Awareness and Perception toward Human Papilloma Virus and Its' Vaccine among Selected Medical and Non-Medical Students at Minia University

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Abstract

Background: One of the most prevalent sexually transmitted diseases in the world is the human papillomavirus (HPV). It may occur without any symptoms. The HPV vaccine is the most effective preventive measure for cancers associated with HPV. **Aim:** Assess the awareness and perception toward human papillomavirus and its' vaccine among selected medical and non-medical students at Minia University. **Design:** A descriptive cross-sectional design. **Setting:** This study was carried out at the faculties of: Pharmacy, Nursing, Early Childhood Education, Tourism and Hotels, Dar-olom, and Alsun at Minia University. **Sample**: A random sample of 372 undergraduate female students was used. **Tool:** Data was gathered using two tools: **Tool I:** A structured self-administered questionnaire that consisted of **three parts**: Demographic data of the students, knowledge**,** and attitude of the students towards the HPV and its vaccine. **Tool II:** Perception of the students towards the HPV and its vaccine by using the Health Belief Model. **Results:** The study showed that 52.6% of the medical students had moderate knowledge, 60.5% of them had a positive attitude, and 61.4% of them had moderate perception, compared to 63.6% of the non-medical students who had poor knowledge, 64.3% of them had a negative attitude, and 60.1% had a low perception towards the HPV infection and its vaccine. **Conclusion:** This study revealed that medical students have more awareness and perception toward the HPV and its vaccine than non-medical students. **Recommendations:** Conduct an educational program for all university students to raise the awareness and perception towards HPV and its vaccine.

Keywords: Awareness, Human Papillomavirus, Human Papillomavirus Vaccine, Medical and Non-Medical students, Perception

Introduction:

Human papillomavirus (HPV) is the most prevalent sexually transmitted disease worldwide, a non-enveloped, epitheliotropic, double-stranded deoxyribonucleic acid (DNA) virus belonging to the Papillomaviridae family **(Qaqish et al., 2023)**. Stratified epithelium is infected by more than 170 different strains of HPV. According to their likelihood of developing cancer, high-risk and low-risk HPV types are distinguished **(Thanasa et al., 2022)**.

The main method of HPV transmission is skin-to-skin or skin-to-mucosa contact. The most well-documented transmission is sexual, while some research has suggested non-sexual pathways such as the horizontal transmission of HPV through the mouth, fingers, and skin contact, self-inoculation as a possible means of HPV transmission because it has been proven effective in female virgins and in kids with genital warts who have never experienced sexual abuse. Vertical transfer from mother to baby through the placenta, the amniotic fluid, or during a natural birth **(Petca et al., 2020).**

Most genital HPV infections are asymptomatic; they go away on their own and do not cause any illness. This depends on the types of viruses. HPV16 and HPV18 are high-risk HPVs and can cause cancer, whereas HPV types 6 and 11 are low-risk and primarily linked to genital warts. Up to 70% of all instances of all cancers are caused by cervical cancer, particularly those caused by HPV strains 16 and 18 **(Rabiu & Yahuza, 2023)**.

Reducing incidence and mortality requires the implementation of primary and secondary preventive measures, such as HPV vaccination, screening, and early treatment of precancerous lesions. It is advised by the World Health Organization (WHO) that nations incorporate HPV vaccination into their regular immunization programs. Teenagers between the ages of 11 and 13 should receive the HPV vaccination, which can be administered as early as age 9 **(Ebu et al., 2021).**

Three types of prophylactic vaccines, the quadrivalent HPV vaccine, the bivalent HPV vaccine, and the nonvalent HPV vaccine, have been approved for use in many countries. These three vaccines prevent 70%–90% of the HPV-related cancers with their advantages of safety and effectiveness. The quadrivalent and nonvalent HPV vaccines also protect against HPV6 and HPV11, which cause anogenital warts **(Wang et al., 2020)**.

The college student's awareness of HPV infection and vaccinations is very important to improve health and prevent cancers. By better assessment and educating people and busting myths and stigmas, we can raise awareness of HPV infection and the HPV vaccine. **(Goldfarb & Comber, 2022)**.

Significance of the research:

One of the most common sexually transmitted infections in the world is genital human papilloma-virus infection. Sub-Saharan Africa has the highest prevalence of cervical HPV infection among women (24%), followed by South-East Asia (14%), Latin America and the Caribbean (16%), and eastern Europe (14%) **(WHO, 2024).** According to a very important multicenter observational study conducted in Egypt in October 2014, the prevalence of HPV infection among Egyptian women who are 18 years of age or older is approximately 10.4%, with the highest prevalence of HPV

infection seen in women between the ages of 45 and 54 **(Elazab et al., 2021)**.

Numerous cancer types can result from an infection with the human papillomavirus. HPV infections are linked to almost all cases of cervical cancer, and in 2020, there were an anticipated 604,000 new cases of cervical cancer worldwide, along with over 300,000 deaths from the disease. Furthermore, it's thought that HPV infection is linked to over 124,000 instances of vulvar, vaginal, penile, oropharyngeal, and anal cancers annually **(Ellingson et al., 2023).**

As indicated by references, in Egypt, cervical cancer ranks as the 14th leading cause of female cancers in all ages and the 11th most common female cancer in women aged 15 to 44 years with an estimated age-standardized incidence rate of 2.3 per 100,000 individuals per year. Recent estimates showed that 33.2 million women were at risk for cervical cancer in Egypt, with an annual incidence of 1320 cases in 2020. Cervical cancer is also the 12th leading cause of cancer deaths in women aged 15 to 44 years in Egypt, with an age-standardized mortality rate of 1.5 per 100,000 individuals per year **(Khalifa Khalil et al., 2024)**.

