https://doi.org/10.48047/AFJBS.6.7.2024.4207-4221

African Journal of Biological Sciences

Journal homepage: http://www.afjbs.com

Research Paper Open Access

Assessing Knowledge, Attitudes, and Parental Acceptability of the HPV Vaccine in Saudi Arabia: A Cross-Sectional Study.

Amal Murad, Eman Elsabbagh, Mark Y Roque, Laila Habiballah

Maternity and Childhood Department, College of Nursing, Taibah University, Al Madinah, Saudi Arabia

Corresponding author: Dr Amal Murad.

Email: amurad@taibahu.edu.sa

Article History

Volume 6, **Issue** 7, 2024

Received: 05 July 2024

Accepted: 01 August 2024

Published: 05 August 2024

doi: *10.48047/AFJBS.6.7.2024.4207-4221*

Abstract:

Background: Human papillomavirus (HPV) is a common sexually transmitted infection (STD) among young women, which is linked to a higher risk of cervical cancer. Cervical cancer incidence can be decreased by effective HPV vaccination and screening. **Methods**: A cross-sectional study was implemented using an Arabic-language questionnaire that was administered electronically to parents of girl's middle school students in AL Madinah AL Munawara from April to August 2023. The t-test and ANOVA test were used to analyze the collected data. **Results**: There were of 229 participants in this study; The findings showed that the level of parents' knowledge about this virus was 42%; (37%) knew that HPV is an STD, 64% knew that HPV and cervical cancer are related, 63% were against their daughter getting the HPV vaccination. Furthermore, two-thirds of participants were concerned about the effectiveness of this vaccine, and 57% of them refused HPV vaccination due to moral or religious beliefs. The findings indicated also that parents' knowledge and acceptability of the HPV vaccine varied, with mothers being more knowledgeable than dads but fathers being more accepting of it. **Conclusion**: The results indicate insufficient knowledge about HPV infection, negative attitudes toward and limited acceptance of the HPV vaccination among parents of girls attending middle schools.

Keywords: knowledge, cervical cancer, human papillomavirus vaccine. Saudi Arabia, infection.

1. Introduction

One sexually transmitted infection is the human papillomavirus (HPV). It is a double-stranded DNA virus that is minuscule and non-enveloped [1] .Basal epithelial cells lining the inner surface of the cervix, pharynx, anus, penis, vagina, and vulva are among several sites in the human body that are infected by this virus: low-risk types, such as types 6 and 11,which cause clinical lesions in the form of warts rather than malignancy, and high-risk types, such as types 16 and 18, which cause about 70% of cervical cancer and high-risk types that cause some malignant diseases [2].

At the global level, uterine cancer ranks second in terms of prevalence[3]. Every year in Saudi Arabia, 358 women are received with cervical cancer, and 179 of them lose their lives to the illness[4]. Furthermore, the World Health Organization estimates that 6.51 million women in Saudi Arabia who are 15 years of age or older are at risk of having cervical cancer [5]. As a result, some research suggested that Saudi Arabia should offer immunizations against this virus and raise public awareness of it [6].

Since 2006, some countries such as the United States, have focused on HPV vaccination, which has raised the prevention rate to 88% among teenage girls and 81% among women[2] . Therefore, Saudi Arabia applied this vaccine to females aged (11 to 26 years) [7, 8] and despite the adoption of this preventive step in the 2010 national immunization schedule [9], the effectiveness of this vaccination is still not well understood [7, 10, 11]**.** Despite the fact that HPV vaccines have been demonstrated to be safe and efficient in preventing genital warts and cervical cancer[12, 13]**,** public awareness of the virus and vaccine acceptance are reported to be low in different countries around the world [14, 15]**.** Saudi Arabia is not an exception in this regard: of 325 female participants in the research, only 34.5% were aware of HPV infection, 27.4% knew how it relates to cervical cancer, and 32.3% did not know about the vaccination, except the 35.7% who chose not to take it [8]. The similar absence of immunization among girls in elementary school (2.5%), according to another study conducted in Lebanon, was ascribed to the mothers' ignorance of the advantages of HPV vaccine [16]**.**

