



KNOWLEDGE AND AWARENESS OF HUMAN PAPILLOMAVIRUS (HPV), CERVICAL CANCER AND HPV VACCINES AMONG MEDICAL STUDENTS

VIKRANT C. SANGAR*¹ AND DR. B. B. GHONGANE²

1. PhD Student, Department of Pharmacology, B. J. Government Medical College and Sassoon General Hospital, Pune, INDIA.

2. Professor and Head, Department of Pharmacology, Government Medical College, Miraj, INDIA.

ABSTRACT

Cervical cancer is one of the leading causes of morbidity and mortality among the gynaecological cancer worldwide. Medical students should be aware of cervical cancer, Human Papillomavirus and Human Papillomavirus vaccines. Therefore, to assess the status of knowledge and awareness of cervical cancer, human papillomavirus and human papillomavirus vaccines among them a cross-sectional, questionnaire based survey was conducted in preclinical (Group I, 129), paraclinical (Group II, 148) and clinical level (Group III, 78) medical students. The data was analyzed using Microsoft Access and Excel software. Preclinical Group had least knowledge. Paraclinical Group was unaware regarding Human Papillomavirus vaccines pricing (58.97%), vaccine manufacturer (81%) and dosing schedule (81%). Clinical Group is unaware of Human Papillomavirus vaccines availability (50%), vaccine dosing schedule (57.65%), manufacturers (65%) and vaccine preparation technology (79.48%). Therefore, there is a need to educate them in these areas because in future they are going to play a pivotal role of physician.

KEYWORDS : Knowledge, Awareness, Cervical cancer, Human Papillomavirus, HPV vaccines, Medical students



VIKRANT C. SANGAR

PhD Student, Department of Pharmacology, B. J. Government Medical College and Sassoon General Hospital, Pune, INDIA.

*Corresponding author

INTRODUCTION

Cervical cancer (CaCx) is one of the leading causes of morbidity and mortality among the gynaecological cancer worldwide¹. According to World Health Organisation: Human Papillomavirus and Related Cancers Summary Report (2010), in India cervical cancer is reported to take the lives of 8 women every hour². In developed countries, a number of preventive strategies are currently being practiced including use of two novel prophylactic vaccines and a number of secondary preventive strategies. In INDIA, these two HPV vaccines are not available through government settings however; both vaccines can be obtained from private health care professionals³. It is crucial that Indian medical students should be aware of the advances and especially of those interventions, which can be utilized, in low-resource settings⁴. Medical students are future physicians so they need to understand about cervical cancer, HPV and HPV vaccines in order to deal with this disease. Pandey et al (2010), conducted a general questionnaire based on study to detect the awareness and attitude towards HPV vaccines among final year and recently joined medical students. Most of the participants from above study were aware regarding the preventive nature and etiology of cervical cancer, availability, target population and vaccination schedule of HPV vaccines⁵. However, above study lacks in designing basic questions on HPV vaccine like route of administration, pricing and manufacturer. Therefore, the present study planned which will cover topics of cervical cancer, HPV and two HPV vaccines and includes all preclinical, paraclinical and clinical student groups for study. The designed questionnaire can also find out how much individual student knew in detail about particular type of HPV vaccine. This data may be useful to develop more comprehensive policy and help to implement awareness programs among the health care professionals.

MATERIALS AND METHODS

(i) Questionnaire formulation

A questionnaire was designed from the point of view of medical students which was divided into 3 parts: 1) respondent sociodemographic characteristics and qualification, 2) knowledge and attitude about Epidemiology and Etiology of Cervical cancer and 3) knowledge and attitude about the HPV vaccines. Knowledge and awareness section had 26 questions and attitude scale consisted of 5 questions. Responses were recorded on a five-point Likert scale, Strongly agree (1) to Strongly disagree (5).

(ii) Study population and sample size

Total 355 medical students were enrolled using convenience sampling during October 2012 to Jan 2013 in the tertiary medical care hospital. Out of 355 medical students, 129 students (36.33%) were from preclinical stage i.e. I MBBS (Group I), 148 students (41.69%) from paraclinical stage i.e. II MBBS (Group II) and 78 students were from clinical stage i.e. III MBBS onwards (Group III).

(iii) Ethical approval and CTRI registration

The study protocol was approved by institutional ethical review committee and registered in Clinical trial registry of INDIA (CTRI/2012/12/003269).

(iv) Data collection

During data collection, the medical students were explained in detail in person regarding the purpose of the study and confidentiality of their opinion for questionnaire. They were briefed that their participation is voluntary and they have full right to withdraw from the study. If they decided to enter into study, written informed consent was taken from each participant. After written informed consent, participant was asked to fill up the study based questionnaire. The immediate response was requested and the questionnaire was collected back.

(v) Data collection Tools and Analysis

Information obtained from the above questionnaire was entered in password protected database. Then, percentage and chi square test was applied for the analysis and interpretation of the result.

