Knowledge about cervical cancer and awareness about human papillomavirus vaccination among medical students in Jordan

Mervat M Alsous [Corresp., 1], **Ahlam Ali** [2], **Sayer Al-Azzam** [3], **Reema Karasneh** [4], **Haneen Amawi** [1]

[1] Department of Clinical Pharmacy and Pharmacy Practice, Faculty of Pharmacy, Yarmouk University, Irbid, Irbid governorate, Jordan

[2] Medical Biology Centre, School of Medicine, Dentistry and Biomedical Sciences, Queen's University Belfast, Belfast, United Kingdom

[3] Department of Clinical Pharmacy, Faculty of Pharmacy, Jordan University of Science and Technology, Irbid, Irbid governorate, Jordan

[4] Department of Basic Medical Sciences, Faculty of Medicine, Yarmouk University, Irbid, Irbid governorate, Jordan

Corresponding Author: Mervat M Alsous
Email address: mervat.alsous@yu.edu.jo

Objectives To assess the knowledge on cervical cancer and HPV infection, and the awareness towards and perceived barriers of HPV vaccination amid medical students in Jordan. **Methods** The present study is a cross-sectional survey that was conducted for a period of 3 months in the college of Medicine at six different Universities in Jordan. Third-year to sixth-year students form all medical colleges in Jordan were invited to participate in the study. **Results** 504 students took part in the study. 42.3% of males and 57.7% of females. The mean knowledge score of students in our survey 21.4 ± 4.4 out of 34, which was categorized as a moderate level of knowledge regarding cervical cancer and HPV. Only 40.5% knew about the availability of HPV vaccine in Jordan, and 65.9% accept the idea that it is necessary to introduce HPV vaccine in schoolgirls in Jordan. **Conclusions** This study highlights inadequate knowledge about cervical cancer and its screening among medical students in Jordan. Despite the limited awareness about HPV vaccine among the study's participants, there is a favorable opinion towards the introduction of the vaccine in school girls in Jordan. The data provide a benchmark on the level of knowledge about cervical cancer and awareness about HPV, which can be used to formulate an effective awareness program.

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Mervat Alsous[1*], Ahlam Ali[2], Sayer Al-Azzam[3], Reema Karasneh[4], Haneen Amawi[1]

[1] Department of Clinical Pharmacy and Pharmacy Practice, Faculty of Pharmacy, Yarmouk University, Irbid, Jordan

[2] Medical Biology Centre, School of Medicine, Dentistry and Biomedical Sciences, Queen's University Belfast, Belfast, United Kingdom

[3] Department of Clinical Pharmacy, Faculty of Pharmacy, Jordan University of Science and Technology, Irbid, Jordan

[4] Department of Basic Medical Sciences, Faculty of Medicine, Yarmouk University, Irbid, Jordan

***Corresponding Author**: Dr. Mervat Alsous, PhD.

Department of Clinical Pharmacy and Pharmacy Practice, Faculty of Pharmacy, Yarmouk University, Irbid, Jordan

Email: mervat.alsous@yu.edu.jo

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Abstract

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Methods

The present study is a cross-sectional survey that was conducted for a period of 3 months in the college of Medicine at six different Universities in Jordan. Third-year to sixth-year students form all medical colleges in Jordan were invited to participate in the study.

Results

504 students took part in the study. 42.3% of males and 57.7% of females. The mean knowledge score of students in our survey 21.4 ± 4.4 out of 34, which was categorized as a moderate level of knowledge regarding cervical cancer and HPV. Only 40.5% knew about the availability of HPV vaccine in Jordan, and 65.9% accept the idea that it is necessary to introduce HPV vaccine in schoolgirls in Jordan.

Conclusions

This study highlights inadequate knowledge about cervical cancer and its screening among medical students in Jordan. Despite the limited awareness about HPV vaccine among the study's participants, there is a favorable opinion towards the introduction of the vaccine in school girls in Jordan. The data provide a benchmark on the level of knowledge about cervical cancer and awareness about HPV, which can be used to formulate an effective awareness program.

Keywords: Cervical cancer, Jordan, knowledge, medical students, Human Papillomavirus, vaccine

What is already known about this topic?

Cervical cancer (CC) is the most common gynecologic malignancy worldwide and the fourth most common cancer in women. Most cases of cervical cancer are attributed to Human Papillomavirus (HPV). Assessment of knowledge about cervical cancer and HPV vaccination is needed.