Determining the HPV vaccine's uptake in Egypt is difficult because it was not included in the country's national program. Women's knowledge of HPV infection, its hazards, and preventive methods is insufficient, despite the virus's substantial prevalence **(Marzouk & Fadel., 2020).** Therefore, the goal of the current study was to assess the awareness and perception toward human papillomavirus and its' vaccine among selected medical and non-medical students at Minia university.

Aim of the study:

Assess awareness and perception toward human papilloma virus and its' vaccine among selected medical and non-medical students at Minia University.

Research Questions:

1. What is the level of awareness and perception about the human papilloma virus and its vaccine among medical and non-medical university students?
2. Are there relationships between awareness and perception among university students and their demographic characteristics?
3. Are there differences in awareness and perception toward human papilloma virus and its vaccine between medical and non-medical university students?

Subject and Methods:

Research Design:

A descriptive cross-sectional research design was utilized to fulfill the aim of this study.

Setting:

This study was conducted at Minia University from selected medical and non-medical faculties using a random method and the ratio of 2:4. The medical faculties included: (Faculty of Nursing and Pharmacy), while the non-medical faculties included: (Early Childhood and Education, Dar Al-Ulum, Alsun, and Tourism and Hotels). However, the university included 20 faculties: 6 medical and 14 non-medical faculties.

Sample:

The study used a probability random sample technique from medical and non-medical faculties. By using the manual lottery method, a number was written for each medical faculty in the university, and a number was also given to each non-medical faculty separately, and then the numbers were chosen randomly. The sample size was 372 undergraduate female students. This sample was selected based on **Elazab et al., (2021)**, who noted that the prevalence of HPV in Egypt was 10.4%. The number of samples was taken from faculties, including 22 from the Faculty of Pharmacy, 90 from Nursing, 92 from Early Childhood Education, 79 from Dar-olom, 26 from Alsun, and 63 from Tourism and Hotels. The study was conducted during the 2nd semester of the academic year (2024-2025).

Inclusion Criteria:

- Female undergraduate students from the selected faculties.
- 4th year university students.

Exclusion Criteria

- Male students

Data collection tools:

Two tools were utilized in the current study to collect data.

Too I: A structured Self-administered Questionnaire: it was designed and modified by the researcher after reviewing the related literatures it consisted of three parts.

Part 1: Demographic characteristics: data were collected from medical and non-medical university students and encompass items such as age, residence, marital status, attendance of training scientific courses on HPV, ……etc.

Part 2: knowledge towards the HPV infection and its' vaccine. This part assesses knowledge of undergraduate female students related to HPV infection and its vaccine after reviewing literatures **(Aga et al., 2022, Addisu et al., 2023, Alsarheed, 2023 &Horio et al., 2023)**. It included 16 statements, which divided into two portions:

a. Students' knowledge regarding HPV infection, it included 8 questions.
b. Students' knowledge regarding HPV vaccination which comprised of 8 questions.

Scoring System:

The items were evaluated by using two –points score; whereas one=correct answer and zero= incorrect answer or don't know, the items of knowledge were 16 items given 16 scores. Classification system for the knowledge level was adapted and modified from previous study **Magdy ELSayed et al., (2022)** to be: Poor level of knowledge was defined less than 50% (grades below 8), while Moderate level of knowledge was defined as from 50% to 75% (8 to 12 grades) and more than 75% refer to good knowledge (grades above 12).

Part 3: Attitude towards the HPV infection and its vaccine. This part aimed to assess the undergraduate female students related to HPV and its' vaccine after reviewing related literature **(Abuel-Zahab et al., 2021)**.

Scoring System:

The attitude statements were evaluated by using three -points Likert-scale; whereas 2= agree, 1=sometimes, 0= disagree, the total items of attitude were 15 statements given 30 scores. Classification system for the attitude level was adapted and modified from previous study by **Ebrahim Mahmoud et al., (2021),** and categorized into: Positive attitude more than 75% (> 22 grades) and Negative attitude was defined as 75% or less (≤ 22 grades)**.**

Tool I I: Perception towards the HPV infection and its vaccine. This tool used to assess the female undergraduate student's perception towards the HPV infection and its' vaccine by using the Health Belief Model (HBM), which focused on a person's health-related behavior for predicting future actions developed by **McMahon, (2018).** And it contained 52 questions; they were divided into 6 sections:

Section 1: Perceived susceptibility: Participants' perceptions of their risk of obtaining HPV. It aimed to determine if female students view themselves as susceptible to HPV (3 questions).

Section 2: Perceived severity: Refer to how participants perceive the seriousness of potential HPV-related health problems (11 questions).

Section 3: Perceived benefits: Students' perceptions of the advantages of the vaccine, and effectiveness in preventing HPV (5 questions).

Section 4: Perceived barriers: This section explores participants' perceptions of the barriers associated with receiving HPV vaccination (12 questions).

Section 5: Perceived cues to action for HPV vaccination: aimed to assess the readiness to get the HPV vaccine (10 questions).

Section 6: Self-efficacy: aimed to assess the confidence of students' selves and the ability to move and get the vaccine for HPV (11 questions).

Scoring system:

The tool consisted of items that utilized a five-point Likert scale for response choices. These choices included strongly disagree (1 point), disagree (2 points), neutral (3 points), agree (4 points), and strongly agree (5 points) with maximum scores of 260. Higher scores indicated stronger feelings. All scales were positively related to screening behavior except for barriers, which had a negative association, and were categorized into low perception as less than 50% (<130 grades), moderate perception as 50%-75% (130 to 195 grades), and high perception as more than 75% (more than 195 grades).