RESULTS

A total of 355 students gave consent to participant in the study with 100% response rate. Out of 355 students, 129 students were from preclinical stage, 148 students were from paraclinical stage and 78 students were from clinical stage. Ninety-one (53%) participants were female and 164 (46%) were male. There is a significant difference in the marital status of participants. Three forty nine (98.3%) students were single and 6 (1.69%) were married. Among 355 medical students, more than 90% students (n=331) are completing their graduation while 6% (n=24) are completing their post-graduation. There was significant difference in response to chances of getting cancer in future ($p < 0.001$) among the group II as compared to group I (Table 1). Knowledge about the etiology and epidemiology of cervical cancer: Majority of the 326 participants (91.83%) were aware that virus is the causative agent of cervical cancer. Other responses recorded were bacteria 9 (2.52%) and fungus 3 (0.84%). Seventeen participants (4.78%) do not know causative agent for cervical cancer. One hundred and seventy-eight (93.19%) female and 148 (90.24%) male participants were aware about the causative agent of cervical cancer. Two hundred and forty eight (68.16%) participants were aware about epidemiology of cervical cancer. The group II has 74% awareness as compared to group I 50%, when they asked about epidemiology of cervical cancer. There is significant difference ($p < 0.01$) between group II and group I. One hundred and thirty-seven (71.72%) female and 105 (64.02%) male participants were aware about the epidemiology of cervical cancer. Two hundred and fourteen (60.28%) participants were aware about approximate time period required for the development of cervical cancer from cervical intraepithelial neoplasia (CIN-III). The knowledge and awareness regarding

approximately time period for the development of cervical cancer from cervical intraepithelial neoplasia (CIN-III) is significantly more ($p < 0.001$) in group III as compared to group II. Only 21 (10.99%) female and 20 male (12.19%) were aware about time period required for the development of cervical cancer (Table 2).

1. Knowledge about the risk factors of cervical cancer

Regarding the knowledge of risk factors of cervical cancer, 9 risk factors were reported. The most common reported risk factor by participants was poor hygiene 185 (52.11%). Other stated risk factors were family history - 14 (3.94%), multiparity - 24 (6.76%), contraceptive pills - 17 (4.78%), nulliparity - 4 (1.12%), early age at first coitus - 36 (10.14%), smoking - 16 (4.5%), old age - 7 (1.97%) and genetics - 13 (3.66%). The knowledge about risk factors of cervical cancer is significantly more in group II as compared to group I. However, group I and II students (n=76) reported poor hygiene as main risk factor (Table 3).

2. Knowledge about presenting features of cervical cancer

Sixty-six participants reported bleeding per vaginal (18.59%) as main presenting feature of cervical cancer. Other reported features were discharge per vaginal - 64 (18.02%), lower abdominal pain - 32 (9.01%), menstrual problems - 32 (9.01%), itching - 13 (6.65%) and swelling of cervix -39 (10.98). Seventy-seven participants (21.69%) from all three groups unaware about any presenting feature. The knowledge about presenting features of cervical cancer is significantly ($p < 0.001$) more in group II as compared to group I. Maximum students from group II reported bleeding per vaginal as presenting feature (n=34) as compared to remaining 2 groups (Table 4).

3. Knowledge about Human Papillomavirus (HPV)

One hundred and sixty one (45.35%) participants were aware that HPV can cause any other disease. Group III has more statistically significant difference ($p < 0.001$) in awareness and knowledge as compared to group II when they asked whether HPV can

cause any other disease ($p < 0.001$). Ninety (47.12%) female and 69 male (42.07%) participants were aware that HPV can cause any other disease. Two hundred and eighteen students (61.4%) knew that HPV route of transmission is sexual contact. Group II has more knowledge on HPV transmission. One hundred and twenty-two (63.87%) female and 96 male (58.53%) participants were aware about HPV route of transmission. Majority of the participants ($n=282$) were aware about HPV can be detectable. One hundred and forty seven (76.96%) female and 134 male (81.70%) were aware about this HPV detection. According to participants techniques available for HPV detection are Pap smear ($n=237$), polymerase chain reaction (PCR) ($n=46$), blood ($n=28$) and biopsy ($n=26$). The awareness about HPV detection was significantly more in group II as compared to group I. The 120 participants (33.80%) were aware that high-risk HPV types 16 and 18 covers 70% of cervical cancer. Seventy-three (38.21%) female and 45 male (24.73%) participants were aware about this. Group III students have significantly more knowledge in high-risk HPV types as compared to group II (Table 5).

4. Source of Information regarding HPV vaccine

Most of the participants received HPV vaccine information when they were in school/university or when they had attended a seminar ($n=121$). Other sources of information reported were internet ($n=80$), television ($n=14$), radio ($n=7$), health care clinics/hospitals ($n=78$), friends/colleagues ($n=17$), magazines ($n=34$) and leaflet/poster/pamphlet ($n=4$) (Table 6).

5. Knowledge regarding the HPV vaccines route of administration

Ninety-two participants (25.92%) were aware about the route of HPV vaccine administration. Only 57 (29.84%) female and 35 male (21.34%) were aware about this. The II group students ($n=37$) know the proper route of HPV vaccine administration i.e. deep intramuscular as compared to group I ($n=12$) and group III ($n=37$) students. Group II has more significant ($p < 0.01$) awareness and knowledge in route of

HPV vaccine administration as compared to group I. Among the three groups, group III has more knowledge in route of HPV vaccine administration (Table 7).

6. Knowledge regarding the HPV vaccines preparation technology

Only 50 participants (14%) knew that virus like particle technology is used for this HPV vaccine preparation. The awareness regarding HPV vaccines preparation technology showed no statistical difference among all three groups. Twenty-six females (13.08%) and 24 males (14.63%) participants were aware about this HPV vaccine preparation technology (Table 7).