What does this paper add?

This is the first study in Jordan that assesses the knowledge about cervical cancer and awareness about HPV vaccine among medical students. The awareness of physicians and medical students will greatly impact the success of cervical cancer prevention. The current study highlights the need for a proper educational campaign about cervical cancer and the HPV vaccine.

1. Introduction

Cervical cancer (CC) is the fourth most common cancer in females with 270,000 women dying from the disease annually; 90% of whom live in developing countries. In North Africa and the Middle East, CC affects 19,500 women per year, leading to 9,930 deaths annually. By 2035, these numbers are expected to double in this region, unless effective public health interventions are introduced [1].

In Jordan, current estimates indicate that 104 women are diagnosed with cervical cancer every year and 61 die from the disease. Data on the HPV burden in the general population of Jordan is not yet available [2].

Amongst all known risk factors, persistent infection with high-risk human papillomavirus (HPV) plays a considerable role in the pathogenesis of CC. Almost all cases of CC are attributed to HPV, with subtypes 16 and 18 accounting for more than half of all CC cases cervical cancers worldwide [3-7].

Successful achievements in basic and clinical research have expanded the possibilities of CC prevention by introducing HPV testing as part of the screening technology. Most importantly, by production of efficacious prophylactic HPV vaccines [5]. It is established that well-organized cervical screening programs or widespread good quality cytology can reduce CC incidence and mortality. Diagnostic screening programs for HPV lesions are generally available in the developed countries, however all Middle East countries including Jordan don’t have a national CC screening program due to the lack of public health policy, professional and general education, clinical settings, financial resources, and media awareness. Noteworthy, most female cancer awareness campaigns are mainly focused on breast cancer [8].

Several studies, mostly from developed countries, have demonstrated that the knowledge about HPV infection and the acceptability of HPV vaccines amongst health care professionals and the general public vary from low to high [9-12]. Recommendation of HPV immunization by physicians has been recognized as one the most significant factors in the individual's willingness to receive the vaccine. Updated knowledge about the HPV vaccine and the elimination of any barriers to prescription among physicians are the main determinant factors [13-14].

Physicians can play an imperative role in circulating knowledge about CC and the available preventive vaccines. Therefore, the awareness of physicians and medical students will greatly impact the success of CC prevention. The awareness programs should focus on family physicians and gynecologists depending on the known immunizer in each country. Targeted community education that responds to concerns about HPV vaccine has proven to be effective [15]. It is therefore important to enhance promotion, communication, and social mobilization strategy to increase awareness among decision makers and demand among the population. The strategy should include several buddies including non-governmental organizations, women's groups, religious leaders, and professional organizations.

The objectives of this study were to evaluate the knowledge on CC and HPV infection, and the awareness towards and perceived barriers of HPV vaccination among Medical students in Jordan. This comes from their essential role as health care providers to raise community awareness and to modify population behavior.

2. Methods

2.1 Study design and Purpose

The present study is a cross sectional survey, that was designed to investigate knowledge about CC and awareness about HPV vaccine among medical students in Jordan.

2.2 Study Participants and ethical Considerations

The protocol of the study was approved by the Scientific Research Committee at Yarmouk University. The study was conducted after obtaining ethical approval from the Institutional Review Board (IRB) of Jordan University of Science and Technology (JUST) and King Abdulla University Hospital (KAUH), Irbid, Jordan (13/128/2019).

The questionnaire was distributed utilizing an electronic format, through Google Forms. The link to the survey was shared with medical students in six universities in Jordan. The questionnaire was prefaced by a page explaining the nature and objectives of the study and the voluntary nature of participation with a consent statement, if they would like to take part in the study. Participants who completed the questionnaire have given electronic informed consent by declaring their acceptance to fill out the questionnaire. The questionnaire was terminated automatically if participants declined to take part. This procedure was approved by the IRB committee.

The participants were assured that the outcomes of the research would not be used for routine appraisal of the participants. The individuals were requested to complete the questionnaire without textbooks or consulting materials.

149 The study was conducted for a period of 3 months in the colleges of Medicine at six different
150 Universities in Jordan. Third year to sixth year students form all medical colleges in Jordan were
151 invited to participate in the study.

