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Awareness and Knowledge of Medical, Nursing and Midwifery Students about Human Papillomavirus Infection and its Vaccine in Ahvaz Jundishapur University of Medical Sciences in 2020

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Abstract

Background: Human papillomavirus (HPV) infection is the most common sexually transmissible infection, which has a key role in the development of cervical cancer.
Objectives: This study aimed to assess the level of awareness/knowledge among medical, nursing and midwifery students about HPV infection and its vaccine in Ahvaz Jundishapur University of Medical Sciences (AJUMS) in 2020.
Methods: This cross-sectional study was conducted on 181 medical, nursing and midwifery students who were selected based on convenience sampling. Students' awareness/knowledge were assessed through a validated questionnaire consisted of 15 correct and incorrect questions with a score range of 0-15. Data were analyzed using Chi-square test and logistic regression by SPSS-18.
***Results*:** The mean (SD) of age of the participants was 25.4 (1.84) years, and the majority of them were female (60.2%) and single (79.6%). Overall, the students' awareness/knowledge score about HPV was 66.92 (22.8) (out of 100). The mean (SD) of awareness/knowledge of female students was higher than male students 68.8 (18.5) vs 64.1 (28.1), but there was no statistically significant (p=0.210). The awareness/knowledge among the medical students was significantly higher than that of the nursing and midwifery students (t_{179}=7.17, p<0.001). Significant odds ratio (OR) for predictors to good awareness/knowledge were higher age (OR=0.76, p = 0.023), higher grade point average (OR=1.49, p=0.030), and medical students' group (OR=17.31, p<0.001).
Conclusion: Although the awareness/knowledge of students in this study was above average, which highlights the need for education measures to improve awareness/knowledge of students regarding HPV, since they will be future health care providers in society.

Keywords: human papilloma virus, cervical cancer, papillomavirus vaccines, awareness, knowledge, medicine, nursing, midwifery, students

Introduction

Human papillomavirus (HPV) infection is a sexually transmissible infection, which has a key role in the development of cervical cancer [1]. WHO/International Information Center on HPV (ICO) and cervical cancer report that more than 99% of cervical cancers are associated with HPV infection [2]. According to Globocan the 2020

data published by the International Agency for Research on Cancer, cervical cancer is the fourth most common cancer among women worldwide and ranks second in cancer-related deaths after breast cancer. The worldwide incidence of cervical cancer was estimated at 604,127 new cases, of which 341,831 women died of the disease [3].

According to the Iranian cancer statistics 2020 report, the incidence of all cancer types was 131,191 in both sexes, and 60,484 cases were reported as having gynecological cancer. Current estimates indicate that each year, 7.9% of these were diagnosed as cervical cancer. In Iran, cervical cancer ranks as the 14th most common cancer among women, with an estimated 2.54 per hundred thousand. It was reported in 2020 that 1,056 new cases of cervical cancer are diagnosed every year in Iran, of which 644 cases die of the disease annually [4-6].

In Iran, according to the National Cancer Registry Center statistics, cervical cancer has an increasing trend [7]. Therefore, awareness about HPV infection and its vaccine plays a significant role in reducing the global incidence of cervical cancer. Obviously, identifying awareness among the public about HPV has become one of the most important and effective goals for cervical cancer prevention control. Accordingly, it can be claimed that determination of the HPV awareness has a huge impact on improving the performance of public behaviors and reducing cervical cancer [8].

An Iranian study reported the level of knowledge about HPV, ways of infection transmission, and its prevention in women was insufficient [9]. Another study carried out on medical students also indicated the little knowledge about HPV infection and the vaccine [10]. In Iran, a recent systematic review carried out by Taebi et al. revealed that the level of knowledge about HPV infection and vaccination is poor. The public is not aware of the transmission methods of this disease and its important consequences like cervical cancer [11]. As HPV has an important role in the etiology of cervical cancer, the awareness and understanding of HPV-related infections and malignancies is an effective way to prevent and control it [2].