7. Knowledge regarding pricing and sale of HPV vaccines

Two hundred and forty-seven participants (69.47%) were unaware about which HPV vaccines are licensed for use in INDIA and 244 participants (68.73%) were unaware HPV vaccine pricing in INDIA. Group III has significantly ($p < 0.001$) more knowledge regarding HPV vaccine licensing and HPV vaccine pricing in INDIA as compared to group II. Similar more significant ($p < 0.001$) difference was observed in group II when it is compared to group I. Twenty (10.47%) female and 14 male (8.53%) were aware about HPV vaccine licensing in INDIA. Thirty-seven (19.37%) female and 24 male (14.63%) were aware about HPV vaccine pricing in INDIA. Two hundred and forty-four medical students (68.73%) were unaware about which HPV vaccines are more utilized in maximum countries. Among the three groups, group III has significantly ($p < 0.001$) more knowledge about which HPV vaccine is utilized in maximum countries. Group III (35%) has recorded HPV4 is utilized in maximum countries. Thirty-one (16.23%) female and 33 male (20.12%) participants were aware about this HPV vaccine utilization in maximum countries. There is no statistical difference between the knowledge among all three groups regarding knowledge of HPV vaccines clinical trial. Among all three groups, group III ($n=25$) recorded HPV4 as right answer. Twenty-one (10.99%) female and 25 male (15.24%) were aware about this knowledge of

HPV vaccines clinical trial. Two hundred and thirty-eight medical students feel that though government introduces HPV vaccine in immunization program, Pap smear is important. Sixty-nine (36.12%) females and 49 males (29.87%) strongly support Pap smear testing (Table 7).

8. Knowledge about manufacturer and dosing schedule of HPV vaccines

Only 8 students (2.25%) knew about the HPV4 vaccines manufacturer. The knowledge regarding HPV4 manufacturer is significantly ($p < 0.01$) more in group III as compared to group II. Only 2 (1.04%) female and 6 (3.65%) male were aware about HPV4 manufacturer. Similarly knowledge regarding HPV2 vaccine was significantly ($p < 0.05$) more in group III as compared to group II. Only 15 (4.22%) students knew right manufacturer of HPV2 vaccine. The 10 (5.23%) female and 4 (2.43%) male participants were aware about HPV2 manufacturer.

The dosing schedule for quadrivalent HPV vaccine is not known to 273 participants (76.9%). Maximum awareness for dosing schedule for quadrivalent HPV vaccine was recorded from group II ($n=5$). Seven (3.66%) females and 4 (2.43%) males were aware about HPV4 vaccine schedule. Two hundred and seventy-one participants (76.33%) were unaware about the dosing schedule for bivalent HPV vaccine. Only 32 participants thought to prevent cervical cancer the vaccine dosing schedules 0, 1 and 6 months. Knowledge regarding HPV vaccines immunization schedule is significantly ($p < 0.001$) more in group III as compared to group II (Table 7).

9. Attitude about the HPV vaccines

About 188 participants (52.95%) strongly agree that at appropriate age, children should be taught about sex related preventive measures education. Eighty participants (22.53%) are somewhat agree on whether we can really treat HPV infection by using HPV vaccination. Twenty-two participants (6.19%) are neutral on their views. Regarding the concern about HPV vaccine side-effects, 179 participants (50.42%) were neutral on their views (Table 8).

10. Acceptance of the HPV vaccine

More than 229 participants (64.50%) are ready to accept the HPV vaccines to prevent cervical cancer and 24 participants (6.76%) are ready to take HPV vaccination because they had close relatives with cancer. Fifty-three female participants (14.92%) seemed to be more ready to accept the vaccine and recommended to others (Table 8).

11. Obstacles for of the implementation of HPV vaccines

One hundred and twelve participants (31.54%) reported lack of knowledge is the most important barrier for the implementation of HPV vaccines. Other barriers for rejecting HPV vaccination are vaccine cost - 68 (19.15%), fear of side effects - 75 (21.12%), do not have time for it - 27 (7.60%), already sexually active - 14 (3.94%), against having too many vaccines - 22 (6.19%) and lack of access - 37 (10.42%) (Table 8).

DISCUSSION

The majority of respondents in current survey were aware about the viral etiology and epidemiology of cervical cancer. A study conducted by Pandey et al (2012) in Manipur, India revealed very high level of awareness among the medical students about this important health issue⁵. Another recently published questionnaire based study conducted among interns in Pakistan on cervical cancer and its prevention showed poor awareness regarding epidemiology of cervical cancer with 23%⁴. More than half of the participants of present study reported poor hygiene as main risk factor for the cause of cervical cancer which shows a major misconception among medical students. Another recently published questionnaire based study conducted to find out awareness about the risk factors for cervical cancer among the medical students of Turkey. The awareness regarding this was found to be 76%⁶. From present study it is observed that only 18% of the medical students know post-coital bleeding as a common presenting feature of cervical cancer whereas study conducted among interns in Pakistan it was 3%⁴. Awareness regarding the whether HPV

can cause any other disease was 45% in present study whereas in a study conducted among medical students of Turkey it was 40%. Current participant awareness rate for HPV route of transmission was 61% on other hand in medical students of Turkey it was 76%⁶. More than 65% response rate was recorded among present study and interns from Pakistan study regarding awareness about the techniques available for HPV detection⁴. For present planned study and Manipur study the most common source of information was medical school teaching with 34% and 42% respectively⁵. The present study participants were not aware about route of bivalent and quadrivalent HPV vaccine administration, pricing regarding both HPV vaccines in INDIA, clinical trials, manufacturers of HPV vaccines and patented technology they used for cancer vaccines preparation. They were also unaware about HPV vaccine drug manufacturing companies and dosing schedules for bivalent and quadrivalent HPV vaccine. Allie and Moodley (2012) published study on 300 private healthcare providers regarding knowledge, awareness and utilization of the human papillomavirus vaccine in Durban. Those 300 private healthcare providers were aware of the HPV vaccine. However, they prescribe HPV vaccines less than 10 times since it was licensed⁷. Study conducted in Medical students of Turkey reported very good awareness and knowledge regarding the 3 doses of HPV vaccine schedule cost⁶. More than 75% were aware that HPV vaccines are available for cervical cancer prevention however more than 50% study participants from Manipur were unaware about dosing

