

Awareness, Knowledge, and Attitude Toward Cervical Cancer and HPV Prevention Among Female Medical School Students

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Abstract

Early diagnosis of cervical dysplasia (pre-cancerous) with a Pap smear is preventable against cervical cancer. In nations with well-established cervical cancer screening programs, the disease is less common. In Saudi Arabia, there is a lack of knowledge and expertise about HPV and cervical cancer screening. We aim to assess female students' awareness about cervical cancer, PAP smear, and HPV as well as barriers and attitudes towards HPV vaccine at Umm Al-Qura University, KSA. A cross-sectional study was done at Umm Al-Qura University (UQU), Makkah Saudi Arabia on 479 female students using an online questionnaire. The majority of participants (86.4%) were aware of cervical cancer, while 40.7%, 30.5%, and 55.1% of them were aware of HPV, its vaccine, and Pap tests, respectively. The majority of the participants (59.7%) knew that cervical cancer could be a preventable disease. Only 16.5 percent were aware of when to receive the HPV vaccine. Only 7.1 percent knew when to start the PAP smear screening. The majority of individuals (72%) supported receiving the HPV vaccine. Only 4% of women who accepted a Pap smear after marriage had a relative who had cervical cancer, only 2.1 percent had received the HPV vaccine, and 4.4 percent had undergone a Pap smear. A much higher percentage of participants with a good level of knowledge were in a health sciences specialty (college). There is a need for health awareness & Educational campaigns on the importance of cervical cancer screening and HPV vaccination.

Keywords: Awareness, Cervical, Cancer, HPV vaccine, Human papillomavirus, PAP smear

INTRODUCTION

Cervical cancer is the second most common cancer in women worldwide [1, 2]. It is one of the most significant causes of early death in women of reproductive age [3, 4]. However, most cases of cervical cancer in Saudi Arabia are diagnosed in advanced stages where the management is already difficult [3, 5]. There are nearly 500,000 new cases of cervical cancer worldwide and 250,000 cervical cancer deaths per year [4, 6]. The incidence rate was the lowest in the Middle East, particularly among Muslims and Jews, compared to other religious groups [7-9].

Many factors have been identified as risk factors for cervical cancer, including the Human papillomavirus (HPV), lack of screening services, adequate access to screening and treatment, and a social climate that encourages such behavioral factors [3, 10, 11]. Cervical cancer can be prevented by early recognition through cervical screening tests such as Pap smears [7].

The HPV test is a convenient, highly sensitive screening tool [8]. There is a reduced incidence of the disease in countries with established cervical cancer screening programs [12]. No

national screening programs are available in Saudi Arabia, with only opportunistic screening given to women attending healthcare facilities for any gynecologic visit [9, 13].

Previous research stressed the need to raise awareness of cervical cancer among medical professionals, such as interns and nurses, who are involved in providing the general patient population's primary health care (PHC) and serve as an important source of advice for patients [14].

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The data in Saudi Arabia from previous studies have shown that awareness and experience are typically insufficient for cervical cancer and HPV screening [15]. This study aimed to assess female students' awareness of cervical cancer, HPV, barriers, and attitudes toward the HPV vaccine and Pap smear screening test at Umm Al-Qura University, Saudi Arabia.

MATERIALS AND METHODS

Study Design, Setting, and Time Frame

A descriptive cross-sectional study was conducted at Umm Al-Qura University (UQU) in Makkah from May to June 2022.

Sample Size

According to the statistics on the Umm Al-Qura University website, the percentage of female students was 45%, so the total population is 55042 female students in the university. Hence, the estimated sample size is 382, at a confidence level of 95%, with a margin of error of 5%.

Study Participants

The inclusion criteria were female students aged 18-25 years old in UQU in Makkah, Kingdom of Saudi Arabia (KSA). Students from all colleges, of all nationalities, and who agree to participate in the study were included. The exclusion criteria were students outside the age range, doctors, teachers, and anyone from outside UQU.