152 **2.3 Study Instruments**

153 The study questionnaire was developed by authors by extensive review of literature. A Printed
154 English version of a pre-validated questionnaire, consisting of items as modified from
155 questionnaires used in other studies [14,16] was used. The questionnaire was reviewed by the
156 authors and then subjected to pilot testing by 30 participants to ensure clarity of the questions,
157 which resulted in several minor amendments.
158 The final version of the questionnaire consists of 3 parts. The first one was about demographic
159 information of participants which included age, gender, year of study, and average monthly
160 income. The second part assesses the knowledge about CC and HPV. Finally, the third part
161 assessed the awareness and acceptance of HPV vaccination.
162 The knowledge of the students about CC was evaluated using 14 multiple choice questions with
163 34 statements related to disease etiology, risk factors, clinical features and screening
164 recommendations according to world health organization (WHO). Each answer was scored as
165 incorrect or correct. The respondent was given a zero point for each wrong answer and one point
166 for each correct answer.

167 Total knowledge score was calculated for each participant out of 34. Participants were
168 categorized to have poor, moderate, and good knowledge if their score was 0–17, 18-25, and 26-
169 34, respectively.

Regarding respondents' awareness about the HPV vaccination, this part consists of 7 questions. Each question was scored out of 2 points. Poor awareness was given to the students with maximum %39 of awareness mean, average awareness level was allocated to those with at most %40-%69 of awareness mean and good awareness level was assigned to people with over %70 of awareness mean i.e. if their awareness score was 0–5, 6-9, and 10-14 respectively.

Last three questions in the questionnaire assessed the acceptance of HPV vaccination in Jordan among Medical students in Jordan, perceived barriers of HPV vaccination and source of information about it.

2.4 Statistical Analysis

Data was analyzed using SPSS software version 24. Descriptive data was expressed as frequencies and percentages. Chi square was used to analyze significant differences between categorical variables. Student's t-test was used to compare the means between two groups. All p-values were two sided and any p-value of less than 0.05 was considered statistically significant.

2.5 Sample Size Calculation

The sample size was calculated utilizing the online Raosoft software sample size calculator. The minimum required sample size assuming a 95% confidence level, 50% recruitment rate, 5% margin of error and a and a maximal sample size of 6000 students, would be 362 participants.

3. Results

3.1 Demographic Characteristics

The number of total responses was 508, 4 students disagree to take part in the study while 504 of the students completed the questionnaire. Recruited students were from all medical colleges in Jordan including: Yarmouk University (33.3%), Jordan University of Science and Technology (25.0%), University of Jordan (16.1%), Hashemite University (13.5%), Mutah University (6.3%), and Albalqa University (5.8%). About 42.3% were males and the mean age was 22.3 ± 1.6 years. Table 1 shows participants' demographic characteristics.

3.2 Knowledge Assessment about CC

Knowledge was assessed using 14 questions with total 34 points related to disease diagnosis, risk factors, symptoms and relation to HPV. Regards knowledge about CC, the mean knowledge score for students was 21.4 ± 4.4. Table 2 shows the proportion of students who correctly answered questions related to CC and HPV. Most participants knew that CC is caused by infection (n = 413, 81.9%) and that HPV is responsible for a wide array of diseases including CC (n = 455, 90.3%).

Concerning its epidemiology, (60.7%) of students answered correctly that CC is a leading cause among gynecological cancer.

Student' knowledge about the clinical features of CC wide-ranging and percentages of correct answers were 35.5% for no symptoms and 80.6% for bleeding per vagina. The percentages of students who were aware that fever, itching and swelling of cervix were not among the clinical features of the disease were 87.5%, 70.0% and 54.85 respectively. The mean percentage knowledge score of this part was 59.7%±16.5%.

Concerning knowledge about CC screening and vaccine, 26.4% of participants knew correctly that women aged 45-60 years should be present for screening according to WHO once every 5 years.

211 On the other hand, 76.6% were aware that there is a vaccine that protects from CC. The mean
212 percentage knowledge score of this part was 55.2%±25.9%.

213 Most of students (90.3%) knew that HPV is responsible for a wide array of diseases including CC.
214 Most of them (88.9%) were aware that HPV is transmitted sexually. About two third of students
215 were aware that HPV subtypes 6 and 11 are commonly associated with Genital warts (65.1%) and
216 HPV subtypes 16 and 18 are commonly associated with CC (70.4%). The mean percentage
217 knowledge score of this domain was 67.9%±21.5%.