Although the prevalence of HPV infection is low in the Iranian population [12,13], due to rapid changes in the lifestyle of people in different parts of the world, including Iran, it is necessary to pay attention to the nature and spread of HPV infection and the factors affecting it [6]. Therefore, the first step in this regard is to examine the awareness of the public, especially students of medical sciences as health workers in the future, about this infection and its consequences. Students of medical sciences will be healthcare providers, so they play very effective roles in the prevention of HPV infection and promoting HPV vaccination in the future. Therefore, it is necessary to assess the awareness/knowledge of these students about HPV infection. Due to the paucity of information available on the extent of student's awareness of HPV infection in Ahvaz Jundishapur University of Medical Sciences (AJUMS) and the scant published research on this topic, this study aimed to assess the awareness and knowledge of HPV infection among medical, nursing, and midwifery students at AJUMS in 2020. A study on this group of participants is also important because these students play a vital role in educating their community regarding HPV infection and cervical cancer prevention.

Methods

This cross-sectional study was conducted in Ahvaz Jundishapur University of Medical Sciences, Iran, from Sept to Dec 2020. Medical, nursing and midwifery students of both sexes who had registered for this year and participated in the study were enrolled through convenience sampling method. All final year medical, nursing and midwifery students were included in this study.The inclusion criteria were studying medicine, nursing and midwifery in the final-year of curriculum at AJUMS, and willingness to participate in the research. The exclusion criteria were non-completion of the questionnaires.

The data collection instrument in this study was a questionnaire developed by researchers and its validity and reliability were confirmed and was used in the previous study [14]. In this study, awareness in the questionnaire meant that the participants had heard about cervical cancer, HPV and HPV vaccine; and Knowledge meant more details about HPV infection in the rest of the second domain of the questionnaire.

This questionnaire consisted of two sections: the first included demographic characteristics of participants such as age, gender, marital status, and grade point average (GPA), and second involved fifteen items to assess the participants' knowledge and awareness regarding HPV infection and its vaccine among respondents. These 15 items were divided into 3 main parts, the first 4 items were about awareness of HPV infection (questions 1–4), the next 8 items were about knowledge (questions 5–12), and the last 3 items were related to their knowledge about HPV vaccines (questions 13–15). Finally, at the end of the questionnaire, 1 question was included inquiring about receiving the HPV vaccine. Each answer scored as correct or incorrect. The respondent was given a zero for each wrong answer and one point for each correct answer. The overall score weighting was calculated from the 15 questions covering awareness/knowledge topics about HPV infection and HPV vaccine. Question 16 was considered as personal responses and was not counted in the overall score. The score was calculated as the sum of correct answers divided by the total number of questions, as shown in the formula below:

$$\sum \text{correct answers}/15 \text{ questions related to awareness/knowledge} \times 100$$

Therefore, the point results of the response for each item will be divided by the maximum score possible in that item and multiplied by 100, resulting in a final score for each item and overall. The score ranges from 0 to 100, with higher scores indicating higher level of awareness/knowledge and vice versa. The cut-off for good awareness/knowledge for the questionnaire is a total score of ≥60%; meanwhile, weak awareness/knowledge was considered <60% [15]. One mark was considered for each correct response and zero mark were assigned to incorrect responses. The range of scores is 0 to 15 and a high score indicates a high awareness/knowledge level.

