

RESEARCH ARTICLE

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Human Papillomavirus Vaccine Awareness and Acceptability for Primary Prevention of Cervical Cancer in Pakistan: A Cross-Sectional Study

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Abstract

Background: Human papillomavirus (HPV) vaccine is the most effective option for primary prevention HPV, a well-known cause of cervical cancer. The objective of the study was to assess awareness of HPV, the acceptability of its vaccine and factors associated with the acceptability among the adult population in Pakistan. **Materials and Methods:** A cross-sectional survey was conducted among adult population of Pakistan from January 2022 and March 2022. Due to the ongoing COVID-19 pandemic, instead of face-to-face interviews, a self-administered questionnaire was developed and distributed through Google Forms. The questionnaire was available in both English and Urdu languages to cater to a diverse population. **Results:** Overall, 313 (65.2 %) study participants had heard about HPV infection, while 297 (61.9%) knew HPV as the cause of genital warts and 256 (53.3 %) knew that HPV can cause any type of cancer, with a higher percentage of awareness among those who were in any health care setting compared to those who were in a non-healthcare setting. Regarding the acceptability to get HPV vaccine, 320 (66.7%) of the study participants were willing to get vaccinated, while only 15(3.1%) of the study population had previously received HPV vaccine. The most important factors associated with HPV vaccine acceptability were younger age of 18-25 years (Prevalence Ratio (PR)=1.60, 95% Confidence Interval (CI)=1.11, 2.32), and 26-35 years (PR= 1.65, 95% CI=1.09, 2.50). HPV vaccine acceptability was also associated with working in a healthcare setting due to better awareness of HPV vaccine (PR= 1.29, 95% CI=1.03, 1.62). **Conclusion:** It is important to address the knowledge gaps existing in the community about HPV vaccine acceptability and barriers against it for the successful rollout of the HPV vaccination program in Pakistan. Mass awareness campaigns about HPV, HPV vaccine, and cervical cancer are needed to increase the acceptability of HPV vaccine among public at the time of reintroducing HPV vaccine.

Keywords: Human Papillomavirus- HPV vaccine- knowledge- acceptability- cervical cancer

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Introduction

Human Papillomavirus (HPV) infection is the most common sexually transmitted infection worldwide, with a 50 percent chance of infection once in a lifetime among both males and females [1]. Approximately 218 different types of HPV have been currently identified as causing disease in humans, with the types, HPV 16 and 18 linked to most cervical cancer cases. Infection from both of these types is preventable by vaccination [2]. Despite the availability of a preventative vaccine, approximately 44,000 HPV-related cancers occur just in United States [3].

HPV vaccine is emerging as the most effective option for primary prevention against HPV and cervical cancer

in young females and other anogenital cancers in males too. With recent focus on availability of a single-dose HPV vaccine to increase compliance, one study showed sustained and strong immune response against HPV types 16 and 18 with a single dose of HPV vaccine. The vaccine effectiveness regardless of the number of doses administered was found to be between 83 and 96.1% [4]. In countries where there is no system for HPV screening and prevention, a single dose vaccine for HPV is a very reasonable solution to protect people from cervical cancer [5].

In 2018, WHO issued a global call to eliminate cervical cancer, which was identified as a public health problem [6]. According to a study that modelled various countries, it

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is possible to eliminate cervical cancer worldwide by vaccinating only girls with a highly effective 9-valent HPV vaccine at a coverage rate of 80-100% coupled with twice-lifetime screening for HPV [7]. Countries such as Haiti and Italy introduced school-based programs for immunization against HPV that were well-received and resulted in high coverage [8, 9]. Australia introduced its National human papillomavirus vaccination program in 2007, which has one of the highest observed uptake rates worldwide [10]. Now, with the continued high coverage among both females and males due to the gender-neutral program, Australia is moving towards elimination of vaccine-covered HPV disease [11].