schedule of HPV vaccines⁵. More than 64% among current population were ready to accept HPV vaccine to prevent cervical cancer. Some of the respondents accepted to get vaccinated if doctors recommend them to take vaccines. Similar results obtained from Pandey et al (2012) study participants more than 68% were willing to accept HPV vaccines⁵. According to Bhatla and Elizabeth (2009), the major obstacles for the implementation of HPV vaccine is lack of knowledge and awareness⁸. Current study participants (31%) are also not exception to this barrier. However, among medical students of Turkey study the major barrier in vaccinating themselves is HPV vaccines unknown side effects⁶. The participants of current study want to educate themselves by expert on cervical cancer, HPV and HPV vaccines so that they can take vaccine shots and spread awareness regarding this gynecological cancer among patients or colleagues. This study has some limitations. It is based on convenience sampling. Medical students from only one government medical college of allopathy were included which might not reflect the overall awareness and knowledge of medical students in India. Further, only medical student are included and not the paramedical students. Inclusion of these paramedical students can gives us clear idea about how much they are aware and how much knowledge they possess regarding HPV, cervical cancer and HPV vaccines. In addition, this is a cross-sectional study because of time constraint. However, more accurate results could be obtained if participants are followed up over a period of time.

Table 1
Demographic characteristics of the health care professionals (n=355).

Variables	Group I: Pre-clinical stage (N=129)		Group II: Para-Clinical stage (N=148)		Group III: Clinical stage (N=78)		Total	
	N	%	N	%	N	%	N	%
Sex								
Male	60	46.51	65	43.91	39	50	164	46.19
Female	69	53.48	83	56.08	39	50	191	53.8
Total	129	36.33	148	41.69	78	21.97	355	100
Age								
18-27	129	100	148	100	76	97.43	353	99.43
28-37	0	0	0	0	2	2.56	2	0.56

Total	129	36.33	148	41.69	78	21.97	355	100
Religion								
Hindu	117	90.69	135	91.21	71	91.02 ^{\$\$\$}	323	90.98
Buddhism	4	3.1	2	1.35	2	2.56 ^{\$\$\$}	8	22.85
Muslim	2	1.55	4	2.7	3	3.84 ^{\$\$\$}	9	2.53
Christian	0	0	0	0	1	1.28 ^{\$\$\$}	1	0.28
Jain	5	3.87	7	4.72	1	1.28 ^{\$\$\$}	13	3.66
Sikh	1	0.77	0	0	0	0 ^{\$\$\$}	1	0.28
Total	129	36.33	148	41.69	78	21.97	355	100
Marital status								
Single	129	100	147	99.32	73	93.58 ^{\$\$}	349	98.3
Married	0	0	1	0.67	5	6.41 ^{\$\$}	6	1.69
Total	129	36.33	148	41.69	78	21.97	355	100
Education								
Undergraduate	129	100	148	100	54	69.23 ^{\$\$\$}	331	93.23
Postgraduate	0	0	0	0	24	30.76 ^{\$\$\$}	24	6.76
Total	129	36.33	148	41.69	78	21.97	355	100
Passing year of current degree								
2001-2010	0	0	0	0	1	1.28 ^{\$\$\$}	1	0.28
2011-Present	129	100	148	100	77	98.71 ^{\$\$\$}	354	99.71
Total	129	36.33	148	41.69	78	21.97	355	100
Parity								
Nulliparous	129	100	148	100	77	98.71 ^{\$\$\$}	354	99.71
1	0	0	0	0	1	1.28 ^{\$\$\$}	1	0.28
Total	129	36.33	148	41.69	78	21.97	355	100
Smoking Status								
Never	129	100	144	97.29	76	97.43	349	98.3
Ex-smoker	0	0	1	0.67	1	1.28	2	0.56
Current	0	0	3	2.02	1	1.28	4	1.12
Total	129	36.33	148	41.69	78	21.97	355	100
Chances of getting cancer in future is								
Least	53	41.08	65	43.91 ^{***}	41	52.56	159	44.78
High	1	0.77	5	3.37 ^{***}	1	1.28	7	1.97
Medium	13	10.07	35	23.64 ^{***}	8	10.25	56	15.77
Not applicable	62	48.06	43	29.05 ^{***}	28	35.89	133	37.46
Total	129	36.33	148	41.69	78	21.97	355	100

* denoted for comparison between group I and II: (1st yr and 2nd yr medical students) Chi-square test *p<0.05, Chi-square test **p<0.01, Chi-square test ***p<0.001. § denoted for comparison between group II and III: (2nd yr and 3rd yr medical students, interns and post-graduate students) Chi-square test §p<0.05, Chi-square test §§p<0.01, Chi-square test §§§p<0.001.

Table 2
Knowledge about etiology and epidemiology of Cervical cancer (n=355).