We measured the face and content validity of the instrument. Content and face validity were usually evaluated by ten experts in the field and determined as content validity index (CVI) and content validity ratio (CVR). To assess the face validity of the questionnaire, we requested 10 people from the target population to assess the ambiguity, wrong perceptions, and appropriateness and relevance items on the Likert scale. Five experts in gynecology-oncology from medical school and five teachers from nursing/midwifery faculty of AJUMS were selected by convenience sampling. Regarding content validity, we requested from experts to evaluate the questionnaire and assess each item based on 4 criteria including necessity, relevancy, clarity and simplicity. CVR was calculated based on the responses to the necessity of questions. According to Lawshe, for 10 experts, minimum required CVR for each item is 0.62. Content Validity Index (CVI) was used based on Waltz and Basel content validity index. CVI for each item was obtained by dividing the number of experts who ranked the items as compatible or full compatible for each criterion to the total number of experts. The CVI and CVR were calculated for each item. Minimum and maximum CVR were 0.78 and 1, respectively and for all items, so CVR was higher than acceptance level (0.62). Total CVR for whole questionnaire was 0.89. Minimum and maximum CVI (average of CVIs for relevancy, clarity and simplicity criteria) were 0.770 and 0.92, respectively. All items were satisfactory in terms of CVI and no items were removed. Finally, Using CVI and CVR scoring cutoffs, all 15 items were approved, and the questionnaire was developed to assess awareness and knowledge of students in this study [16]. The reliability of the questionnaire was calculated via Kuder-rechardson 20 in a pilot study with the participation of 25 students (α=0.67). The reliability coefficient for the 2 subscales of awareness and knowledge was also calculated to be 0.70, and 0.74, respectively.

The Ethics Committee of AJUMS approved the study (Ref. ID: IR.AJUMS.REC.1397.892). Written Informed consent was obtained from all students, who agreed to participate in the study, prior to their involvement in the research. The respondents were assured of the confidentiality of their responses.

Data was analyzed using the SPSS version 18.0 (SPSS Inc., Chicago, IL, USA). The demographic and baseline variables were summarized using descriptive statistics mean (SD) for continuous variables frequency (percentage) for categorical variables. The chi-square test was used to analyze the differences. Multivariate logistic regression analysis was used to assess the relationship

between awareness, knowledge and characteristics among the respondents, and odds ratios (ORs) along with 95% confidence interval (CI) were also calculated. P<0.05 was considered statistically significant.

Results

Out of 197 questionnaires distributed, 181 were completed and returned back (the response rate was 91.8%). The study sample included 120 (66.3%) medical students and 61 (33.7%) midwifery and nurse students, with the mean (SD) age of 25.43 (1.84) years (22 to 30 years). The majority were female (60.2%) and single (79.6%). The socio-demographic characteristics of the study respondents in Table 1. Based on Modified cut-off points of the total knowledge score which was categorized into good and weak, most than half of the participants (65.2%) had overall good awareness/knowledge about HPV, and one-third (34.8%) of participants were weak.

Table 1: Demographic Characteristics of Study Participants and Awareness/Knowledge about HPV

Characteristics		Total (n=181)	Medical students (n=120)	nursing/midwifery (n=61)
		N (%)	N (%)	N (%)
Age	>25 years	95 (52.5)	45 (37.5)	50 (82)
	≤ 25 years	86 (47.5)	75 (62.5)	11 (18)
Age Mean age (SD)		25.43 (1.84)	26.09 (1.41)	24.13 (1.90)
Gender	male	72 (39.8)	59 (49.2)	13 (21.3)
	female	109 (60.2)	61 (50.8)	48 (78.7)
Marital status	single	144 (79.6)	96 (80)	48 (78.7)
	married	37 (20.4)	24 (20)	13 (21.3)
Grade point average(GPA)	Low	89 (49.2)	72 (60)	17 (29.3)
	High	89 (49.2)	48 (40)	41 (70.7)
Total awareness/knowledge	weak (score <60)	63 (34.8)	27 (22.5)	36 (59.0)
	Good (score ≥60)	118 (65.2)	93 (77.5)	25 (41.0)

Distribution and comparison of the frequency of good and weak awareness/knowledge about HPV infection and its vaccine is shown in Table 2. Accordingly, the level of overall awareness/knowledge of HPV was significantly higher in the medical students compared nursing/midwifery students ($\chi2$=23.76; p< 0.001). However, no significant differences between the students' knowledge by gender was observed ($\chi2$=0.09; p<0.443).