Validity

The tools were tested for content validity by a jury panel of five expert in the field of the study who reviewed the tools for clarity, relevance, comprehensiveness, understanding, applicability and easiness. Based on experts' comments and recommendations modifications were made.

Reliability

The reliability of the tools was evaluated through an Alpha Cronbach test, and they were found to be highly reliable, with a score of 0.853 for the knowledge Questionnaire (tool I-part 2), 0.831 for the attitude Scale (tool I -part 3), and 0.942 for the perception Scale (tool II).

Pilot study

A pilot study was conducted before the beginning of the study, by using online questionnaire (Google Form), it included 10% (37 undergraduate female students) from the total sample. The pilot study was conducted for purpose to testing clarity, completeness, and to determine the time required for completing the tools of the study. Based on the result of pilot study, the needed modification and additions were done. The sample of pilot study was excluded from the total sample.

Data collection procedures:

A formal letter included a brief explanation of the objectives of the study that was granted from the dean of the faculty of nursing at Minia University to be directed to the deans of the previously mentioned medical and non-medical faculties to gain their approval to conduct the study. Then, the researcher met the deans of selected faculties; each dean directed the researcher to the vice dean for students' affairs of his faculty. The researcher explained the nature of the study, and the questionnaire would be a Google form in the Arabic language. Finally, the researcher was introduced to faculty members, their assistants, and the leaders who were responsible for fourth-year students for facilitating the data collection.

Each leader of the fourth year of the selected faculties was interviewed separately and welcomed. Communication was made through WhatsApp to know a suitable time for the students for each faculty, whether medical or non-medical, and then the researcher went for each faculty and explained the goal and purpose of the study for fourth-year undergraduate females who were present at that time, and they have been informed that their participation is optional.

Moreover, the researcher translates the questionnaire into Arabic language then made structured online questionnaire through Google Form for each faculty. After that, a Google Form was sent to each leader separately via WhatsApp to be resent to their colleagues through their Telegram or WhatsApp group. The time needed to respond the google form ranged from (10 - 15 minute). Opening the questionnaire means that the student agrees to participate in the study. Continuous communication was made with each leader in the fourth year of each faculty, as well as with the demonstrators to encourage them to participate in the questionnaire. Data were collected in three months (from February to April during 2nd semester for the academic year 2024-2025).

Google Forms links:

- The link that was sent to the female students in the faculty of pharmacy was https://forms.office.com/r/6qnApK5gAS.
- The link that was used for the faculty of nursing was https://forms.office.com/r/2yXVr54hWC .
- As for the Faculty of Tourism and Hotels, this link was used https://forms.office.com/r/WZY3Hd9rUE.
- This link was sent to female students in the Faculty of Dar Al-Ulum. https://forms.office.com/r/rL4DqPgq93 .
- For the Faculty of Alsun, this link had been sent: https://forms.office.com/r/6MRKvwqW47.
- Faculty of Early Childhood and Education was sent this link to undergraduate female students https://forms.office.com/r/XNqTSYecSd .

Ethical consideration:

An official permission to conduct the study was obtained from the Scientific Research Ethics Committees, Faculty of Nursing Minia University (with approval number REC 20231137 on 7 \ 11\ 2023).

Statistical Analysis:

Statistical Package for Social Studies (SPSS) version 24 was applied to arrange, classify, and analyze the collected data. For qualitative and quantitative variables, respectively, the mean and standard deviations of the data were reported using descriptive statistics paired t test for p value $P \leq 0.001$. To demonstrate the relationship between the quantitative measures, correlation was used. The Chi-square was utilized in tests of relation, and a statistically significant difference should be taken into account when the p-value ≤ 0.05

Results:

Table 1: Demographic Characteristics of Medical and Non-Medical University Students (n = 372).

Demographic Characteristics	Medical students (n=112)		Non-medical students (n=260)		X2	p- value
	No	%	No	%		
Age						
≤22	96	**85.7**	242	**93.1**	1.32	0.214
>22	16	14.3	18	6.9		
Mean± SD	**20.1±.6**		**19.7±.9**			
Residence						
Urban	19	17	83	31.9	8.44	**0.002***
Rural	93	83	177	68.1		
Marital Status						
Married	6	5.4	42	16.2	2.16	0.011*
Single	106	**94.6**	218	**83.8**		
Attendance of any training courses about HPV and its vaccination						
Yes	16	14.3	13	5.0	3.21	0.012*
No	96	**85.7**	247	**95.0**		
You have been vaccinated against HPV						
Yes	4	3.6	4	1.5	1.34	0.214
No	108	96.4	256	98.5		
Source of information about the HPV vaccine						
Faculty education	**33**	**29.5**	64	24.6	2.31	0.126
Social media	18	16	**93**	**35.8**		
Friends	14	12.5	24	9.2		
Health care provider (doctors)	23	20.5	33	12.7		
Relatives	21	18.8	45	17.3		
Others (television, magazines)	3	2.7	1	0.4		

P > 0.05 insignificance, P≤0.05* significance, SD= Standard Deviation. Chi-Square test for p value

Table 1 shows that 85.7% and 93.1% of students in medical and non-medical groups respectively were 22 years old or below. The majority (94.6% and 83.8%) of participants in both groups were single. In terms of educational courses and receiving vaccines, the majority in both groups (85.7% and 95.0%) did not attend training classes and didn't have vaccines against HPV. Additionally, 29.5% of medical students got the information about the HPV vaccine from Health services units through faculties, and 35.8% of the non-medical students through social media.