218 The association of socioeconomic factors with knowledge score was assessed using t-test analysis
219 and there was a significant difference between mean knowledge score for male students
220 20.6±4.7 and female students 22.0±4.0 (p-value=0.001). Knowledge score was significantly
221 associated with the year of study with highest mean score among students in the 6th year level
222 with 23.6±3.5 (p-value<0.001) and the least mean score was among 3rd year level students
223 18.4±4.2. No significant association between family income or place of living or Nationality or
224 University and knowledge score (p-value >0.05).

225 **3.3 Awareness about HPV vaccine and acceptance**

226 Regarding student's awareness about HPV vaccine, only 40.5% knew about the availability of HPV
227 vaccine in Jordan, 71.4% were aware that the HPV vaccine should be given at age between 11
228 and 29 and that it can be given to boys also (54.0%). Moreover, CC protection provided by HPV
229 vaccine is 70% (21.0%). The mean awareness score of students about HPV vaccine was 5.7±2.8
230 with (Range 0-13) which is classified as average awareness. (Table 3)

About 322 students (65.9%) accept the idea that it is essential to introduce HPV vaccine in schoolgirls in Jordan. Among obstacles preventing form receiving or advice taking HPV vaccination were high cost (53.8%) and Inadequate information about the vaccine (62.5%) as shown in Figure 1.

Figure 2 presents the sources of information about HPV vaccination as reported by students with Medical school teaching being the main source of information (87.7%) followed by internet sources (33.3%) and books (23.2%).

The association of socioeconomic factors with awareness score was assessed using t-test analysis and there was a significant difference between mean awareness score for students in the 6th year level with 6.3±2.8 (p-value=0.01). On the other hand, the awareness score was not associated with all other demographic data (p-value>0.05).

4. Discussion

CC caused by HPV, is the major single cause of years of life lost to cancer in the developing world. Since it affects women in their most productive years, CC has a disturbing effect on the well-being of families [17]. Data is not yet available on the HPV burden in Jordan, however, in Western Asia, the region Jordan belongs to, 72.4% of invasive cervical cancers are contributed to HPV [1]. Therefore, conducting comprehensive evaluations of HPV prevalence, examining knowledge, attitudes, and practices toward HPV vaccination will provide a clear description of the situation in the region. Introducing a successful HPV vaccination program will directly reduce morbidity and mortality from HPV types, improve women health, increase healthcare cost savings, and extend positive externalities on women's immediate communities.

252 In the current study, general CC and HPV knowledge was moderate which was similar to the result
253 of a study done on nurses in Thailand [18]. Most of participants in the present study were aware
254 that CC is caused by infection and that HPV infection can lead to CC. These results show adequate
255 knowledge about CC epidemiology and similar to other studies conducted on health care
256 professionals [12,19].

257 In our study most medical students were able to recognize that infection and risky sexual
258 practices are common risk factors to CC, these results were similar to other studies [20-22],
259 however, some students had incorrect information that old age and nulliparity were among risk
260 factors of CC. In the current study a high percentage of participants were unaware that lower
261 pelvic pain and anemia are common clinical features of CC and some of them wrongly thought
262 that fever, itching and swelling of cervix were symptoms of CC. This highlights the need to
263 increase the consciousness about CC among physicians who act as the main source of health
264 information to their patients.

265 Less than half of students correctly reported PCR as a test used for detection of HPV infection
266 and knew the appropriate frequency of CC screening in women (i.e. women aged 25-44 years
267 should be screened every 3 years and women aged 45-60 years should be screened every 5
268 years). This showed inadequacy of knowledge about is important as preventive measure for CC.
269 In addition,

270 The knowledge score was significantly associated with gender and year of study and this was
271 consistent with other studies where the score was higher among female students [23-24] and
272 higher level of study [25].

The HPV vaccine offer a major breakthrough to limit the global burden of CC [26]. Many studies have been conducted worldwide recently on the knowledge, attitude, beliefs and awareness about HPV vaccine [12,19,27-29]. In the current study, only 40.5% of medical students were aware about the availability of HPV vaccine in Jordan which protect from CC and only 21.6% were aware that no need to screen girls before getting vaccinated. Less than one third of students were aware about the appropriate frequency of doses of HPV vaccine (3 doses) and the appropriate protection level (70%) provided by vaccine with an overall awareness score 5.7±2.8. This indicates inadequate awareness about HPV vaccine. Our results were similar to a result from study on University students in Turkey [30].