Variables	Group I: Pre-clinical stage (N=129)		Group II: Para-Clinical stage (N=148)		Group III: Clinical stage (N=78)		Total	
	N	%	N	%	N	%	N	%
The organism causing cervical cancer is								
Bacteria	1	0.77	7	4.72	1	1.28	9	2.52
Virus	115	89.14	136	91.89	75	96.15	326	91.83
Fungus	0	0	3	2.02	0	0	3	0.84
Don't know	13	10.07	2	1.35	2	2.56	17	4.78
Total	129	36.33	148	41.69	78	21.97	355	100
How common is cervical cancer among gynaecological cancers?								
Least	2	1.55	1	0.67**	3	3.84 [§]	6	1.69
Moderate	28	21.7	22	14.86**	10	12.82 [§]	60	16.9
Most	68	52.71	110	74.32**	64	82.05 [§]	242	68.16
Don't know	31	24.03	15	10.13**	1	1.28 [§]	47	13.23
Total	129	36.33	148	41.69	78	21.97	355	100
The mortality ranks of cervical cancer among gynaecological cancers is								
Leading cause	32	24.8	56	37.83	47	60.25 ^{§§§}	135	38.02
Third in rank	9	6.97	5	3.37	10	12.82 ^{§§§}	24	6.76
Second in rank	21	16.27	27	18.24	7	8.97 ^{§§§}	55	15.49
Don't know	67	51.93	60	40.54	14	17.94 ^{§§§}	141	39.71
Total	129	36.33	148	41.69	78	21.97	355	100
What is the appropriate time period required for the development of cervical cancer from CIN-III?								
2-8 months	14	10.85	18	12.16*	8	10.25 ^{§§§}	40	11.26
2-3 yrs	6	4.65	20	13.51*	25	32.05 ^{§§§}	51	14.36
1 decade	8	6.2	14	9.45*	28	35.89 ^{§§§}	28	7.88
Don't know	101	78.29	96	64.86*	17	21.79 ^{§§§}	214	60.28
Total	129	36.33	148	41.69	78	21.97	355	100

* denoted for comparison between group I and II: (1st yr and 2nd yr medical students)

Chi-square test *p<0.05, Chi-square test **p<0.01, Chi-square test ***p<0.001.

§ denoted for comparison between group II and III: (2nd yr and 3rd yr medical students, interns and post-graduate students) Chi-square test [§]p<0.05, Chi-square test ^{§§}p<0.01, Chi-square test ^{§§§}p<0.001.

Table 3
Knowledge about risk factors of Cervical cancer (n=355).

Variables	Group I: Pre-clinical stage (N=129)		Group II: Para-Clinical stage (N=148)		Group III: Clinical stage (N=78)		Total	
	N	%	N	%	N	%	N	%
Poor hygiene	76	58.91	76	51.35***	33	42.3	185	52.11
Family history	4	3.1	2	1.35***	8	10.25	14	3.94
Multiparity	3	2.32	13	8.78***	8	10.25	24	6.76
Contraceptives pills	4	3.1	11	7.43***	2	2.56	17	4.78
Nulliparity	0	0	2	1.35***	2	2.56	4	1.12
Early age at first coitus	5	3.87	18	12.16***	13	16.66	36	10.14
Smoking	5	3.87	5	3.37***	6	7.69	16	4.5
Old age	1	0.77	5	3.37***	1	1.28	7	1.97
Genetics	2	1.55	6	4.05***	5	6.41	13	3.66
Don't know	29	22.48	10	6.75***	0	0	39	10.98
Total	129	36.33	148	41.69	78	21.97	355	100

* denoted for comparison between group I and II: (1st yr and 2nd yr medical students)

Chi-square test *p<0.05, Chi-square test **p<0.01, Chi-square test ***p<0.001.

§ denoted for comparison between group II and III: (2nd yr and 3rd yr medical students, interns and post-graduate students) Chi-square test [§]p<0.05, Chi-square test ^{§§}p<0.01, Chi-square test ^{§§§}p<0.001.

Table 4
Knowledge about presenting features of cervical cancer (n=355).

Variables	Group I: Pre-clinical stage (N=129)		Group II: Para-Clinical stage (N=148)		Group III: Clinical stage (N=78)		Total	
	N	%	N	%	N	%	N	%
Lower abdominal pain	7	5.42	14	9.45***	11	14.1	32	9.01
Discharge per vaginal	17	13.17	28	18.91***	19	24.35	64	18.02
Menstrual problems	7	5.42	14	9.45***	11	14.1	32	9.01
Itching	4	3.1	8	5.4***	1	1.28	13	3.66
Anaemia	3	2.32	4	2.7***	4	5.12	11	3.09
Bleeding per vaginal	14	10.85	34	22.97***	18	23.07	66	18.59
Fever	1	0.77	6	4.05***	1	1.28	8	2.25
Weight loss	1	0.77	7	4.72***	5	6.41	12	3.38
Swelling of cervix	17	13.17	16	10.81***	6	7.69	39	10.98
Don't know	58	44.96	17	11.48***	2	2.56	77	21.69
Total	129	36.33	148	41.69	78	21.97	355	100

* denoted for comparison between group I and II: (1st yr and 2nd yr medical students)

Chi-square test *p<0.05, Chi-square test **p<0.01, Chi-square test ***p<0.001.

§ denoted for comparison between group II and III: (2nd yr and 3rd yr medical students, interns and post-graduate students)

Chi-square test §p<0.05, Chi-square test §§p<0.01, Chi-square test §§§p<0.001.

Table 5
Knowledge about Human Papillomavirus (HPV) (n=355).