Table 2: Comparison of the Awareness/Knowledge about HPV by Gender and Educational Field

Variables	Medical students	Nursing/ midwifery	$\chi2$	p	male	female	$\chi2$	p
	N (%)	N (%)			N (%)	N (%)		
Awareness about HPV								
weak	24(20.0)	30(49.2)	16.45	<0.001	23(31.9)	31(28.4)	0.25	0.366
good	96(80.0)	31(50.8)			49(68.1)	78(71.6)		
Knowledge about HPV								
weak	55(45.8)	45(73.8)	12.76	<0.001	37(51.4)	63(57.8)	0.72	0.243
good	65(54.2)	16(26.2)			35(48.6)	46(42.2)		
Knowledge about vaccine								
weak	40(33.3)	39(63.9)	15.39	<0.001	36(50.0)	43(39.4)	1.96	0.106
good	80(66.6)	22(36.1)			36(50.0)	66(60.6)		
Total awareness/knowledge								
weak	27(22.5)	36(59.0)	23.76	<0.001	26(36.1)	37(33.9)	0.09	0.443
good	93(77.5)	25(41.0)			46(63.9)	72(66.1)		

Table 3 demonstrates the awareness/knowledge of HPV among the medical and nursing/midwifery students. Almost all the students (92.3%) reported that they had heard about HPV infection however

(99.2% of medical and 78.7% nursing/midwifery students), only 71.3% knew that it can cause cervical cancer (82.5% of medical and 63.3 nursing/midwifery students). More than half (55.8%) knew preventing HPV infection lead to prevention of cervical cancer (63.3% of medical and 41.0% nursing/midwifery students), and less than half of them (47%) knew vaccine effective in preventing cervical cancer (55.0% of medical and 31.1% nursing/midwifery students). Finally, as far as vaccination was concerned, 85 (70.8%) of the medical students and 31 (50.8%) of the nursing/midwifery students had heard about the HPV vaccine. The comparison of frequency of students' views by Chi square test in table 3 showed awareness/knowledge of the medical students was significantly higher than that of the nursing/midwifery students in most items ($p<0.05$).

Table 3: Awareness/Knowledge about HPV Infection Among Students

Questions	Total	Medical students	Nursing & Midwifery students	P value
	CI (95%)	% (no)	% (no)	
1. Have you ever heard about HPV?	92.3 (87.15; 95.57)	71.3 (119)	28.7 (48)	0.001
2. Is HPV infection sexually transmitted?	88.4 (82.60; 92.51)	71.9 (115)	28.1 (45)	0.001
3. Can the HPV infect the genital area?	81.2 (74.58; 86.46)	73.5 (108)	26.5 (39)	0.001
5. Does HPV infection have visible signs or symptoms?	75.1 (68.03; 81.08)	73.5 (100)	26.5 (36)	0.001
6. Can HPV cause genital warts?	48.6 (41.15; 56.11)	76.1 (67)	23.9 (21)	0.005
7. Can the HPV be transmitted from mother to fetus?	53.6 (46.06; 60.98)	81.4 (79)	18.6 (18)	0.001
8 Can HPV cause cervical cancer?	71.3 (64.03; 77.65)	76.7 (99)	23.3 (30)	0.001
9. Can men get HPV?	36.5 (29.57; 44.01)	77.3 (51)	22.7 (15)	0.013
10. Can HPV infection be diagnosed by Pap smear?	55.2 (47.65; 62.53)	72.0 (72)	28.0 (28)	0.050
11. Should HPV infection be treated very quickly	75.7 (68.67; 81.62)	73.7 (101)	26.3 (36)	0.001
12. Does preventing HPV infection lead to prevention of cervical cancer?	55.8 (48.24; 63.11)	75.2 (76)	24.8 (25)	0.003
13 Is HPV vaccine effective in preventing cervical cancer?	47.0 (39.60; 54.53)	77.6 (66)	22.4 (19)	0.002
14. Have you ever heard about the HPV vaccine?	64.1 (56.60; 70.99)	73.3 (85)	26.7 (31)	0.007
15. Is pregnancy a contraindication to the papilloma vaccine?	80.1 (73.39; 85.51)	68.3 (99)	31.7 (46)	0.175

HPV: Human Papilloma Virus

Regarding about receiving the HPV vaccine, out of the 181 respondents, only 3 (1.7%) were vaccinated against HPV, while 178 (98.3) were not vaccinated.