In the current study, about two third of students (65.9%) thought that it is important to introduce the vaccine in schoolgirls in Jordan which indicates favorable acceptance of using the vaccine in Jordan. Hoque et al., 2016 indicated that most of the physicians in their study reported that they intended to prescribe the HPV vaccine to patients; as they expected an important advantage from HPV vaccination [31].

In the present study, more than half of the students (62.5%) reported inadequate information about CC and HPV vaccine as an obstacle preventing form receiving or advice taking HPV vaccination. Our results were similar to a study on medical students in India [14]. Therefore, it is recommended that physicians should receive information about HPV from educational campaigns to improve their communication practices for recommending HPV vaccination [32].

5. Strength and limitations of the study

The high response rate and the inclusion of all medical colleges in Jordan enhance the generalizability of our results. However, this is across sectional study and therefore causal relationship between variables cannot be established. We could not also detect the response rate as the questionnaire was distributed electronically. Our study is considered a starting point for future studies on this sensitive topic exploring attitudes and barriers to vaccination among women in Jordan.

6. Conclusion

This study highlights insufficient knowledge about CC and its screening among medical students in Jordan. Despite the limited awareness about HPV vaccine among the study's participants, there is a favorable opinion towards the introduction of the vaccine in school girls in Jordan. More emphasis should be placed on medical curriculum taught in undergraduate education. Suitable Educational campaign should be stratified at hospitals along with workshops and seminars which highlight the importance of CC screening in women and increase the awareness about HPV among physicians. Medical students who are the future health care providers can educate their patients, address their sensitive cultural concerns and later increase the health seeking behavior in women in Jordan especially if they are properly aware of CC and hence its burden reduced.

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Ethics approval and consent to participate

The study was approved by the Institutional Review Board (IRB) of Jordan University of Science and Technology (JUST) and King Abdulla University Hospital (KAUH), Irbid, Jordan (13/128/2019). All study participants provided informed consent to participate in the study.

Consent for publication

Not applicable.

Availability of data and materials

Raw data of the study is available as supplementary data.

Competing interests

The authors declare that they have no competing interests.

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Table 1(on next page)

Tables

Table 1: Participant's demographic data (n=504)

Age (Year), Mean±SD	22.3±1.6
Age range	20-29
Gender, N (%)	
Male	213 (42.3)
Female	291 (57.7)
University, N (%)	
All Public Universities in Jordan	504 (100)
Level of Education, N (%)	
3rd year	131 (26.0)
4th year	63 (12.5)
5th year	113 (22.4)
6th year	197 (39.1)
Know someone with cervical cancer, N (%)	
Yes	22 (4.4)
No	482 (95.6)
Nationality, N (%)	
Jordanian	454 (90.1)
Not Jordanian	50 (9.9)
Place of living, N (%)	
Urban	395 (78.4)
Rural	109 (21.6)
Family Income JD, N (%)	
<500	33 (6.5)
501-1000	128 (25.4)
1001-1499	111 (22.0)
1500-2000	94 (18.7)
>2000	138 (27.4)

N: number, SD: standard deviation.

Table 2(on next page)

Table 2: Participant’s knowledge about Cervical cancer (n=504)