Data Collection

An online structured, modified questionnaire was developed based on the reviewed literature [3, 7]. It consisted of 32 clear, concise, close-ended questions. It is written in Arabic and English versions of each question so that participants can easily understand it. The second section included 16 items to assess the participants' knowledge about cancer cervix, HPV and its vaccine as well as the Pap smear and their sources of information. The 3rd section included items to assess the participants' attitudes and practices towards the HPV vaccine and Pap smear and causes of refusal. The respondent's level of knowledge about cancer cervix, HPV and its vaccine, and Pap smear was reported as good knowledge if the study participant correctly responded to more than or equal to 80% of knowledge assessment tools, and poor for <80% [16].

The first section of the questionnaire collected data about the participants' demographic characteristics. It contains 10 statements including (age, nationality, university branch, college, study year, marital status [if married, the husband's highest level of education and number of children], mother's level of education, father's level of education, monthly income, and place of residence).

Data Analysis

Data were analyzed using the (SPSS) program version 26. To test the relationship between variables, qualitative data were expressed as numbers and percentages, and the Chi-squared

test (χ^2) was used. Quantitative data was expressed as mean and standard deviation (Mean \pm SD) and a p-value of less than 0.05 was considered statistically significant.

RESULTS AND DISCUSSION

Participants' Demographics

Of the studied participants, 52.4% of the participants had an age ranging from 22-25 years, 92.9% were Saudi nationality and 52.6% were in a health sciences college. Only 11.9% were married and of those married participants, 58% had a husband with a bachelor's degree as an educational level. The majority were in an urban residence and 28.6% had a monthly income of less than 5000 SR. Almost half of the participants had a mother and a father with a secondary school level of education or less respectively (**Table 1**).

Table 1. Distribution of studied participants according to their demographics and husband's, mother's, and father's educational level

Variable	No. (%)
Age/years	
18-21	228 (47.6)
22-25	251 (52.4)
Nationality	
Saudi	445 (92.9)
Non-Saudi	34 (7.1)
Specialty	
Medical	252 (52.6)
Non-medical	227 (47.4)
Marital status	
Single	422 (88.1)
Married	57 (11.9)
If married (No.:57), what is your husband's educational level?	
Bachelor	33 (58)
Secondary or less	19 (33.3)
Postgraduate education	5 (8.7)
Residence	
Rural	65 (13.6)
Urban	414 (86.4)
Monthly income / SR	
<5,000	137 (28.6)
5,000-10,000	95 (19.8)
10,000-15,000	111 (23.2)
>15,000	136 (28.4)
Mother's education	
Bachelor	214 (44.7)
Secondary or less	247 (51.6)
Postgraduate education	18 (3.8)
Father's education	
Bachelor	192 (40.1)
Secondary or less	248 (51.8)
Postgraduate education	39 (8.1)

Knowledge about cervical cancer and Human Papilloma Virus (HPV)

The majority of the participants have heard about cervical cancer but only 26.9% knew its causes and risk factors. Of them, 69.1%, 52.4%, 69.3%, and 55.5% knew that pain, bleeding after intercourse, abnormal uterine bleeding, and vaginal secretions are common symptoms of the disease. Regarding the participant’s knowledge of HPV, 40.7% heard about it, 30.5% heard about its vaccine, and 55.1% heard about Pap smear (Table 2).