For assessing the association between demographic variables and awareness/knowledge of HPV infection and vaccination was used logistic regression, and the results are summarized in Table 4. We observed that the age (OR=0.76, p=0.023), GPA (OR=1.49, p=0.030) and educational field (OR=17.31, $p<0.001$) were statistically associated with awareness/knowledge toward HPV (Table 4).

Table 4: Logistic Regression Analysis for Awareness/Knowledge about HPV Infection and Vaccination

Variables	B	Std. Error	P value	OR (95% CI)
Age	-.268	.11	.023	0.76 (0.60-0.96)
Sex				
Male				Ref.(1)
Female	-.493	.40	.221	0.61 (0.27-1.34)
Marital status				
Single				Ref.(1)
Married	.721	.47	.128	2.05 (0.81-5.19)
GPA	.400	.18	.030	1.49 (1.03-2.14)
Educational Field				
Medical student				Ref.(1)
Nursing/midwifery	2.852	.52	<0.001	17.31 (6.14-47.78)

Discussion

The study was conducted to assess awareness/knowledge towards the HPV infection, its vaccine and associated factors among medical and nursing/midwifery students in AJUMS in Iran. The finding of this study indicated that most than half of the study participants had good awareness/knowledge about the HPV infection and its vaccine. This finding is consistent with the studies conducted in Iran [17,18], Iraq [19] and India [20]. However, this finding is higher than the studies done in Malaysia [21] and Turkey [22]. The discrepancy could be due to the lack of a proper curriculum in medical education and lack of general education regarding HPV in the University.

Systematic reviews in Asian countries indicates poor awareness/knowledge of HPV infection in students [11,23,24]. While, in literature a higher level of awareness/knowledge of HPV was reported in western countries such as the UK and Canada [25]. According to research, Americans, as well as European students, seem to have higher awareness compared with African and Asian students [26], which may be related to the content of the university curriculum and the social and cultural context in different parts of the world.

In the present study, 92.3% of the participants had heard about HPV. Most participants who had heard of HPV knew its association with cervical cancer (71.3%) and that HPV is sexually transmitted (88.4%). In a similar study done in India, 98.8 % of medical students knew the HPV virus as a causative agent for cervical cancer [27]. In other countries, 90.3% of medical students in Jordan [23], 96.39% of medical students in Poland [28], and 97.2% of university students in Indonesia [29] had heard about HPV. The reason for this finding is that participants in the current study were medical sciences students, which have more knowledge due to their courses in university.

We found that medical students had significantly more comprehensive knowledge related to HPV infection, cervical cancer and HPV vaccination compared to nursing/midwifery students. This highlighted the need to include relevant general medical knowledge, especially on HPV vaccination, in the curricula of nursing/midwifery students. Medical students received systematic education on health-related issues, it was not surprising that medical students having more comprehensive knowledge on cervical cancer, which is one of the most prevalent cancer in women. While, nursing/midwifery students had less opportunity to come in contact with general medical knowledge. Therefore, it was reasonable to see that nursing/midwifery students were less familiar with HPV and its vaccination. Overall, according to the literature, most medical students from across the world are generally aware of the HPV, and the rate of knowledge of the medical students' university about HPV was higher than that of the general population [24,30]. This may be attributed to the fact that students receiving education in health science and medical departments hear more about HPV compared with people from other walks of life. This suggests that this topic is more commonly being taught during medical school. Indeed, for the prevention of any infection, health education is the first step in the long-term plan. The present study recruited

medical and nursing/midwifery students as the "best-case scenario" of HPV knowledge in the community. The proper information and education can prevent the spread of this problem.

In the current study, 64.1% of the participants had heard about the HPV vaccine and 47% knew the vaccine effectiveness in preventing cervical cancer. This was consistent with a recent study at the University of Jordan that indicated 65.5% of medical students knew that HPV vaccines exist [23]. In a similar study conducted by Borlu et al. in Turkey among university students, 62.5% of medical students were aware about the availability of HPV vaccine [31].The finding of this study about HPV vaccine is lower than the studies conducted in Ethiopia (77%) and Brazil (90.7%) [32,33]. The possible reasons might be due to the difference in the target population, and sampling methods. Some researchers have reported that some participants feared the side effect of HPV vaccination [29,31]. This may provide information on the low attention and a low number of HPV vaccination in some areas.