Variables	Group I: Pre-clinical stage (N=129)		Group II: Para-Clinical stage (N=148)		Group III: Clinical stage (N=78)		Total	
	N	%	N	%	N	%	N	%
Do you know HPV can cause any other disease?								
Yes	37	28.68	60	40.54*	64	82.05 ^{§§§}	161	45.35
No	92	71.31	88	59.45*	14	17.94 ^{§§§}	194	54.64
Total	129	36.33	148	41.69	78	21.97	355	100
Have you heard about cancer causing types of HPV?								
Yes	67	51.93	72	48.64	73	93.58 ^{§§§}	212	59.71
No	62	48.06	76	51.35	5	6.41 ^{§§§}	143	40.28
Total	129	36.33	148	41.69	78	21.97	355	100
Do you think HPV can be detected?								
Yes	97	75.19	116	78.37	69	88.46 ^{§§§}	282	79.43
No	22	17.05	16	10.81	6	7.69 ^{§§§}	44	12.39
Don't know	10	7.75	16	10.81	3	3.84 ^{§§§}	29	8.16
Total	129	36.33	148	41.69	78	21.97	355	100
HPV is transmitted by								
Injection	1	0.77	1	0.67***	3	3.84 ^{§§§}	5	1.4
Blood- transfusion	8	6.2	4	2.7***	1	1.28 ^{§§§}	13	3.66
Mother to child	5	3.87	2	1.35***	3	3.84 ^{§§§}	10	2.81
Sexual contact	46	35.65	103	69.59***	69	88.46 ^{§§§}	218	61.4
Don't know	69	53.48	38	25.67***	2	2.56 ^{§§§}	109	30.7
Total	129	36.33	148	41.69	78	21.97	355	100
Technique available for HPV presence detection								
Blood	18	13.95	8	5.4**	2	2.56	28	7.88
Pap smear	86	66.66	120	81.08**	49	62.82	237	66.76
PCR	11	8.52	14	9.45**	21	26.92	46	12.95
Biopsy	14	10.85	6	4.05**	6	7.69	26	7.32
Total	129	36.33	148	41.69	78	21.97	355	100
Which are the two high -risk HPV types for covering 70% of cervical cancer?								
HPV 6 & 11	62	48.06	59	39.86	14	17.94 ^{§§§}	135	38.02
HPV 11 & 18	28	21.7	32	21.62	8	10.25 ^{§§§}	68	19.15
HPV 16 & 17	12	9.3	18	12.16	2	2.56 ^{§§§}	32	9.01
HPV 16 & 18	27	20.93	39	26.35	54	69.23 ^{§§§}	120	33.8
Total	129	36.33	148	41.69	78	21.97	355	100

* denoted for comparison between group I and II: (1st yr and 2nd yr medical students)

Chi-square test *p<0.05, Chi-square test **p<0.01, Chi-square test ***p<0.001.

§ denoted for comparison between group II and III: (2nd yr and 3rd yr medical students, interns and post-graduate students)

Chi-square test §p<0.05, Chi-square test §§p<0.01, Chi-square test §§§p<0.001.

Table 6
Source of Information regarding HPV vaccine (n=355).

Variables	Group I: Pre-clinical stage (N=129)		Group II: Para-Clinical stage (N=148)		Group III: Clinical stage (N=78)		Total	
	N	%	N	%	N	%	N	%
Internet	37	28.68	24	16.21	19	24.35	80	22.53
TV	5	3.87	7	4.72	2	2.56	14	3.94
Radio	3	2.32	2	1.35	2	2.56	7	2.00
Health care clinic/ Hospitals	21	16.27	34	22.97	23	29.48	78	21.97
Friends/ Classmates/ Colleagues/ Families	4	3.1	8	5.4	5	6.41	17	4.78
Magazine	13	10.07	15	10.13	6	7.69	34	9.57
Leaflet/ Pamplet/ Poster	0	0	3	2.02	1	1.28	4	1.12
School/ University/ seminar	46	35.65	55	37.16	20	25.64	121	34.08
Total	129	36.33	148	41.69	78	21.97	355	100

* denoted for comparison between group I and II: (1st yr and 2nd yr medical students)

Chi-square test *p<0.05, Chi-square test **p<0.01, Chi-square test ***p<0.001.

§ denoted for comparison between group II and III: (2nd yr and 3rd yr medical students, interns and post-graduate students)

Chi-square test §p<0.05, Chi-square test §§p<0.01, Chi-square test §§§p<0.001.

Table 7
Knowledge about the HPV vaccine (n=355).

Variables	Group I: Pre-clinical stage (N=129)		Group II: Para-Clinical stage (N=148)		Group III: Clinical stage (N=78)		Total	
	N	%	N	%	N	%	N	%
What is the common route of HPV vaccine administration?								
Oral	5	3.87	16	10.81**	4	5.12	25	7.04
Intradermal	12	9.3	16	10.81**	9	11.53	37	10.42
Deep intramuscular	18	13.95	37	25**	37	47.43	92	25.92
Don't Know	94	72.86	79	53.37**	28	35.89	201	56.61
Total	129	36.33	148	41.69	78	21.97	355	100
Which latest technology is used in HPV vaccine preparation?								
Live Virus Particle	5	3.87	14	9.45	9	11.53	28	7.88
Actual virus technology	6	4.65	15	10.13	2	2.56	23	6.47
Virus Like Particle	18	13.95	16	10.81	16	20.51	50	14.08
Don't know	100	77.51	103	69.59	51	65.38	254	71.54
Total	129	36.33	148	41.69	78	21.97	355	100
What is a price per dose of HPV vaccination in INDIA?								
Below Rs.2000	9	6.97	9	6.08	6	7.69	24	6.76
Rs.2000-4500	16	12.4	25	16.89	19	24.35	60	16.9
Above Rs.4500	7	5.42	13	8.78	7	8.97	27	7.6
Don't know	97	75.19	101	68.24	46	58.97	244	68.73
Total	129	36.33	148	41.69	78	21.97	355	100
Which HPV vaccine is costlier in INDIA?								
HPV4	18	13.95	19	12.43***	28	35.89§§§	65	18.3
HPV2	11	8.52	13	8.78***	10	12.82§§§	24	6.76
Don't know	100	77.51	116	78.37***	40	51.28§§§	256	72.11
Total	129	36.33	148	41.69	78	21.97	355	100
Which HPV vaccine approved in maximum countries?								
HPV4	19	14.72	20	13.51	25	32.05§§§	64	18.02
HPV2	10	7.75	15	10.13	22	28.2§§§	47	13.23
Don't know	100	77.51	113	76.35	31	39.74§§§	244	68.73
Total	129	36.33	148	41.69	78	21.97	355	100