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Question	Correct answer N (%)	Wrong answer N (%)
Epidemiology of cervical cancer		
1. Is Cervical cancer the leading cause among gynecological cancer?[1]	306 (60.7)	198 (39.3)
2. The cause of cervical cancer	413 (81.9)	91 (18.1)
Mean % score=71.3%±30.8%		
3. Risk factors of cervical cancer		
- Multiple sexual partner	422 (83.7)	82 (16.3)
-Infection with HPV	482 (95.6)	22 (4.4)
-Early age of first coitus	245 (48.6)	259 (51.4)
-Smoking	301 (59.7)	203 (40.3)
-Family History of disease	324 (64.3)	180 (35.7)
-Poor Hygiene	201 (39.9)	303 (60.1)
-Old age (False)	366 (72.6)	138 (27.4)
-Contraception	178 (35.3)	326 (64.7)
-Nulliparity (False)	426 (84.5)	78 (15.5)
Mean % score=64.9%±21.0%		
4. Clinical features of cervical cancer		
-No symptom	179 (35.5)	325 (64.5)
-Lower pelvic pain	200 (39.7)	304 (60.3)
-Bleeding per vagina	406 (80.6)	98 (19.4)
-Fever (False)*	441 (87.5)	63 (12.5)
-Discharge per vagina	318 (63.1)	186 (36.9)
-Itching (False)*	353 (70.0)	151 (30.0)
-Weight loss	264 (52.4)	240 (47.6)
-Swelling of cervix (False)*	276 (54.8)	228 (45.2)
-Anemia	202 (40.1)	302 (59.9)
-Post coital bleeding	370 (73.4)	134 (26.6)
Mean % score=59.7%±16.5%		

Cervical cancer screening		
5. Time of screening for women aged 25-44 years	180 (35.7)	324 (64.3)
6. Time of screening for women aged 45-60 years	133 (26.4)	371 (73.6)
7. Is there a vaccine to protect from cervical cancer?[1]	386 (76.6)	118 (23.4)
8. Does the vaccine protect against all cervical cancer?[2]	332 (65.9)	172 (34.1)
9. Girls who have been vaccinated will need to attend for cervical cancer screening[1]	359 (71.2)	145 (28.8)
Mean % score=55.2%±25.9%		
Knowledge about HPV		
10. Is HPV responsible for a wide range of diseases including cervical cancer? [1]	455 (90.3)	49 (9.7)
11. Transmission of HPV	448 (88.9)	56 (11.1)
12. The Technique available for HPV detection		
- Pap smear	376 (74.6)	128 (25.4)
- Biopsy	169 (33.5)	335 (66.5)
- PCR	218 (43.3)	286 (56.7)
- Blood (False)*	390 (77.4)	114 (22.6)
13. HPV subtypes 6 and 11 are commonly associated with Genital warts [1]	328 (65.1)	176 (34.9)
14. HPV subtypes 16 and 18 are commonly associated with Cervical carcinoma [1]	355 (70.4)	149 (29.6)
Mean % score=67.9%±21.5%		
Overall % Knowledge score=63.0%±12.9%		

1 Yes
2 No
*Student get one point if the answer for this statement is false

Table 3(on next page)

Table 3: Participant’s awareness and acceptance of HPV vaccination (n=504)

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Question	Correct answer N (%)	Wrong answer N (%)
1.Is the HPV vaccine available in Jordan?[1]	204 (40.5)	300 (59.5)
-Yes (2 points)	204 (40.5)	
-No	64 (12.7)	
-Don't know	236 (46.8)	
2.Which age group HPV vaccine should be given?	443 (87.9) *	51 (12.1)
-(0-10) Years	48 (9.5)	
-(11-29) Years (2 points)	360 (71.4)	
-(30-50) Years (1 point)	83 (16.5)	
-(51) years and above	13 (2.6)	
3.Can HP vaccine be given to boys?1	272 (54.0)	132 (46.0)
-Yes (2 points)	272 (54.0)	
-No	50 (9.9)	
-Don't know	182 (36.1)	
4.Do girls/women need to be screened for HPV before getting vaccinated?2	109 (21.6)	395 (78.4)
-Yes	237(47.0)	
-No (2 points)	109 (21.6)	
-Don't know	158 (31.3)	
5.Can HP vaccine be given to a woman already having HPV infection?2	155 (30.8)	349 (69.2)
-Yes	141 (28.0)	
-No (2 points)	155 (30.8)	
-Don't know	208 (41.3)	
6.How many doses of HPV vaccine are required for protection in women?	96 (19.0)	408 (81.0)
-One	49 (9.7)	
-Two	70 (13.9)	
-Three (2 points)	96 (19.0)	

-Four	8 (1.6)	
-Don't Know	281 (55.8)	
7.Cervical cancer protection provided by HPV vaccine is:	275 (54.6) *	263 (45.4)
-100%	21(4.2)	
-90% (1 points)	135(26.8)	
-70% (2 point)	106 (21.0)	
-50% (1 point)	34 (6.7)	
-Don't know	208 (41.3)	
Overall % awareness score=40.5%±19.8%	332 (65.9)	172 (34.1)