Table 2. Distribution of studied participants according to their response to dichotomous questions related to knowledge about cervical cancer and Human Papilloma Virus (HPV)

Variable	No No. (%)	Yes No. (%)
Knowledge about cervical cancer		
Have you ever heard of cervical cancer?	106 (22.1)	414 (86.4)
Do you know the causes of cervical cancer?	350 (73.1)	129 (26.9)
Do you know the symptoms of cervical cancer? [Pain]	148 (30.9)	331 (69.1)
Do you know the symptoms of cervical cancer? [Bleeding after intercourse]	228 (47.6)	251 (52.4)
Do you know the symptoms of cervical cancer? [Abnormal uterine bleeding]	147 (30.7)	332 (69.3)
Do you know the symptoms of cervical cancer? [vaginal secretions]	213 (44.5)	266 (55.5)
Knowledge about HPV, HPV vaccine, and Pap smear		
Have you ever heard of HPV?	284 (59.3)	195 (40.7)
Have you ever heard of the HPV vaccine?	333 (69.5)	146 (30.5)
Have you ever heard of a Pap smear?	215 (44.9)	264 (55.1)
Practice related to cervical cancer, HPV, and Pap smear		

More than half of the participants thought that cervical cancer can be prevented and 47% thought that its mode of transmission is direct transmission (Genital, Skin, hands.). Only 16.5% knew that the best age to take the HPV vaccine is 9-13 years, however, only 6% knew that the frequency of vaccination is 3 doses over 6 months. Only 7.1% knew that the most appropriate time to start the screening program (pap smear test) is after 3 years after marriage and 7.7% knew that the best frequency of pap smear screening test is every 3 years. About 26% (26.7%) of participants females reported that screening for cervical cancer should not stop after vaccination (Table 3).

Table 3. Distribution of studied participants according to their responses to multiple choice questions related to knowledge about cervical cancer and Human Papilloma Virus (HPV)

Variable	No. (%)
Do you think cervical cancer can be prevented?	
No	15 (3.1)
Don't know	178 (37.2)
Yes	286 (59.7)

Mode of transmission of HPV	
Direct transmission (Genital, Skin, hands.)	225 (47)
Indirect transmission (Shared objects, surfaces)	24 (5)
Airborne or aerosol transmission	8 (1.7)
Bloodborne transmission	64 (13.4)
I don't know	234 (48.9)
Do you know what is the best age to take the HPV vaccine?	
>35	12 (2.5)
9-13	79 (16.5)
Don't know	388 (81)
Do you know how often the vaccination doses are repeated?	
3 doses over 5 years	19 (4)
3 doses over 6 months	32 (6)
3 doses over 2 years	21 (4.4)
I don't know	407 (85)
Do you know what is the most appropriate time to start the screening program (pap smear test)?	
>30	30 (6.3)
After 3 years of marriage	34 (7.1)
At the age of 21	80 (16.7)
I don't know	335 (69.9)
Do you know what is the best frequency of pap smear screening tests in females between 21-29 years old?	
Every 3 years	62 (12.9)
Every 5 years	37 (7.7)
I didn't hear about it	380 (79.3)
Do you think screening for cervical cancer should stop after vaccination?	
No	128 (26.7)
I don't know	330 (68.9)
Yes	21(4.4)

Sources of information about cervical cancer

Attitude towards HPV vaccine and Pap smear

As for the participant’s attitude toward the vaccine shows that most of the participants (72%) agreed to have the HPV vaccine. For those who refused to have the HPV vaccine, the most common barriers were that they didn’t hear about it (17.3%), were worried about side effects (11.5%), and not believing in the benefits of vaccination (8.4%). Most of the participants also accepted a Pap smear after marriage for early diagnosis (79.3%). For those who refused, the most common causes were not seeing a reason for the screening test and feeling uncomfortable with a pelvic exam (Table 4).

Table 4. Attitude of the participants towards HPV vaccine and Pap smear and causes of refusal

Variable	No. (%)
Do you agree to have the HPV vaccine?	
Agree	345 (72)
Don't agree	134 (28)
What is the reason for your refusal to vaccinate? (No.:134) (more than one answer was allowed)	
I didn't hear about it	83 (17.3)
It is rare and is not worth the vaccination	27 (5.6)
I don't believe in the benefits of vaccination	40 (8.4)
Being worried about side effects	55 (11.5)
I don't know where the vaccine is available	26 (5.4)
I have no time	17 (3.5)
Being afraid of the vaccine injection	26 (5.4)
Family refusal	19 (4)