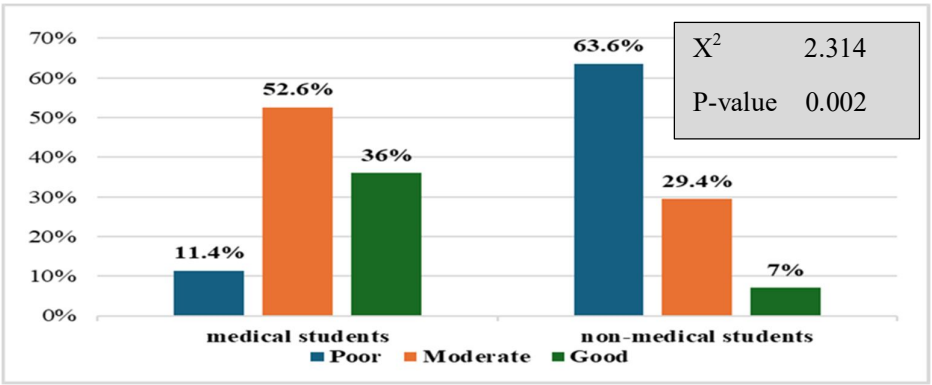

Figure 1: Percentage Distribution of University Students According to Their Total Knowledge Score Regarding Human Papillomavirus and Its Vaccine (n = 372).

Figure 1 presents that 52.6% of studied medical students had a moderate level of knowledge related to human papillomavirus and its vaccine, while 63.6% of studied non-medical students had a poor level of knowledge about human papillomavirus and its vaccine.

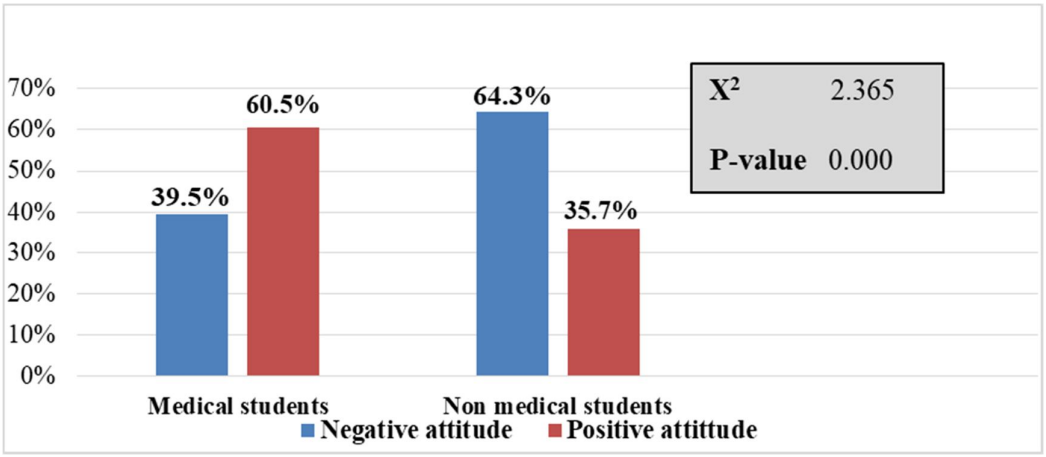

Figure 2: Percentage Distribution of University Students According to Their Total Attitude Score Regarding Human Papillomavirus and Its Vaccine (n = 372).

Figure 2 reveals that 60.5% of medical university students had a positive attitude regarding human papillomavirus and its vaccine. In comparison, 64.3% of non-medical students had a negative attitude.

Table 2: Comparison of Mean Scores Between the Medical and Non-Medical University Students Related to Their Perception About Human Papillomavirus and Its Vaccine (n=372).

Perception	Medical students (n=112)	Non-Medical students (n=260)	T	P- value
	Mean± SD	Mean± SD		
Perceived Susceptibility	11.2 ± **0.21**	9.1±**0.46**	12.6	.001*
Perceived Severity	20.1±**1.67**	11.9±**2.11**	14.3	.001*
Perceived Benefits	24.3±**2.41**	11.3±**2.54**	14.8	.001*
Perceived Barriers	24.9±**3.11**	10.2±**2.31**	15.1	.001*
Cues to Action	22.4±**1.21**	9.6±**1.61**	13.7	.001*
Self-Efficacy	20.7±**2.32**	10.2±**1.32**	12.1	.001*
Total	123.6±**10.93**	62.3±**10.35**	17.8	.001*

* High Significance P ≤ 0.001, paired t test for p value

Table 2 indicates that there were highly statistically significant differences (p-value < 0.001) between medical and non-medical students concerning all items of perception regarding human papillomavirus and its vaccine (perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action, and self-efficacy).

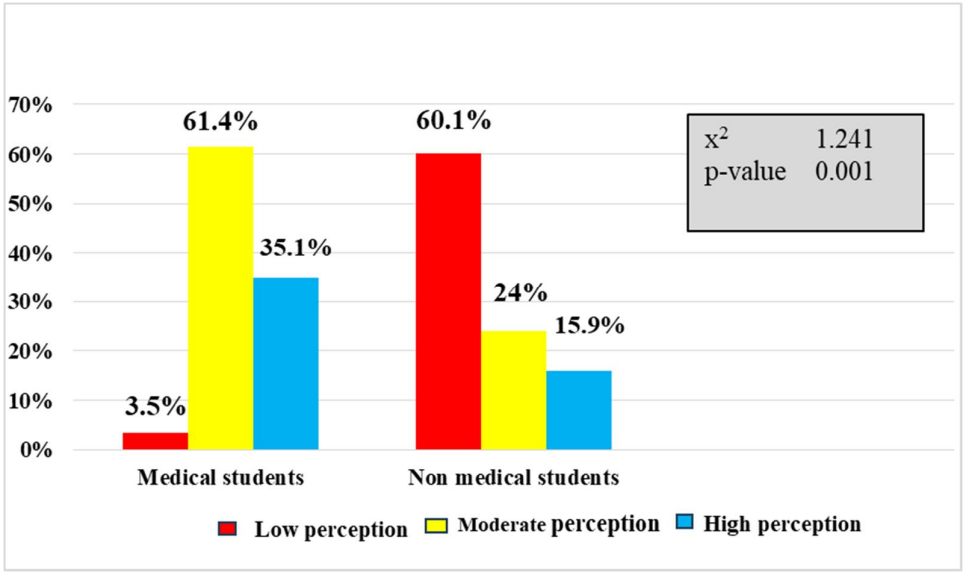

Figure 3: Percentage Distribution of University Students According to Their Total Perception Score Toward Human Papillomavirus and Its Vaccine (n = 372).