1 Yes
2 No
*Number of students who had a score of 1 or 2 points

Figure 1

Figure1: Obstacle preventing form receiving or advice taking HPV vaccination

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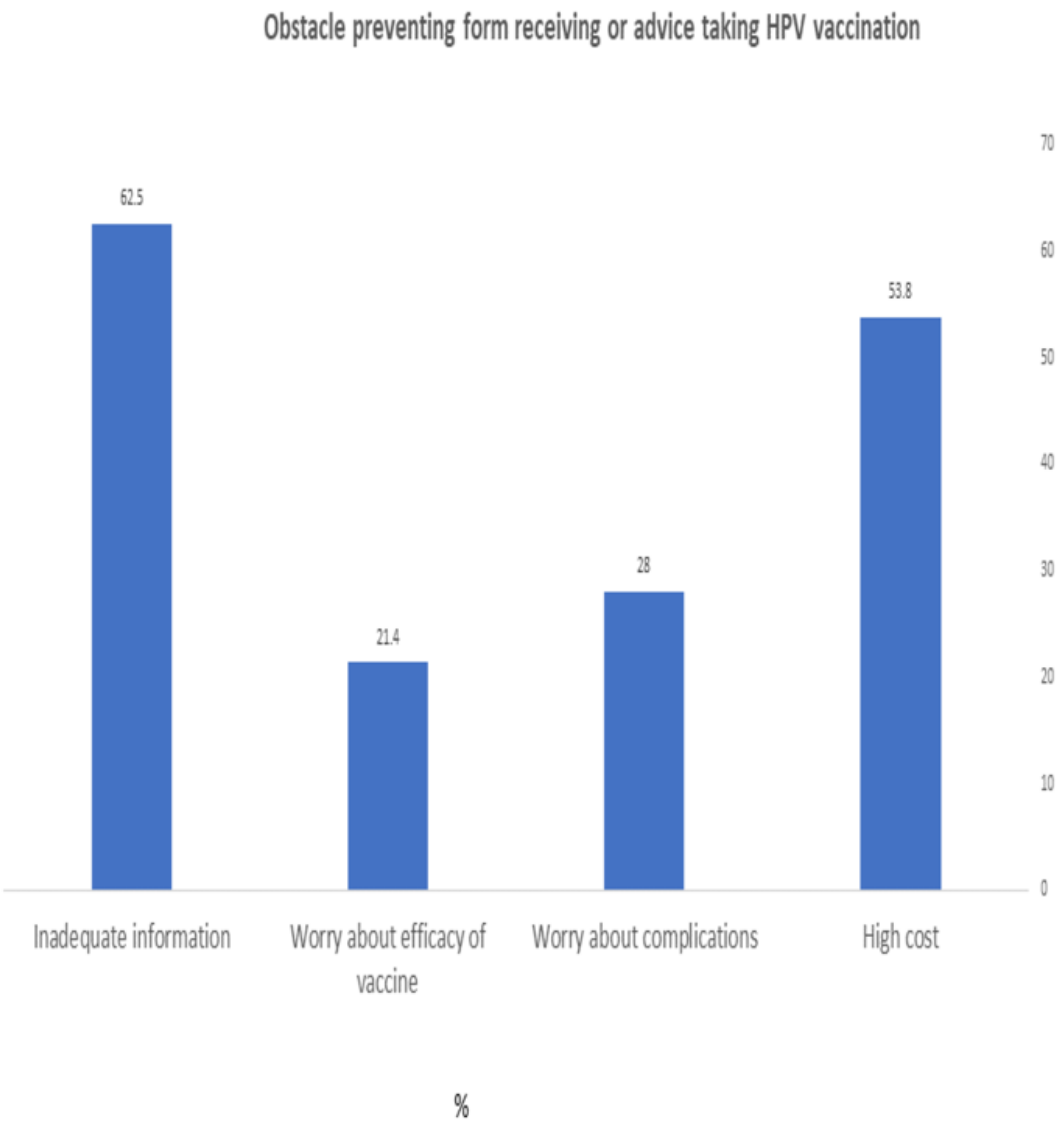

Figure 2

Figure1: Obstacle preventing form receiving or advice taking HPV vaccination

Figure2: Sources of knowledge and information on HPV vaccination