: 1.22 - 16.13; P = 0.003) were significantly associated with inadequate knowledge regarding a Pap smear and HPV vaccination (Table 3). Figure 1 shows the reasons for unwillingness to undergo a Pap smear test the most common of which was fear of genital warts.

## 5. Discussion

This study showed that adequate knowledge regarding a Pap smear and HPV vaccination among medical students was higher than 60%. Medical students should have adequate knowledge of a Pap smear and HPV vaccination because most of them undergo training and receive medical education. In this study, the knowledge level among medical students was about 60%; this result is consistent with the results of another study conducted in Nigeria (15).

The inadequate knowledge level due to HPV infection is mainly asymptomatic, and infections cure without intervention. Another study conducted in Turkey demonstrated that the knowledge level was inadequate, and only 11.6% of the subjects were vaccinated (16). The results showed that the HPV vaccination knowledge level was increased among final-year students, compared to that reported among first-year students, which is consistent with findings of other studies (17).

The results of a study performed on reasons for non-vaccination against HPV indicated that 48% of the subjects were unlikely to know anything regarding vaccination (18). Various cited reasons were being married, a new type of vaccine, inadequate information on the vaccine, and fear of sides effects of vaccination (18).

There are various factors contributing to the knowledge level among students. In this study, married students were more likely associated with inadequate knowledge, which is consistent with the results of other studies (19). The main reasons for this level of knowledge are the early age of marriage and society and family knowledge levels.

The findings of the present study showed that the first-year students had a knowledge gap, compared to the final-year students. This result is consistent with the results of previous studies (20). The first-year students did not have enough knowledge and experience regarding HPV vaccination and a Pap smear.

The results indicated that only 6.8% of the students were vaccinated. A study carried out in South Korea demonstrated that the rate of HPV vaccination among female students was 62.8% (21). This poor practice of vaccination is due to the knowledge gap; knowledge is directly associated with the vaccination rate. The common barrier to HPV vaccination is the social stigma of becoming sexually active in society (22). Another study conducted in Italy reported that medical students were vaccinated because it was associated with further openness to sex-related topics (23).

Only 3.4% of medical students in this study underwent a Pap smear test. The reasons for these results were the lack of inclusion in the national prevention vaccination program and the lack of advice by health practitioners. This

**Table 3.** Factors Contributing to Knowledge of a Pap Smear and Human Papillomavirus Vaccination

Characteristics	Inadequate Knowledge, Crude Odds Ratio (95% CI), [P-Value]	Inadequate Knowledge, Adjusted Odds Ratio (95% CI), [P-Value]
<b>Age (y)</b>		
16 - 21	2.51 (1.26 - 5.01) [0.009]	1.32 (0.52 - 3.34) [0.258]
22 - 27	1	1
<b>Marital status</b>		
Married	1.92 (0.89 - 8.98) [0.097]	2.98 (1.23 - 11.09) [0.003]
Single	1	1
<b>Year of study</b>		
First	9.06 (2.25 - 16.60) [0.007]	10.78 (1.03 - 12.01) [0.046]
Second	2.93 (0.24 - 5.32) [0.397]	4.50 (0.24 - 14.07) [0.418]
Third	6.84 (2.28 - 10.54) [0.001]	7.61 (2.03 - 18.47) [0.005]
Forth	1.62 (0.70 - 3.73) [0.253]	1.41 (0.55 - 3.57) [0.551]
Final	1	1
<b>Family history of cancer</b>		
No	1.23 (0.45 - 7.34) [0.897]	2.76 (1.34 - 7.90) [0.004]
Yes	1	1
<b>Family income (PKR/mo)</b>		
≤ 100000	3.09 (1.21 - 8.90) [0.003]	5.45 (2.09 - 9.06) [0.005]
> 100000	1	1
<b>HPV vaccinated</b>		
No	2.45 (0.66 - 9.10) [0.005]	6.65 (1.22 - 16.13) [0.003]
Yes	1	1
<b>Pap smear test done</b>		
No	1.38 (0.89 - 4.56) [0.06]	1.98 (1.03 - 7.86) [0.004]
Yes	1	1

Abbreviations: PKR, Pakistani Rupee; HPV, human papillomavirus.

result is in contrast to the results of other studies, indicating that more than 50% of students underwent a Pap smear test (24-26).

There are several limitations in the current study. Firstly, this study had a cross-sectional design lacking temporality of association between outcomes and risk factors. Secondly, information bias in the study results was due to self-reported information obtained from the study participants. Thirdly, the internal validity of the data was low due to the time constraints of data collection.

### 5.1. Conclusions

The results of the present study showed adequate levels of knowledge about HPV vaccination and a Pap smear test but the poor practice of a Pap smear and HPV vaccination. The HPV vaccination should be included in the national immunization program, which helps reduce the prevalence of cervical cancer.

### Footnotes

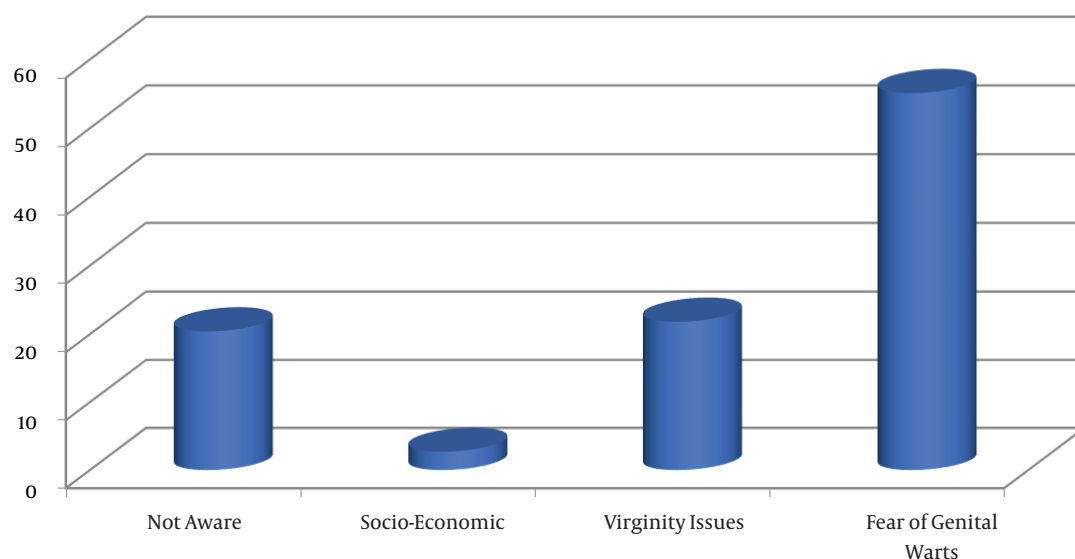
**Authors' Contribution:** Conception and study design: TZ, RN, IS, KS, AA, MY, RZ, and TS; Data collection: RN, IS, KS, AA, MY, RZ, and TS; Data analysis and interpretation: MZ; Manuscript drafting: TZ; Manuscript revision: RN and KS; Study guarantor: TZ. All the authors approved the final version of the manuscript.

**Conflict of Interests:** There is no conflict of interest.

**Ethical Approval:** JSMU-564321-2021.

**Funding/Support:** There was no funding/support.

**Informed Consent:** Permission was obtained from the participants who were informed about the purpose of the study. Furthermore, written consent was obtained before asking the questions from the study subjects.



**Figure 1.** Reasons for unwillingness to undergo a pap smear test among study participants

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