Figure 3 shows that 61.4% of studied medical students had a moderate perception toward human papillomavirus and its vaccine. In comparison, 60.1% of studied non-medical students had a low perception toward human papillomavirus and its vaccine.

Table 3: Relation Between Demographic Characteristics of Medical and Non-Medical University Students and Their Total Knowledge Score About Human Papillomavirus and Its Vaccine (n=372).

Demographic characteristics	Medical students (n=112)						Non-Medical students (n=260)					
	Poor		Moderate		Good		Poor		Moderate		Good	
	No	%	No	%	No	%	No	%	No	%	No	%
Age												
≤22	6	54.5	30	50.0	18	43.9	71	42.8	30	39.5	8	44.4
>22	5	45.5	30	50.0	23	56.1	95	57.2	46	60.5	10	55.6
X^2 (P- value)	12.6 (0.281)						12.3 (0.264)					
Residence												
Urban	3	27.3	2	3.3	14	34.2	50	30.1	29	38.2	6	(33.3)
Rural	8	72.7	**58**	**96.7**	27	65.8	116	69.9	47	61.8	12	66.7
X^2 (P- value)	**13.9 (0.002)***						12.3 (0.124)					
Marital Status												
Married	0	0.0	2	3.3	4	9.8	32	19.3	9	11.8	3	16.7
Single	11	100.0	58	96.7	37	90.2	134	80.7	67	88.2	**15**	83.3
X^2 (P- value)	14.8 (0.231)						11.7 (0.171)					
Attendance of training courses about virus and its vaccination												
No	11	100.0	**54**	**90.0**	31	75.6	160	96.4	68	89.5	17	94.4
Yes	0	0.0	6	10.0	10	24.4	6	3.6	8	10.5	1	5.6
X^2 (P- value)	**9.63 (.004)***						10.2 (0.314)					
You have been vaccinated against HPV												
Not vaccinated	11	100.0	56	93.3	41	100.0	166	100.0	72	94.7	18	100.0
Vaccinated	0	0.0	4	6.7	0	0.0	0	0.0	4	5.3	0	0.0
X^2 (P- value)	11.3 (0.431)						9.1 (0.254)					
Source of information about the HPV vaccine												
Faculty education	4	36.3	24	40.0	4	9.7	32	19.3	25	32.9	8	44.4
Social media	1	9.1	9	15.0	10	24.4	48	28.9	36	47.4	7	38.9
Friends	1	9.1	1	1.7	12	29.4	23	13.9	2	2.6	0	0.0
Health care provider (doctors)	3	27.3	6	10.0	13	31.7	32	19.3	1	1.3	0	0.0
Relatives	1	9.1	19	31.6	1	2.4	30	18.0	12	15.8	3	16.7
Others (television, magazines)	1	9.1	1	1.7	1	2.4	1	0.6	0	0.0	0	0.0
X^2 (P- value)	10.57 (0.071)						11.3 (0.147)					

P > 0.05 insignificance, P≤0.05* significance, Chi-Square test for p value

Table 3 reveals that the relationship between the total knowledge scores of medical and non-medical students and their demographic characteristics. It indicates a highly statistically significant correlation between the total knowledge scores of medical students and their place of residence, as well as their attendance of virus-related courses, with p-values of 0.002 and 0.004, respectively. On the other hand, no statistically significant relationship was found between non-medical students' total score of knowledge and their demographic characteristics.

Table 4: Relation Between Demographic Characteristics of Medical and Non-Medical University Students and Their Total Attitude Score About Human Papillomavirus and Its Vaccine (n=372).

Demographic characteristics	Medical students (n=112)				Non-Medical students (n=260)			
	Negative (43)		Positive (69)		Negative (168)		Positive (92)	
	No	%	No	%	No	%	No	%
Age								
≤22	30	69.8	25	36.2	68	40.5	42	45.7
>22	13	30.2	44	63.8	100	59.5	50	54.3
X^2 (P- value)	**3.21 (0.001)***				7.31 (0.004)			
Residence								
Urban	3	7.0	14	20.3	48	28.6	37	40.2
Rural	40	93.0	55	79.7	120	71.4	55	59.8
X^2 (P- value)	**4.37 (0.002)***				**4.61 (0.002)***			
Marital Status								
Married	2	4.7	4	5.8	31	18.5	13	14.1
Single	41	95.3	65	94.2	137	81.5	79	85.9
X^2 (P- value)	1.61 (0.814)				5.13 (0.621)			
Attendance of training courses about virus and its vaccination								
No	43	100.0	53	76.8	160	95.2	85	92.4
Yes	0	0.0	16	23.2	8	4.8	7	7.6
X^2 (P- value)	**2.38 (0.001)***				4.34 (0.135)			
You have been vaccinated against HPV								
Not vaccinated	43	100.0	65	94.2	164	97.6	90	97.8
Vaccinated	0	0.0	4	5.8	4	2.4	2	2.2
X^2 (P- value)	3.01 (0.121)				4.72 (0.214)			
Source of information about the HPV vaccine								
Faculty education	11	25.6	21	30.4	82	48.8	32	34.8
Social media	10	23.3	10	14.5	48	28.6	44	47.8
Friends	4	9.3	10	14.5	3	1.8	1	1.1
Health care provider (doctors)	6	14.0	16	23.2	3	1.8	0	0.0
Relatives	9	20.9	12	17.4	30	17.8	15	16.3
Others (television, magazines)	3	6.9	0	0.0	2	1.2	0	0.0
X^2 (P- value)	4.21 (0.127)				5.11 (0.431)			