Despite the relatively high awareness/knowledge regarding HPV vaccination in this study, Overall vaccination rates were very low; only 3 (1.7%) of the participants reported that they have been vaccinated against HPV. This proportion is far lower than that in other studies, particularly European and American studies [27,34]. In a study in the U.S. 66.4% of the students were vaccinated [35]. In the literature, this rate is reported to be 4.4%, 6% to 21.1% among medical students in Turkey, India and Brazil, respectively [36-38]. Low uptake of HPV vaccination in some underdeveloped countries can be due to factors such as unavailability of vaccines and lack of proper knowledge regarding the role of HPV in the development of cervical cancer and the HPV vaccine. It is alarming that a very small proportion of the participants has been vaccinated. The results of our study demonstrate a need for increased awareness of HPV and the HPV vaccine to increase vaccine uptake rates.

The present study showed no association of gender and students' awareness, which was in agreement with the studies conducted in India and Indonesia [29,39]. However, some studies reported that female medical students had a higher knowledge score than their male counterparts. Alsous et al. [23] and Fu et al. [40] in similar studies observed that female students answered most of the questions correctly and showed a higher awareness regarding HPV vaccination. The reason for this difference may be due to religious attitude and cultural behavior of the participants and the study population.

In this study, medical students had comparatively higher knowledge about HPV compared to nursing/midwifery students. It was no wonder that medical students would have higher awareness rates toward HPV due to the information they receive as a part of their education. This finding is consistent with other studies from India and Malaysia [20,41], which indicated a higher level of HPV awareness among medical students compared to nursing students. A similar study on medical and nursing students in Turkey also showed that nursing students have lower-level knowledge of HPV [42]. Since nurses and midwives have an important role in public health education, their awareness about HPV will be among significant determinants of the use of health services. This justifies a necessary plan to revise the curriculum and to increase the awareness of nursing/midwifery students about HPV Infection.

The findings of present study showed a significant difference between awareness/knowledge of students with high and low GPA. It is consistent with finding of studies by Nekooi [9] and Holcomb [43]. They reported awareness/knowledge toward HPV among students with high GPA was a significant higher in comparison to students with low GPA. We found that Students with higher GPA had significantly better knowledge and more awareness about HPV than those with lower educational achievement. Similar studies indicated the relationship between higher education and better knowledge, with high achieving students having a greater knowledge compared with low achieving counterparts as far as knowledge about HPV infection was concerned [25, 44].

Consistent with previous studies, we found that awareness/knowledge scores were positively correlated with age (p-0.023) i.e., young students were less aware of HPV and displayed poorer knowledge than older students [36, 45]. Probably, the longer student attendance at university and more courses passed can be effective factors in

increasing student awareness about HPV infection.

The present study had some limitations. It was conducted in a single university in Iran; therefore, the results are not representative of other universities in Iran. In addition, the small sample size is another limitation in the current study. Therefore, future studies are recommended to involve other schools of medical universities as well as students of other fields of study to make comparisons between different schools.

Conclusion

The awareness/knowledge of medical and nursing/midwifery students in this study were above average. Medical students were more knowledgeable than nursing/midwifery students. The logistic regression showed that the older age, higher GPA and medical students' group were predictors of awareness/knowledge about HPV. The medical and nursing/midwifery students of today are the future healthcare professionals who will have an important role in promoting HPV awareness and cervical cancer prevention.

Therefore, they must have a basic knowledge of the HPV infection and its vaccination so that as future health care providers can present the public with adequate knowledge. The study findings highlight the need for education measures to improve knowledge and awareness regarding HPV for students who will be future health care providers. Since the nurses and midwives have an important role in public health education, their awareness/knowledge regarding HPV will be among significant determinants of the use of health services. Awareness regarding HPV and cervical cancer should be raised via different approaches, including educational events and inclusion in curricular updates.

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Conflict of interest

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