The vaccine might be unaffordable	20 (4.2)
Do you accept a Pap smear after marriage for early diagnosis?	380 (79.3)
Accept	99 (10.7)
Refuse	15 (3.1)
Why did you refuse? (No.:99)	
being worried about another bad result	45 (9.4)
I feel uncomfortable with a pelvic exam	58 (12.1)
I don't see a reason for the screening test	
I didn't hear about it	30 (6.3)
Family refusal	11 (2.3)

Regarding the participants' practice, it shows that only 4% of the participants had a personal history or a relative with cervical cancer and only 2.1% were vaccinated with the HPV vaccine. Only 4.4% of them ever had a Pap smear (Table 5).

Knowledge Level

Participants with an age ranged from 22-25 years and those studying in a medical college had a significantly higher level of knowledge compared to others ($p < 0.05$). Participants who had a previous vaccination with the HPV vaccine also had a significantly higher percentage of those who had a good level of knowledge ($p < 0.05$) (Table 6). Participants age 22-25 years and those having a medical specialty, who previously heard about cervical cancer, HPV, and its vaccine, and Pap smear had a significantly higher percentage of those who accepted to have the HPV ($p < 0.05$). Participants who had themselves or a relative with cervical cancer and those who had a Pap smear also had a significantly higher percentage of those who had a good level of knowledge ($p < 0.05$) (Table 7).

Table 5. Distribution of studied participants according to their practice related to cervical cancer, HPV, and Pap smear

Practice related to cervical cancer, HPV, and Pap smear	No No. (%)	Yes No. (%)
Do you or a relative have cervical cancer?	460 (96)	19 (4)
Have you ever been vaccinated with the HPV vaccine?	469 (97.9)	10 (2.1)
Have you ever had a Pap smear?	458 (95.6)	21 (4.4)

Table 6. Relationship between participants' level of knowledge and their demographics, husband's, mother's, and father's education, previous hearing about cervical cancer, HPV and its vaccine, Pap smear and their related practice

Variable	Knowledge level		χ^2	p-value
	Poor No. (%)	Good No. (%)		

Age/years				
18-21	224 (98.2)	4 (1.8)	14.14	< 0.001
22-25	226 (90)	25 (10)		
Nationality				
Saudi	416 (93.5)	29 (6.5)	2.35	0.125
Non-Saudi	34 (100)	0 (0.0)		
Specialty				
Medical	224 (88.9)	28 (11.1)	23.9	< 0.001
Non-medical	226 (99.6)	1 (0.4)		
Marital status				
Single	394 (93.4)	28 (6.6)	2.1	0.147
Married	56 (98.2)	1 (1.8)		
If married (No.:57), what is your husband's educational level?				
Bachelor	32 (97)	1 (3)	2.32	0.507
Secondary or less	19 (100)	0 (0.0)		
Postgraduate education	5 (100)	0 (0.0)		
Residence				
Rural	61 (93.8)	4 (6.2)	0.001	0.971
Urban	389 (94)	25 (6)		
Monthly income / SR				
<5,000	131 (95.6)	6 (4.4)	3.97	0.265
5,000-10,0001	88 (92.6)	7 (7.4)		
10,000-15,000	107 (96.4)	4 (3.6)		
>15,000	124 (91.2)	12 (8.8)		
Mother's education				
Bachelor	199 (93)	15 (7)	1.77	0.412
Secondary or less	235 (95.1)	12 (4.9)		
Postgraduate education	16 (88.9)	2 (11.1)		
Father's education				
Bachelor	180 (93.8)	12 (6.3)	1.51	0.47
Secondary or less	235 (94.8)	13 (5.2)		
Postgraduate education	35 (89.7)	4 (10.3)		
Have you ever heard of cervical cancer?				
No	106 (100)	0 (0.0)	8.77	0.003
Yes	344 (92.2)	29 (7.8)		
Have you ever heard of HPV?				
No	284 (100)	0 (0.0)	44.95	< 0.001
Yes	166 (85.1)	29 (14.9)		
Have you ever heard of the HPV vaccine?				
No	333 (100)	0 (0.0)	70.4	< 0.001
Yes	117 (80.1)	29 (19.9)		
Have you ever heard of a Pap smear?				
No	215 (100)	0 (0.0)	25.13	< 0.001
Yes	235 (89)	29 (11)		
Do you or a relative have cervical cancer?				
No	432 (93.9)	28 (6.1)	0.02	0.882
Yes	18 (94.7)	1 (5.3)		
Have you ever been vaccinated with the HPV vaccine?				
No	445 (94.9)	5 (5.1)	34.67	< 0.001
Yes	5 (50)	5 (50)		
Have you ever had a Pap smear?				
No	429 (93.7)	29 (6.3)	1.41	0.234
Yes	21 (100)	0 (0.0)		