P > 0.05 insignificance, P≤0.05* significance, Chi-Square test for p value

Table 4 shows that there was a highly statistically significant relation between medical students' attitude and their residence, and attendance of courses about the HPV and its vaccination, where P-values were 0.002, and 0.001, respectively. Regarding non-medical students, a statistically significant relation was found between their' attitude, and their residence where the P-values were 0.004 and 0.002, respectively

Table 5: Relation Between Demographic Characteristics of The University Students and Their Total Perception Score About Human Papillomavirus and Its Vaccine (n=372).

Demographic characteristics	Medical students (n=112)						Non-Medical students (n=260)					
	Low		Moderate		High		Low		Moderate		High	
	No	%	No	%	No	%	No	%	No	%	No	%
Age												
≤22	4	100.0	41	58.6	8	21.1	72	45.9	30	48.4	8	19.5
>22	0	0.0	29	41.4	30	78.9	85	54.1	32	51.6	33	80.5
X^2 (P- value)	**6.31 (0.001)***						**3.62 (0.001)***					
Residence												
Urban	1	25.0	14	20.0	4	10.5	42	26.8	24	38.7	19	46.3
Rural	3	75.0	56	80.0	34	89.5	115	73.2	38	61.3	22	53.7
X^2 (P- value)	3.87 (0.004)*						5.14 (0.004)*					
Marital Status												
Married	2	50.0	4	5.7	0	0.0	21	13.4	15	24.2	8	19.5
Single	2	50.0	66	94.3	38	100.0	136	86.6	47	75.8	33	80.5
X^2 (P- value)	4.52 (0.004)*						4.57 (0.004)*					
Attendance of training courses about virus and its vaccination												
No	4	100.0	64	91.4	30	78.9	154	98.1	59	95.2	32	78.1
Yes	0	0.0	6	8.6	8	21.1	3	1.9	3	4.8	9	21.9
X^2 (P- value)	2.36 (0.004)*						4.97 (0.004)*					
You have been vaccinated against HPV												
Not vaccinated	4	100.0	69	98.6	35	92.1	157	100.0	61	98.4	38	92.7
Vaccinated	0	0.0	1	1.4	3	7.9	0	0.0	1	1.6	3	7.3
X^2 (P- value)	4.64 (0.181)						6.31 (0.217)					
Source of information about the HPV vaccine												
Faculty education	0	0.0	17	24.3	15	39.5	24	15.3	23	37.1	17	41.5
Social media	0	0.0	13	18.6	7	18.4	43	27.4	32	51.6	17	41.5
Friends	2	50.0	8	11.4	4	10.5	20	12.7	4	6.5	0	0.0
Health care provider (doctors)	1	25.0	13	18.6	8	21.1	30	19.1	3	4.8	0	0.0
Relatives	0	0.0	17	24.3	4	10.5	38	24.2	0	0.0	7	17.0
Others (television, magazines)	1	25.0	2	2.8	0	0.0	2	1.3	0	0.0	0	0.0
X^2 (P- value)	1.32 (0.114)						4.64 (0.124)					

P > 0.05 insignificance, P≤0.05* significance, Chi-Square test for p value

Table 5 reveals that there was a highly statistically significant relationship between the perceptions of studied medical and non-medical students and their residence, marital status, and attendance of training courses about the HPV virus and its vaccination, with P-values of 0.004, 0.004, and 0.004, respectively.

Table 6: Correlation Between Medical University Students' Total Knowledge, Attitude and Perception Scores Regarding Human Papillomavirus and Its Vaccine (n=112).

Items	Knowledge	Attitude	Perception
Knowledge r. value (P. value)	1	0.248 (.000) **	0.293 (0.001) *
Attitude r. value (P. value)	0.248 (.000) **	1	0.158 (0.001)*
Perception r. value (P. value)	0.293 (.001) *	0.158 (0.001)*	1

**** Correlation is significant at the 0.01 level (2- tailed). * Correlation is significant at the 0.05 level (2- tailed).**

Table 6 It was observed that there was a weak positive correlation between the knowledge of students in the medical faculties and their attitude, with a correlation coefficient (r) value of (0.248), and this difference was highly statistically significant (P-value: 0.000). Additionally, there was a weak positive correlation between students in the medical faculties' knowledge and their perception, with a correlation coefficient (r) value of (0.293), and this difference was statistically significant (P-value: 0.001). Furthermore, there was a weak positive correlation between students in the medical faculties' attitude and their perception, with a correlation coefficient (r) value of (0.158), and this difference was highly statistically significant (P-value: 0.000).

Table 7: Correlation Between Non-Medical University Students' Total Knowledge, Attitude and Perception Regarding Human Papillomavirus and Its Vaccine (n=260).