In Pakistan, the lower prevalence of sexually transmitted infections [12] including HPV was attributed to the religiously conservative cultural norms, as a high prevalence of STIs was reported only in female sex worker [12]. However, recent changes have been observed in sexual behaviours including an increase in premarital sexual activity which could increase the risk of HPV infection and associated risk of cervical and other malignancies [13]. This is reflected in the fact that a high incidence of HPV infection was reported in women with precancerous lesions of the cervix in married Pakistani women in a study conducted in 2015 [14]. In addition, there have been a very limited number of studies or government-led campaigns in Pakistan to assess the vaccination rate against HPV [15].

A previous study conducted in Pakistan in 2019 showed that only 51.3 percent of the females interviewed had heard the term “cervical cancer”. Among those who had heard of cervical cancer and were further interviewed 64 % had poor knowledge with only 40.2 % being aware of the HPV vaccine [16]. Another study conducted in 2019 on a younger university-attending population found that only 4.5% of the participants had been vaccinated against HPV even though most of these participants were studying medicine [15].

The HPV vaccine was introduced and rolled out in 2019 in Pakistan as a part of the Expanded Program on Immunization (EPI). The vaccine was initially introduced for girls aged 9 to 14 years. However, currently, there is no HPV vaccine available or any HPV vaccination program [17]. Pakistan needs to reintroduce the HPV vaccine, preferably at national level, utilizing routine immunization delivery strategy. However, before the vaccine rollout, it is important to assess awareness and acceptability of HPV vaccine program among general population. Therefore, the main objective of this study was to assess awareness of HPV, and acceptability of Human Papillomavirus Vaccine among adult population in Pakistan. The secondary objective was to assess the factors associated with acceptability of HPV Vaccine.

Materials and Methods

A cross-sectional study was conducted in Pakistan, among the adult population (18 years of age and older) between January 27th, 2022 and March 15th, 2022. Questionnaire was adapted according to our local context from two different validated questionnaires

after an extensive literature review of the knowledge, attitude, perception, acceptability, and behaviour regarding the HPV vaccines. The vaccination & Hpv Knowledge (THink) questionnaire, and another validated questionnaire from China were used to formulate our questionnaire [18, 19]. The final questionnaire had 4 main sections: socio-demographics, knowledge and awareness about HPV infection and cervical cancer, knowledge and awareness about HPV vaccine, and acceptability of HPV Vaccine (Additional Files 1 and 2).

The first section of socio demographics, asked for factors that helped us to identify the demographical details of the respondents. These included age, gender, ethnicity, level of education, marital status, number of children, household income and employment status. Their willingness to get vaccinated was also assessed. This information also helped us identify the subset of the population that our data represented.

The next section asked respondents about their knowledge about HPV infection and cervical cancer. It assessed their knowledge on the association of HPV and cervical cancer and about the prevention of cervical cancer.

The third section assessed the knowledge of the participants regarding HPV vaccine. It assessed whether they had ever heard of vaccination against HPV, the timing when the vaccine needs to be administered, knowledge about its availability in Pakistan and if it causes any side effects. The last section assessed the acceptability of respondents with regards to the HPV vaccine. It assessed if they have been vaccinated, if they would be willing to get their current or future daughters vaccinated and explored the barriers to vaccination that the respondents faced.

Data was collected by circulating an online self-administered Google Form. Communication was multifaceted, involving emails to potential participants from institutions and collaborations, and social media posts. We ensured accessibility through a dedicated website, and prominent social media sharing. As of July 2021; the percentage of internet users in Pakistan is 54%(118 million) citizens having access to internet, out of which 66% of internet users belong to urban areas while 47% belong to rural [20]. The random distribution of the forms was aimed to reduce bias in the results. The questionnaire was distributed to a variety of groups that included adults >18 years of age, belonging to both healthcare setting as well as non-healthcare setting, in order to receive a diverse set of data. This comprehensive approach aimed to reach a diverse audience, contributing to the robustness of our conclusions. Informed consent was given by the participants after they chose their preferred language of either English or Urdu.

Our primary outcome variable was the acceptability of the HPV vaccine among the participants. Our independent variables were the demographical variables of the participants.