Table 7. Relationship between participants' attitude and their demographics, husband's, mother's, and father's education, previous hearing about cervical cancer, HPV and its vaccine, Pap smear and their related practice

Variable	Attitude towards HPV vaccine		X ²	p-value
	Accept No. (%)	Don't accept No. (%)		
Age/years				
18-21	147 (64.5)	81 (35.5)	12.31	< 0.001
22-25	198 (78.9)	53 (21.1)		
Nationality			0.97	0.324
Saudi	323 (72.6)	122 (27.4)		
Non-Saudi	22 (64.7)	12 (35.3)		
Specialty			14.21	< 0.001
Medical	200 (79.4)	52 (20.6)		
Non-medical	145 (63.9)	82 (36.1)		
Marital status			0.08	0.766
Single	303 (71.8)	119 (28.2)		
Married	42 (73.7)	15 (26.3)		
If married (No.:57), what is your husband's educational level?			0.7	0.871
Bachelor	23 (69.7)	10 (30.3)		
Secondary or less	15 (78.9)	4 (21.1)		
Postgraduate education	4 (80)	1 (20)		
Residence			0.29	0.589
Rural	45 (69.2)	20 (30.8)		
Urban	300 (72.5)	114 (27.5)		
Monthly income / SR			5.87	0.118
<5,000	97 (70.8)	40 (29.2)		
5,000-10,000	60 (63.2)	35 (36.8)		
10,000-15,000	84 (75.7)	27 (24.3)		
>15,000	104 (76.5)	32 (23.5)		
Mother's education			0.03	0.983
Bachelor	155 (72.4)	59 (27.6)		
Secondary or less	177 (71.7)	70 (28.3)		
Postgraduate education	13 (72.2)	5 (27.8)		
Father's education			0.55	0.757
Bachelor	141 (73.4)	51 (26.6)		
Secondary or less	175 (70.6)	73 (29.4)		
Postgraduate education	29 (74.4)	10 (25.6)		
Have you ever heard of cervical cancer?			7.74	0.005
No	65 (61.3)	41 (38.7)		
Yes	280 (75.1)	93 (24.9)		
Have you ever heard of HPV?			18.13	< 0.001
No	184 (64.8)	100 (35.2)		
Yes	161 (82.6)	34 (17.4)		
Have you ever heard of the HPV vaccine?			21.24	< 0.001
No	219 (65.8)	114 (34.2)		
Yes	126 (86.3)	20 (13.7)		
Have you ever heard of a Pap smear?			30.2	< 0.001
No	128 (59.5)	87 (40.5)		
Yes	217 (82.2)	47 (17.8)		

Do you or a relative have cervical cancer?				
No	327 (71.1)	133 (28.9)	5.06	0.024
Yes	18 (94.7)	1 (5.3)		
Have you ever been vaccinated with the HPV vaccine?			1.63	0.201
No	336 (71.6)	133 (28.4)		
Yes	9 (90)	1 (10)		
Have you ever had a Pap smear?			5.06	0.024
No	327 (71.1)	133 (28.9)		
Yes	18 (94.7)	1 (5.3)		

Awareness About Cervical Cancer, HPV and Vaccine, and Pap Smear

This research aimed to assess female students' awareness of cervical cancer, HPV and their attitude towards the HPV vaccine and Pap smear screening at Umm Al-Qura University, Saudi Arabia.