Variables	Group I: Pre-clinical stage (N=129)		Group II: Para-Clinical stage (N=148)		Group III: Clinical stage (N=78)		Total	
	N	%	N	%	N	%	N	%
FUTURE I and II trial has been conducted for which type of HPV vaccine?								
HPV4	13	10.07	14	9.45	18	23.07692	45	12.67
HPV2	5	3.87	9	6.08	9	11.53	23	6.47
Don't know	111	86.04	125	84.45	51	65.38	287	80.84
Total	129	36.33	148	41.69	78	21.97	355	100
Can HPV vaccine diminish need of Pap smear?								
Yes	45	34.88	38	25.67	34	43.58	117	32.95
No	84	65.11	110	74.32	44	56.41	238	67.04
Total	129	36.33	148	41.69	78	21.97	355	100
Who is the manufacturer of Human Papillomavirus Quadrivalent [Types 6,11,16 and 18] vaccine?								
Merck	2	1.55	1	0.67	5	6.41 ^{\$\$}	8	2.25
Ranbaxy	9	6.97	6	33.33	7	8.97 ^{\$\$}	22	6.19
Serum	3	2.32	2	1.35	3	3.84 ^{\$\$}	8	2.25
Aventis	2	1.55	0	0	2	2.56 ^{\$\$}	4	1.12
GSK	3	2.32	9	6.08	7	8.97 ^{\$\$}	19	5.35
Cipla	6	4.65	10	6.75	3	3.84 ^{\$\$}	19	5.35
Don't know	104	80.62	120	81.08	51	65.38 ^{\$\$}	275	77.46
Total	129	36.33	148	41.69	78	21.97	355	100
Who is the manufacturer of Human Papillomavirus Bivalent [Types 16 and 18] vaccine?								
Merck	1	0.77	4	2.7	4	5.12 ^{\$}	9	2.53
Ranbaxy	4	3.1	8	5.4	7	8.97 ^{\$}	19	5.35
Serum	6	4.65	3	2.02	6	7.69 ^{\$}	15	4.22
Aventis	1	0.77	0	0	3	3.84 ^{\$}	4	1.12
GSK	5	3.87	6	33.33	4	5.12 ^{\$}	15	4.22
Cipla	4	3.1	7	4.72	2	2.56 ^{\$}	13	3.66
Don't know	108	83.72	120	81.08	52	66.66 ^{\$}	280	78.87
Total	129	36.33	148	41.69	78	21.97	355	100
Which Human Papillomavirus vaccines are licensed for sale in INDIA?								
HPV4	11	8.52	5	3.37	10	12.82 ^{\$\$\$}	26	7.32
HPV2	6	4.65	10	6.75	15	19.23 ^{\$\$\$}	31	8.73
Both	10	7.75	13	8.78	11	14.1 ^{\$\$\$}	33	9.29
None	6	4.65	8	5.4	3	3.84 ^{\$\$\$}	17	4.78
Don't know	96	6.97	112	75.67	39	50 ^{\$\$\$}	247	69.57
Total	129	36.33	148	41.69	78	21.97	355	100
What is the dose schedule for Human Papillomavirus Quadrivalent [Types 6, 11, 16 and 18] vaccine?								
0,1 and 6 month	3	2.32	13	8.78	21	26.92 ^{\$\$\$}	37	10.42
0, 2 and 6 month	3	2.32	5	3.37	3	3.84 ^{\$\$\$}	11	3.09
1,2 and 6 month	10	7.75	6	33.33	5	6.41 ^{\$\$\$}	21	5.91
1,4 and 6 month	7	5.42	3	2.02	3	3.84 ^{\$\$\$}	13	3.66
Don't know	106	82.17	121	81.75	46	58.97 ^{\$\$\$}	273	76.9
Total	129	36.33	148	41.69	78	21.97	355	100
What is the dose schedule for Human Papillomavirus Bivalent [Types 16 and 18] vaccine?								
0,1 and 6 month	5	3.87	6	33.33 ^{***}	21	26.92 ^{\$\$\$}	32	9.01
0, 2 and 6 month	2	1.55	8	5.4 ^{***}	3	3.84 ^{\$\$\$}	13	3.66
1,2 and 6 month	10	7.75	7	4.72 ^{***}	7	8.97 ^{\$\$\$}	24	6.76
1,4 and 6 month	7	5.42	6	33.33 ^{***}	2	2.56 ^{\$\$\$}	15	4.22
Don't know	105	81.39	121	81.75 ^{***}	45	57.69 ^{\$\$\$}	271	76.33
Total	129	36.33	148	41.69	78	21.97	355	100

Variables	Group I: Pre-clinical stage (N=129)		Group II: Para-Clinical stage (N=148)		Group III: Clinical stage (N=78)		Total	
	N	%	N	%	N	%	N	%
Which expression system used in Human Papillomavirus Quadrivalent [Type 6, 11, 16 and 18] vaccine?								
Yeast	6	4.65	11	7.43***	5	6.41	22	6.19
Baculovirus	19	14.72	15	10.13***	11	14.1	45	12.67
Don't know	104	80.62	122	82.43***	62	79.48	288	81.12
Total	129	36.33	148	41.69	78	21.97	355	100

* denoted for comparison between group I and II: (1st yr and 2nd yr medical students)

Chi-square test *p<0.05, Chi-square test **p<0.01, Chi-square test ***p<0.001.

§ denoted for comparison between group II and III: (2nd yr and 3rd yr medical students, interns and post-graduate students)

Chi-square test §p<0.05, Chi-square test §§p<0.01, Chi-square test §§§p<0.001.