The sample size, using OpenEpi version 3.0, was calculated to be 384 with a 95 % confidence interval, a power of 80%, and 50% prevalence of awareness and acceptability of HPV in the population. Statistical Analysis: Descriptive statistics were reported using mean (\pm standard deviation (SD)) for continuous variables

and counts(percentages) for categorical variables. The participants were stratified into different groups based on age, gender, ethnicity, level of education, marital status, number of children, having daughters or not, income and employment status. Univariate and multivariate analysis was done to account for confounding factors. Factors associated with willingness to get HPV vaccine were calculated using Prevalence Ratio (PR) with 95% Confidence Interval (CI). The data was analyzed using IBM Statistical Package for Social Sciences (SPSS) version 25.0. The study was conducted after approval by the Ethical Review Committee (ERC) of Aga Khan University (AKU) Karachi, Pakistan (ERC # 7124).

Results

A total of 480 participants were included in final analysis. Our results showed that the mean age of the respondents was 27.4 (\pm 10.7) (Table 1). Of the 480 study participants, 110 (22.9%) were male, and 367 (76.5%) were female. Among the respondents, 179 (37.3%) belonged to Urdu-Speaking and 184 (38.3%) to Punjabi ethnicities. Most of the respondents were unmarried with 343 (71.8%) in this category and 367 (76.5%) had no children. All our respondents had a level of education of undergraduate or higher with most of them belonging to the high monthly household income category. Only 320 (66.7%) were willing to get themselves vaccinated (Table 1).

Among the participants, 313 (65.2 %) had heard about HPV infection, 297 (61.9%) knew that HPV causes genital warts, and 256 (53.3 %) knew that HPV can cause any type of cancer, with a higher percentage of awareness among those who were in any healthcare setting vs non-healthcare setting. Only 285 (59.4 %) had heard about cervical cancer screening tests (Table 2).

Table 3 shows that only 259 (54.0 %) of the respondents knew that an HPV vaccine existed to prevent cervical cancer. Out of all respondents, 261 (54.4 %) were aware of HPV vaccine for primary prevention of cervical cancer. Moreover, 260 (54.2%) of respondents were aware that both males and females should receive HPV vaccination, with a higher percentage of awareness among respondents in any healthcare setting. Only 15 (3.1%) had received HPV vaccine. The role of advice about HPV vaccine by doctors, parents and friends is shown in Figure 1.

The most common reason cited by individuals for non-acceptability of the HPV vaccine was lack of information. This was the barrier to getting vaccinated in 278 (58%) respondents. Around 110 (23 %) respondents were worried about the safety profile of the vaccine, 38 (8%) thought their daughter was too young to get cervical cancer, 29 (6%) respondents thought the vaccine would promote promiscuity, and 24 (5%) thought that the vaccine would be too expensive (data not shown).

In univariate analysis, acceptability to get HPV vaccine was higher among younger age groups, unmarried, employed, students, those who were in any health care setting and those who had awareness about HPV. Those who knew about HPV had higher acceptability for the

vaccine. Multivariate analysis showed that there was a statistically significant association of acceptability to get HPV vaccine with younger age groups of 18-25 years (adjusted PR= 1.60, 95% CI=1.11, 2.32) and 25-35 years (adjusted PR=1.65, 95% CI=1.09, 2.50). There was also a statistically significant association between working in

Table 1. Characteristics of the Study Participants (n= 480)

Characteristics	(n= 480)	(%)
Age Categories (years)		
18-25	305	63.5
26-35	93	19.4
>35	82	17.1
Gender		
Male	110	22.9
Female	367	76.5
Prefer not to answer	3	0.6
Ethnicity		
Urdu	179	37.3
Punjabi	184	38.3
Sindhi	35	7.3
Pathan	25	5.2
Others	57	11.9
Level of Education		
High School till bachelors	306	63.7
Graduate and above	174	36.3
Marital Status		
Unmarried/divorced	343	71.8
Married	135	28.2
Number of Children		
None	367	76.5
1	37	7.7
1-2	65	13.5
>4	11	2.3
Having daughters		
No	395	82.3
Yes	85	17.7
Approximate monthly household income (PKR)		
<50,000	111	23.1
50,000 – 99,999	91	19
100,000 – 200,000	97	20.2
>200,000	181	37.7
Current employment status		
Unemployed/Housewife	120	25
Student	226	47.1
Employed/self-employed/others	134	27.9
Healthcare worker or working in a healthcare setting		
Yes	231	48.1
No	249	51.9
Willing to get HPV vaccine		
Yes	320	66.7
No	160	33.3