In this study, we found 86.4% of the participants heard about cervical cancer, 40.7% heard about HPV, 30.5% heard about its vaccine, and 55.1% heard about Pap smear. These percentages are somewhat consistent with that observed in the previous two studies [17]. Yacouti *et al.* [18] conducted a study in Morocco among university female students, they found 81.9% heard about cervical cancer, 14.7 % heard about HPV, and 7.8 % heard about the vaccine. While in another study done on Saudi women in the Qassim region by Al Nafisah *et al.* they reported 70 % heard about cervical cancer and 7.2 % heard about HPV [19]. The high figures in our study could be explained by the large percentage of participants with a bachelor's degree in education (58%).

Sources of Information About Cancer Cervix

The most common source of information about cervical cancer was the media and blogs (58.7%), while it was the health professionals for HPV. In a study conducted among health profession students at King Saud Bin Abdulaziz University for Health Science by Aga *et al.* [20], they found that hospital is the most common source of knowledge regarding HPV.

Knowledge About Cervical Cancer and Human Papilloma Virus (HPV)

In the current study, 59.7% of the participants agreed that cervical cancer can be prevented [21]. Aga *et al.* reported a similar finding in a study conducted among King Saud Bin Abdulaziz University students, in Jeddah, Saudi Arabia [20].

Most of the participants answered that the mode of transmission of HPV is direct transmission (47%). But only 7.1% knew the appropriate time to start the screening program. On the other hand, the percentage of correct answers about the frequency and timing to stop screening was low. The poor knowledge regarding this issue was also reported in a previous Saudi study done by Al-Shaikh *et al.*

on 1400 students in Health Colleges at Princess Nora Bint Abdul Rahman University, Riyadh [7]. The study found that 95.7% of students had a poor level of knowledge, Pap smear was poorly recognized as a screening tool, with 46.7% of the students hearing about the test [7]. The absence of a national screening program or public education efforts could explain this poor knowledge among Saudi women.

In the present study, the knowledge about the appropriate age for the HPV vaccine and the doses was poorly recognized. A similar finding was reported by Alsous *et al.* in this cross-sectional study conducted in Jordan, Qatar, UAE, and Iraq, it found that participants from all four nations had low levels of awareness and knowledge regarding HPV and its vaccine, but individuals from the UAE had substantially higher levels of awareness and knowledge [22]. This poor knowledge can be related to the lack of an organized cervical cancer screening program, which could involve raising awareness through the media and enticing women to get a Pap smear [23]. The Pap smear test was supported by the majority of Saudi Arabia [7].

Attitude Towards HPV Vaccine and Pap Smear

We found that most of the participants in this study were willing to receive the HPV vaccine, indicating a high degree of awareness about the HPV vaccine and its importance. This was mostly a result of the free and easy availability of the vaccine. A similar finding was reported by Malibari *et al.* [24], Saudi Arabia- 2018. He found in his study that the majority of women accepted the vaccine and wanted their daughters to be vaccinated as well.

We found that the most common barrier to taking the vaccine was that they never heard about it. This was consistent with a previous study done by Jradi *et al.* [3], which showed that lack of information regarding the HPV vaccine was an influential factor for vaccine rejection. A strong correlation was found between awareness of the HPV vaccine and getting the vaccine in the future. This finding was also revealed in the previous study done in Morocco by Yacouti *et al.* [18].