Items	Knowledge	Attitude	Perception
Knowledge r. value (P. value)	1	- 0.112 (.000) **	0.293 (0.001) *
Attitude r. value (P. value)	- 0.112 (.000) **	1	-.424 (.000) **
Perception r. value (P. value)	0.293 (0.05) *	-.424 (.000) **	1

**** Correlation is significant at the 0.01 level (2- tailed). * Correlation is significant at the 0.05 level (2- tailed).**

Table 7 It was observed that there was a negative correlation between the knowledge of students in the non-medical faculties and their attitude, with a correlation coefficient (r) value of (-0.112), and this difference was highly statistically significant (P-value: 0.000). Additionally, there was a weak positive correlation between students in the non-medical faculties' knowledge and their perception, with a correlation coefficient (r) value of (0.293), and this difference was statistically significant (P-value: 0.05). Furthermore, there was a negative correlation between students in the non-medical faculties attitude and their perception, with a correlation coefficient (r) value of (-0.424), and this difference was highly statistically significant (P-value: 0.000).

Discussion:

Human papillomavirus (HPV) is the most often diagnosed sexually transmitted disease worldwide. Cervical cancer is the most common disease associated with HPV, along with cancers of the vulva, vagina, penis, anus, and oropharynx. Over 100 distinct kinds of HPV have been found. These types are separated into two groups based on their carcinogenic characteristics: low-risk and high-risk. Early detection can help reduce HPV-related mortality and morbidity **(Aksoy et al., 2022).**

The HPV vaccine is a prophylaxis shot designed for protection against the most prevalent high-risk strains and low-risk HPV infections **(Yohannes et al., 2023).** Scientific evidence supports the safety and efficacy of these vaccinations in preventing HPV infections of the vaccine type and related illnesses **(Waheed et al., 2021).**

The current study aimed to assess awareness and perception toward human papilloma virus and its 'vaccine among selected medical and non-medical students at Minia University.

Regarding demographic characteristics: The current study revealed that the majority of studied medical and non-medical students were ≤22 years old. This result aligns with the study conducted by **Regasa et al., (2023),** Human Papillomavirus Knowledge, Perception, and Willingness to Receive Vaccination Among Female University Students in Addis Ababa University, and stated that the majority of female students were ≤ 22 years old. Similarly, **Liu et al., (2021),** who studied "difference between medical and nonmedical students on knowledge, practice, and attitude towards the human papillomavirus vaccine in China" and found that above half of female students from medical and non-medical groups were ≤ 22 years old.

The current study presented that the majority of studied medical and non-medical students live in rural areas. Also, less than a quarter of the participants reported that they had received information about the vaccine from health care providers. This result is supported by **Sono et al., (2024),** who studied "human papillomavirus vaccination status among university students in Southern Thailand" and reported that the majority of students were from non-urban areas, and received information from healthcare providers.

Moreover, the majority of students in both groups were single. These findings are consistent with **Koutrakou et al., (2022),** who performed the study on "knowledge and perceptions of Greek students about human papillomavirus, vaccination, and cervical cancer screening", and revealed that nearly two-thirds of students were unmarried.

Concerning Human Papilloma Virus vaccination status, the current study revealed that over three-quarters of the studied medical and non-medical students were not vaccinated against HPV. These findings came in line with **Liu et al., (2021),** found that more than seventy-five percent of the students didn't take the vaccine. Possible explanation may be that HPV vaccine is not in the mandatory schedule immunization in some countries.

Regarding sources of knowledge of HPV vaccination, the current study revealed that more than one-quarter of medical students knew from faculty education, and more than one-third of non-medical students knew from social media. These results agreed with **Azer et al., (2022)**, who conducted the study on "what do university students know about cervical cancer and HPV vaccine" and showed that the majority of medical students said that the source of knowledge was school or college education; on the other hand, about two-thirds of non-medical students reported that social media was the primary source of knowledge. The finding may explain that the nature of the curriculum in medical faculties is different from non-medical faculties, as medical students are provided with information about medical diseases in their faculties, unlike non-medical students, who may obtain medical information from social media.

Relating to total knowledge of the university students toward human papillomavirus and its vaccine: The current study stated that slightly above half of the medical students had a moderate level of knowledge regarding HPV and its vaccine. These results were supported by **Aldawood et al., (2023),** who studied "awareness of human papillomavirus among male and female university students in Saudi Arabia" and found that above half of students had a fair level of knowledge regarding HPV and its vaccine. Also, this is congruent with **Sharma et al., (2020),** who performed the study "Assessment of understanding about human papilloma virus vaccination among undergraduate medical students in a developing country" and reported that nearly half of medical students had an average level of knowledge.

The present study illustrated that more than fifty percent of non-medical students had a poor level of knowledge. This result is similar to C**hanprasertpinyo & Rerkswattavorn, (2020),** who studied "human papillomavirus (HPV) vaccine status and knowledge of students at a university in rural Thailand" and reported that more than two-thirds of non-health students had a low level of knowledge.

The study indicated that the medical student had a moderate awareness compared to non-medical students, who had poor awareness about human papillomavirus and its vaccine. This finding was approved by **Hu et al., (2024),** who

conducted the study on "awareness regarding human papillomavirus and willingness for vaccination among college students with or without medical background in Guizhou Province" and found that the medical group had higher awareness rates for HPV and its vaccines than the non-medical group.

Also, this study is in harmony with **Varer Akpinar & Alanya Tosun., (2023),** who studied "knowledge and perceptions regarding Human Papillomavirus (HPV) and willingness to receive HPV vaccination among university students in a north-eastern city in Turkey" and showed that the students of health sciences had more awareness about HPV and HPV vaccines than non-medical students. This may be due to medical students getting information about sexual diseases through their studies, while non-medical students are not aware of diseases due to the nature of their studies. As for the moderate level of knowledge among female medical students, this means that they have insufficient information about the virus and the vaccine because the vaccine is not included in the mandatory vaccination schedule in Egypt.