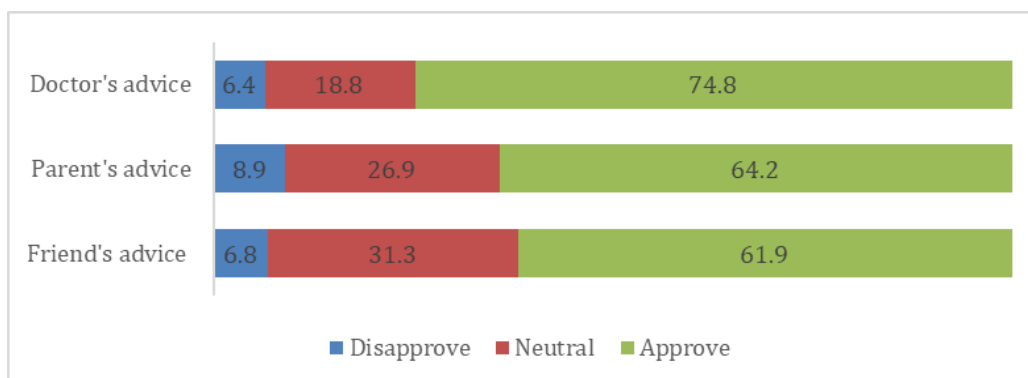


Figure 1. Role of Recommendation for HPV Vaccine by Friend, Parent and Doctor

a health care setting that included medical students and employees with HPV vaccine acceptability (adjusted PR= 1.29, 95% CI=1.03, 1.62) (Table 4).

Discussion

This study provides important insights into HPV vaccine awareness and acceptability among adult

Table 2. Awareness about HPV infection, and cervical cancer among adult population of Pakistan

	Health care setting		Non-healthcare setting		Overall		p-value
	n	%	n	%	n	%	
Have you ever heard of Human Papillomavirus (HPV)?							<0.001
Yes	205	88.70	108	43.40	313	65.20	
No	26	11.30	141	56.60	167	34.80	
Can HPV infect both men and women?							<0.001
Yes	205	88.70	152	61.00	357	74.40	
No	4	1.70	7	2.80	11	2.30	
Not sure	22	9.50	90	36.10	112	23.30	
Can an HPV infection occur without symptoms?							<0.001
Yes	154	66.70	64	25.70	218	45.40	
No	20	8.70	39	15.70	59	12.30	
Not sure	57	24.70	146	58.60	203	42.30	
Does HPV cause genital warts/lesions?							<0.001
Yes	193	83.50	104	41.80	297	61.90	
No	5	2.20	5	2.00	10	2.10	
Not sure	33	14.30	140	56.20	173	36.00	
Ever heard about any relation between HPV and any type of cancer?							<0.001
Yes	186	80.50	70	28.10	256	53.30	
No	17	7.40	95	38.20	112	23.30	
Not sure	28	12.10	84	33.70	112	23.30	
Does HPV usually go away without treatment?							0.004
Yes	53	22.90	20	8.00	73	15.20	
No	118	51.10	99	39.80	217	45.20	
Not sure	60	26.00	130	52.20	190	39.60	
Can the cancer of the neck of the womb (cervical cancer) be prevented?							<0.001
Yes	189	81.80	101	40.60	290	60.40	
No	6	2.60	13	5.20	19	4.00	
Not sure	36	15.60	135	54.20	171	35.60	
Does cervical cancer have a screening test?							0.09
Yes	185	80.10	100	40.20	285	59.40	
No	4	1.70	7	2.80	11	2.30	
Not sure	42	18.20	142	57.00	184	38.30	

Table 3. Factors Associated with Acceptability for HPV Vaccine among Adult Population of Pakistan