Many studies have shown numerous obstacles that stop students from receiving the HPV vaccine. For instance, a study done by Azer *et al.* 2022 highlighted that the main barrier that prevent students from receiving the HPV vaccination was its unavailability in the country [25]. Additionally, Altamimi *et al.* 2020 and Al-Shaikh *et al.* 2014 both reported that the main reasons were being worried about the vaccine's adverse effects and its safety [7, 9].

On the other hand, most of the participants also accepted doing Pap smears after marriage for early diagnosis. This matches the findings of Yacouti *et al.* [18]. Who found that more participants were willing to have a Pap smear test in the future than those who were not. For those who refused the Pap smear, the most common causes were not seeing a reason for the screening test and feeling uncomfortable with a pelvic exam [26]. This result reflects a lack of knowledge regarding Pap smear as a crucial cervical cancer screening test [27].

The present study revealed that participants with ages ranging from 22-25 years and studying in health / medical colleges had a significantly higher percentage of knowledge about cervical cancer [28]. This result was also revealed in a Polish study done by Osowiecka *et al.* [29]. In that study, it was attributed to the material that has been delivered to them during their study in the medical school. These materials could familiarize them with the knowledge of cervical cancer. A different result was observed in a Saudi study done on students at the College of Medicine, King Faisal University, Al-Ahsa, KSA by Al-darwish *et al.* were the study highlighted a lack of knowledge regarding early signs and symptoms, risk factors, and prevention of cervical cancer [30].

Participants who previously heard about cervical cancer, PAP smear, HPV, and its vaccine had a significantly higher percentage of those who had a good level of knowledge in comparison to participants who did not hear [31]. The current study found that 85% have heard about HPV which is considered relatively a high figure compared to other studies done in the Middle East. One of these studies was done in the Emirates by Ortashi O *et al.* where only 30% of the participants have heard about HPV [4].

Rančić *et al.* conducted a study in Serbia, they found that among the studied 1616 first-year female college students at the University of Niš, they found 67% had previously heard about HPV [8]. This could be attributed to the sample chosen in the current study, where 58% had a bachelor's degree in education and 52% had a medical/health college student. This could raise their knowledge of HPV as they will study it as a part of their curriculum. However Medical and non-medical students reported a low level of knowledge regarding cervical cancer, HPV, and its vaccine [32]. This could be due to the absence of a vaccine program and a lack of awareness campaigns.

Other studies reported a similar finding as Alsous *et al.* [22] as there was a lack of public education campaigns regarding the HPV virus coupled with the absence of the HPV vaccination from the national immunization schedule in three of the participating countries (i.e., Jordan, Qatar, and Iraq). The same was reported by Al-Shaikh *et al.* [7] in Saudi Arabia in a study that was conducted in 2014.

Participants who received the HPV vaccine in the present study had a significantly higher level of knowledge about cervical cancer compared to others. This result could be understandable hence the sample which was exposed to the HPV vaccines mostly had more knowledge about cervical cancer [33]. This sample may have been educated before and hence got the HPV vaccine. Overall, 94% of the sample who has a low level of knowledge did not get the HPV vaccine and this could be due to the absence of a vaccine program in Saudi Arabia till lately. This result was consistent with a recent study done by Yacouti *et al.* in 2022. In this study, it was reported that the participants with a better awareness of

cervical cancer and the HPV vaccine and who had the acceptability to Pap smear test had a significantly higher percentage of those who were willing to have the HPV vaccine [18].

The need to establish a sustainable awareness campaign concerning the prevention of cervical cancer with the involvement of Primary Health Care (PHC) settings was recommended in previous studies. These studies emphasize the importance of a nationwide population-based screening program across PHC centers [34].

Limitations

A limitation of this study was the usage of a self-reported questionnaire that could have a recall bias.

CONCLUSION

This study found a deficiency of knowledge about certain aspects related to cervical cancer, PAP smear, HPV, and its vaccine. This necessitates the implementation of health awareness campaigns with an emphasis on the importance of screening for cervical cancer and HPV vaccination. The role of medical professionals in this field should be reemphasized in educating the patients about the screening and HPV vaccine.

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