Concerning the total attitudes of the university students regarding human papillomavirus and its vaccine, the current study revealed that above half of medical students had a positive attitude and nearly two-thirds of non-medical students had a negative attitude regarding human papillomavirus and its vaccine. This is contradicted by **Tung et al., (2019),** who studied "human papillomavirus knowledge, attitudes, and vaccination among Chinese college students in the United States" and stated that nearly two-thirds of health students had a positive attitude, and above half of non-health students had a negative attitude.

On the other hand, the result of non-medical students disagrees with **Seo et al., (2024),** who conducted the study on "the relationship between knowledge with attitudes of college students towards the HPV vaccine" and reported that more than half of non-medical students had a positive attitude. This may be due to the existence of health education and awareness toward HPV and its vaccine in their countries.

The current study results demonstrated that over half had a positive attitude. This result is agreed with **Abuel-Zahab et al., (2021),** who studied "effect of nursing guideline about genital human papilloma virus infection on knowledge and attitude of female university students" and found that above half of medical participants had a positive attitude toward human papilloma infection and its vaccine. Medical students had a positive attitude; this may be due to a moderate level of knowledge about human papillomavirus and its vaccine. On the other hand, the non-medical students had a negative attitude. This may be due to the poor level of HPV knowledge, which indicates a need for HPV and its vaccine health education.

In regard to total perception of university students toward human papillomavirus and its vaccine, the study revealed that nearly three quarters of all students had a low to moderate level of perception, and a quarter of students had a high level of perception. This result agreed with **Fallucca et al., (2022),** who studied "acceptability of HPV vaccination in young students by exploring health belief model and health literacy" and stated that nearly two-thirds of students from different faculties had a low to moderate level of perception, and more than one-third had a high level of perception.

Regarding the comparison between medical and non-medical students related to their perception about human papillomavirus and its vaccine, the current study demonstrated that there was a statistically significant difference of participants concerning all items of perception: perceived susceptibility, perceived severity, benefits, barriers, cues to action, and self-efficacy (p-value < 0.001). These results were approved by **Alsulami et al., (2023),** who conducted the study "predictor of HPV vaccination uptake among foreign-born college students in the US" and mentioned that there was statistical significance of colleagues' students in three domains of perceived susceptibility, perceived barriers, and cues to action (p-value < 0.001).

Relating the relation between demographic characteristics of medical and non-medical university students and their total knowledge score about human papillomavirus and its vaccine, the study illustrated that there was no statistically significant relation between studied medical and non-medical students' knowledge and their marital status (p-value 0.231, 0.171, respectively). This result is agreed with by **Tunaman et al., (2022),** who studied the "knowledge levels and health beliefs of vocational school of health services students about human papillomavirus (HPV) and vaccine" and showed that there was no statistically significant relationship between the knowledge of students regarding HPV and marital status (p-value = 0.716). The possible explanation could be that

In regard to the relation between demographic characteristics of medical and non-medical university students and their total attitude score about human papillomavirus and its vaccine, the study revealed that there was no statistically significant difference between marital status and attitude among medical and non-medical students. This result was consistent with **Abuel-Zahab et al., (2021)** noted that there was no statistically significant relationship between marital status and the attitude of female medical participants.

In regard to the relation between demographic characteristics of the university students and their total perception score about human papillomavirus and its vaccine, the study demonstrated that there was statistical significance (p-value < 0.004) between residence and perception of medical students. This result agreed with **Sanjay et al., (2024),** who studied "HPV vaccine uptake, HPV infection and vaccination related knowledge and health beliefs among health sciences students in Coimbatore district, Tamil Nadu" and stated that there was statistical significance between marital residence and perception (p-value < 0.001).

Regarding the relation between knowledge and attitude of medical students, the current study revealed that there was a highly statistically significant (p-value ≤ 0.000). This result is in agreement with **Magdy ELSayed et al., (2022),** who conducted the study on "knowledge and attitudes of nursing students toward human papilloma virus vaccination" and showed that there was a high statistically significant relation between medical students' knowledge and attitude (p-value ≤ 0.002).

Additionally, the current study of non-medical participants noted that there was a negative correlation between the knowledge of non-medical students and their attitude; the r value is (-0.112). This difference was highly statistically significant (p-value ≤ 0.000). This result was agreed upon by **Seo et al., (2024),** who showed that there was statistical significance between knowledge and attitude (p-value ≤ 0.002).

Regarding the relation between awareness and perception of medical students, the study revealed that there was a weak positive correlation coefficient (r) value (0.293) and statistically significant (P-value ≤ 0.001). This result agreed with **Sanjay et al., (2024)** showed that there was a positive correlation (r) value (0.251) with statistical significance (p-value ≤ 0.001).

Conclusion:

Medical faculties have a moderate level of knowledge and a positive attitude, according to the study's findings. In contrast to non-medical faculties, who have a poor level of knowledge and a negative attitude about the human papillomavirus and its vaccination. Where knowledge and attitude refer to awareness.

In addition, it was found that female medical students' have a moderate level of perception, while female non-medical students have a low level of perception towards HPV and its vaccine.

There was a statistically significant negative correlation between the total score of knowledge and the total score of attitudes, and also a weak positive statistically significant correlation between the total score of knowledge and the total score of perception among female medical students. Finally, there was statistically significant negative correlation between the total score of attitudes and the total score of perception among medical and non-medical female students.

Recommendations:

Based on the findings of the current study, the following recommendations are made:

1- Provide an educational program to university students to increase awareness toward human papillomavirus and its vaccine.
2- Conduct similar research on HPV and its vaccine for females before reproductive age to increase awareness of it in the community.
3- Expanding research work on HPV and its vaccine to incorporate a more comprehensive sample of students from all university faculty levels and grades

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