	Willing		Non willing		All		0.005
	n	%	n	%	n	%	
Ever heard about HPV vaccine (vaccination and prevention against HPV infection)?							
Yes	187	58.40	72	45.00	259	54.00	
No	133	41.60	88	55.00	221	46.00	
Does the HPV vaccine prevent cervical cancer?							
Yes	192	60.00	69	43.10	261	54.40	0.002
No	8	2.50	6	3.80	14	2.90	
Not sure	120	37.50	85	53.10	205	42.70	
Do you know who should get HPV vaccine?							
Males	2	0.60	0	0.00	2	0.40	<0.001
Females	56	17.50	20	12.50	76	15.80	
Both males and females	194	60.60	66	41.30	260	54.20	
I do not know	64	20.00	70	43.80	134	27.90	
There is no vaccine that prevents HPV	4	1.30	4	2.50	8	1.70	
Once vaccinated, women no longer have to be screened for cervical cancer.' Do you agree with this statement?							
Yes	18	5.60	8	5.00	26	5.40	<0.001
No	218	68.10	78	48.80	296	61.70	
Not sure	84	26.30	74	46.30	158	32.90	
Do you know if the HPV vaccine is available in Pakistan?							
Yes	81	25.30	33	20.60	114	23.80	0.317
No	64	20.00	28	17.50	92	19.20	
Not sure	175	54.70	99	61.90	274	57.10	
Can the HPV vaccine cause side effects?							
Yes	68	21.30	29	18.10	97	20.20	0.432
No	49	15.30	20	12.50	69	14.40	
Not sure	203	63.40	111	69.40	314	65.40	
Have you been vaccinated against HPV?							
Yes	7	2.20	8	5.00	15	3.10	0.99
No	313	97.80	152	95.00	465	96.90	

population of Pakistan. To the best of our knowledge, this is the first study of its kind targeting both adult males and females and a diverse group of people in Pakistan working in both healthcare and non-healthcare setting. Previously, studies in Pakistan have been conducted among university students [21] and adult females [22]. Our study demonstrated gaps in HPV and its vaccine awareness among the study respondents.

With the HPV vaccine being recommended for school-going children, it is essential that the public, especially parents, are educated regarding the vaccine and their reservations regarding the vaccine are addressed to increase vaccine uptake. A study conducted in India showed low acceptability with 63.1% of the study population willing to vaccinate their daughters and an even lower percentage willing to vaccinate themselves [23]. Apart from increasing awareness about HPV vaccine, role of healthcare professionals' recommendations is important in increasing acceptability of the vaccine [24]. It is important to highlight the role of awareness campaigns in general, especially the role of physicians including both obstetricians and paediatricians in educating public and

parents to vaccinate their children against HPV.

Interestingly, according to our study, the acceptability to get the HPV vaccine was higher in Pakistan compared to other Muslim countries. 66.7% of the participants in our study intended to get vaccinated compared to 48.9% of people in Saudi Arabia [25]. Our study results are similar to the other studies reporting lack of awareness as the leading reason to refuse HPV vaccination [26-29]. We also found a significant association between younger age and health care setting as factors with higher acceptability to get HPV vaccine. Similar to our study results, a study in China reported the most important factor associated with willingness to get vaccinated among younger age group of Chinese population was education and awareness about HPV and HPV vaccines [30]. Similarly, another study also reports that HPV vaccine acceptability was higher among younger individuals compared to older individuals and younger parents were more likely to vaccinate their adolescents compared to older parents [31, 32].

Better communication of evidence about HPV vaccine is important to address the problem of anti-vaccination campaigns in many countries including Pakistan [33].

Table 4. Factors associated with Acceptability for HPV Vaccine among Adult Population of Pakistan.

Characteristics	Crude PR (95% CI)	Adjusted PR (95% CI)
Age		
18-25	1.74 (1.21, 2.50)	1.60 (1.11, 2.32)
26-35	1.71 (1.13, 2.59)	1.65 (1.09, 2.50)
>35	(Ref)	(Ref)
Education level		
Matric & Bachelors	0.79 (0.631, 1.01)	
Graduate and above	Ref	
Ethnicity		
Urdu	1.04 (0.71, 1.53)	
Punjabi	1.18 (0.81, 1.73)	
Sindhi	1.15 (0.68, 1.94)	
Pathan	1.40 (0.82, 2.43)	
Others	Ref	
Marital status		
Single	1.45 (1.11, 1.90)	
Married	Ref	
Having daughters		
No	1.42 (1.03, 1.97)	
Yes	Ref	
Employment		
Employed/self-employed/ others	1.08 (0.79, 1.50)	
Student	1.36 (1.04, 1.78)	
Unemployed/Housewife	Ref	
Working in a healthcare setting		
Yes	1.37 (1.10, 1.71)	1.29 (1.03, 1.62)
No	Ref	Ref
Ever heard of Human Papillomavirus (HPV)		
Yes	1.34 (1.05, 1.71)	
No	Ref	