Table 8
Attitude about the HPV vaccine (n=355).

Variables	Group I: Pre-clinical stage (N=129)		Group II: Para-Clinical stage (N=148)		Group III: Clinical stage (N=78)		Total	
	N	%	N	%	N	%	N	%
At appropriate age, children should be taught about sex related preventive measures education								
Strongly agree	48	37.2	81	54.72	59	75.64	188	52.95
Neutral	13	10.07	7	4.72	2	2.56	22	6.19
Strongly disagree	3	2.32	1	0.67	0	0	4	1.12
Somewhat agree	58	44.96	55	37.16	17	21.79	80	22.53
Somewhat disagree	6	4.65	4	2.7	0	0	10	2.81
Total	129	36.33	148	41.69	78	21.97	355	100
Can we really treat HPV infection by using HPV vaccination?								
Strongly agree	13	10.07	10	6.75	14	17.94	37	10.42
Neutral	41	31.78	52	35.13	20	25.64	113	31.83
Strongly disagree	6	4.65	12	8.1	12	15.38	30	8.45
Somewhat agree	59	45.73	63	42.56	25	32.05	147	41.4
Somewhat disagree	10	7.75	11	7.43	7	8.97	28	7.88
Total	129	36.33	148	41.69	78	21.97	355	100
I am concerned about HPV vaccine side-effects								
Strongly agree	16	12.4	17	11.48	12	15.38	45	12.67
Neutral	64	49.61	79	53.37	36	46.15	179	50.42
Strongly disagree	4	3.1	12	8.1	5	6.41	21	5.91
Somewhat agree	34	26.35	31	20.94	19	24.35	84	23.66
Somewhat disagree	11	8.52	9	6.08	6	7.69	26	7.32
Total	129	36.33	148	41.69	78	21.97	355	100
Main reasons for rejecting HPV vaccines								
Vaccine too expensive	20	15.5	29	19.59	19	24.35	68	19.15
Fear of side-effects	26	20.15	36	24.32	13	16.66	75	21.12
Don't have time for it	14	10.85	9	6.08	4	5.12	27	7.6
Lack of knowledge	42	32.55	44	29.72	26	33.33	112	31.54
Already sexually active	2	1.55	6	4.05	6	7.69	14	4.0
Against having too many vaccines	7	5.42	10	6.75	5	6.41	22	6.19
Lack of access	18	13.95	14	9.45	5	6.41	37	10.42
Total	129	36.33	148	41.69	78	21.97	355	100

Variables	Group I: Pre-clinical stage (N=129)		Group II: Para-Clinical stage (N=148)		Group III: Clinical stage (N=78)		Total	
	N	%	N	%	N	%	N	%
Main reasons for accepting HPV vaccines								
To prevent cervical cancer	90	69.7	87	58.78	52	66.66	229	64.5
Close relatives with cancer	8	6.2	16	10.81	4	5.12	24	6.76
Recommended by friends	2	1.55	4	2.7	3	3.84	9	25.71
Recommended by partner	1	0.77	4	2.7	0	0	5	1.4
Recommended by parents	2	1.55	7	4.72	1	1.28	10	2.81
Recommended by Dr.	16	12.4	27	18.24	12	15.38	55	15.49
Recommended by siblings	3	2.32	0	0	5	6.41	8	2.25
To prevent genital warts	7	5.42	3	2.02	1	1.28	11	3.09
Total	129	36.33	148	41.69	78	21.97	355	100

CONCLUSION

Group I students are least aware about the epidemiology and etiology of cervical cancer, HPV and HPV vaccines. Group II student have moderate knowledge about the epidemiology, etiology of cervical cancer and HPV. Group III students had significantly more

knowledge in almost all parts of the questionnaire. Therefore stress should be given in above groups in the areas where they are lacking because in future they are going to play a role of physician to deal with cervical cancer.

REFERENCES

- Burd M., Human papillomavirus and cervical cancer. *Clinical microbiology reviews*, 16: 1-17, (2003).
- WHO/ICO Information Centre on HPV and Cervical Cancer (HPV Information Centre) World: Human Papillomavirus and Related Cancers Summary Report Update. November 15, (2010).
- Sangar V. and Ghongane B., Prophylactic Human Papillomavirus vaccines. *Int J Pharm Bio Sci.*, 4(3): 124 – 133, (2013).
- Ali S, Ayub S, Manzoor N, Azim S, Afif M, Akhtar N, Ali Jafery W, Tahir I and Farid-ul-Hasnain S., Knowledge and Awareness about Cervical Cancer and Its Prevention amongst Interns and Nursing Staff in Tertiary Care Hospitals in Karachi, Pakistan. *PLoS ONE*, 5(6): 1-5, (2010).
- Pandey D, Vanya V, Bhagat, S, Binu, VS and Shetty J. Awareness and attitude towards Human Papillomavirus (HPV) Vaccine among Medical students in Premier Medical School in India. *PLoS ONE*, 7(7): e406-e419, (2012).
- Güdücü N, Gönenç G, İşçi H, Yiğiter AB and Dünder I. Awareness of human papilloma virus, cervical cancer and HPV vaccine in healthcare workers and students of medical and nursing schools. *Journal of Clinical and Experimental Investigations*, 3(3): 318-325, (2012).
- Allie N and Moodley M. Knowledge, awareness and utilization of the human papillomavirus vaccine in Durban. *South African Journal of Gynaecology Oncology*, 4(1): 6-10, (2012).
- Bhatla N and Elizabeth J. Cervical cancer prevention & the role of human papillomavirus vaccines in India. *Indian J Med Res.*, 130: 334-340, (2009).