However, after the success of COVID-19 vaccination in Pakistan, it can be anticipated that proper information about HPV vaccine will help in boosting the acceptability of HPV vaccination among our population. Before the initiation of the program, it is vital to increase awareness about HPV and its vaccine and address the barriers against it to bridge the knowledge gaps existing in the community, especially among parents.

An important strength of the study is that the study population included both males and females of diverse backgrounds from various ethnicities and cities around the country to get a more generalizable assessment of the acceptability of the HPV vaccine among the Pakistani population. Another strength was the use of a comprehensive questionnaire, administered in both English and Urdu languages (Additional Files 1 and 2), and the compilation of the responses revealed an almost equal distribution of participants among different groups. We were able to collect detailed demographics to analyze diversity, with people from both health care setting and non-health care setting. While our study made rigorous efforts to engage diverse participants, it's important to acknowledge a potential limitation of using Google

Forms for data collection, considering that over 50% of Pakistan's population has internet access. However, it might have excluded those less familiar with the internet and those who are not literate. Despite our efforts to enhance inclusivity through email outreach and social media sharing, future research should explore methods to encompass a wider range of perspectives to include people with lower literacy levels because another reason for lower rates of acceptability in this population sub-set is sub-optimal communication regarding HPV risk and vaccine awareness [33]

Currently, the unavailability of the vaccine remains a major barrier to initiating HPV vaccination programs. That is the reason that the vaccination rate in our study population was found to be merely 3.1%. It would be a loss if Pakistan missed the opportunity to prevent cervical cancer solely because of a lack of awareness about the HPV vaccine and its unavailability. We hope that the study findings will help promote the HPV vaccination drive in Sindh and throughout the country and address the identified barriers.

We recommend the dissemination of detailed information about HPV, cervical cancer, and its vaccine for primary prevention of HPV in institutions and through social media including radio, and television. Healthcare workers, particularly paediatricians and gynaecologists also have a major role to play in spreading this information. We also suggest that there should be indiscriminate administration of the vaccine to both sexes especially young girls before exposure to HPV infection, preferably as part of the national immunization program.

In conclusion, HPV is the most common sexually transmitted infection, with the HPV vaccine as the most effective option for the primary prevention of cervical cancer. Improving and increasing knowledge about HPV, cervical cancer, its prevalence, and its consequences is essential for the public to understand the importance of primary prevention of HPV via vaccination.

Author Contribution Statement

US is the principal study investigator of the survey, responsible for supervising the data collection, analysis, and interpretation of findings. She also edited, proofread, and approved the final manuscript. AJ, FZ, EH, and FG also helped edit the final manuscript. AJ organized data acquisition, assisted in data interpretation, revised the article critically for important intellectual content, and approved the final manuscript. FZ, MM, and FG led the data analysis and helped draft the manuscript's results section. IA and MS contributed to drafting the discussion section of the manuscript. WB was responsible for the initial conception of the study idea and contributed to drafting the introduction section of the manuscript with EH. EH, AS, and SS also contributed to the final manuscript. All authors participated in the study design, data collection, and final approval of the version to be published. All authors read and approved the final manuscript.

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Study Approval

The study was approved by the Ethical Research Committee of Aga Khan University (ERC #7124)

Conflict of interest

The authors declare that they have no conflict of interest.

Ethics approval and consent to participate

The ethical approval was obtained by the Ethical Review Committees (ERC) of Aga Khan University Hospital (AKUH). Informed consent was given by all the participants through the google form after they chose their preferred language of either English or Urdu.

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