By 2030, the World Health Organization will vaccinate 90% of Saudi girls over the age of 15 Error! Bookmark not defined., so the Ministries of Health and Education cooperated in late 2022 to launch a campaign aimed at educating parents of female middle school students about HPV as an initial step before administering the vaccine [9]**.**

As parents choose whether or not to vaccinate their daughters against this virus, the preceding information indicates that, despite the Kingdom's best efforts, the social and cultural makeup of Saudi society and parents themselves provide a barrier to the prevention of this virus. Thus, the purpose of this study was to assess parents' acceptance, attitudes, and knowledge about the HPV vaccination. Due to the fact that the World Health Organization specifically will target female middle school in 2030, were also singled out them in this research., **Hence, the objectives of this research are:**

- Identifying the extent of the spread of the HPV vaccine among middle school females.
- Assess the present state of parents' attitude and knowledge on HPV as well as their level of acceptance of the HPV vaccine.
- Examining differences in parental knowledge and acceptance according to demographic characteristics.

1. Materials and Methods

1.1.Study design

A questionnaire was distributed to a number of parents of Saudi Arabian middle school girls in order to conduct cross-sectional study to verify the following hypotheses:

- **H1:** There is difference in the degree of parents' knowledge of the HPV according to demographic variables.
- **H2:** There is difference in the degree of parents' acceptance of the HPV vaccine according to demographic variables.

1.2.Sample and Setting

The participants in this study were parents of middle school girls aged 13–15 years in AL Madinah , Saudi Arabia, and was conducted between April and August 2023.

A convenient sampling method was utilized in the study. Parents of second grades girls' students were chosen as the target group. Using a Rao-soft online calculator, with a margin of error taken as 5%, and a 95% level of confidence. According to the report of the Director of the Education Department in AL Madinah , the total target population size was 588 students, taken from 14 classes of Grade 2 students (each class had approximately 42 students). Of the 233 parents of these students, 229 were recruited and completed the questionnaire, representing 42% of the total parent population proportion of the study.

1.3.Measurements

A validated Arabic questionnaire, consisting of four sections, was utilized:

- **Part I: Socio-demographic variables –** including age, gender, educational level, social status, occupation, and place of residence.
- **Part II: Knowledge about HPV vaccine** – consisting of seven questions, a correct response scored 1 point and 0 point for incorrect and not sure response. The proportion of correct scores was classified into three groups: high knowledge (score >70%), average knowledge (score 50–70%), and low knowledge (score <50%).
- **Part III: Attitude towards HPV vaccination –** consisting of four questions covering concerns about vaccination. Each item was evaluated using a Likert scale with three points. (1=agreement; 2=neutrality; 3=disagreement). A score ≥70.0% was categorized as indicating a positive attitude and a score ≤ 70.0% indicated a negative attitude.
- **Part IV: Acceptability of HPV vaccination –** consisting of eight questions covering agreeing to their children receiving the HPV vaccine. In addition to an additional **question** to measure the extent of the spread of the HPV vaccination dissemination among female middle school pupils in AL Madinah .

During the design of the tool, the study of (Darraj et al, 2022) [7] was relied upon with some modifications to include the Arab environment. The tool was presented to four experts in the field of maternal and neonatal health nursing at our institution to evaluate the validity of the tool. The stability of the tool was also evaluated by experimenting with 20 parent participants and using Cronbach's alpha coefficient to measure the degree of correlation between each element in tool. It was proven that the tool has a reliable stability coefficient (0.83).

1.4.Data collection procedure

Once the institutional ethical review committee approved the instruments, the research was coordinated with the principals of the selected middle school. A questionnaire in Arabic was disseminated using the Google Form® platform across the social media accounts of the parent groups. Additionally, a poster containing a QR code was displayed in the selected classrooms.

1.5.Data analysis and statistical tests

Statistical analysis was performed on the data using SPSS (version 25). Both descriptive statistics were used through numbers and percentages, in order to test the normal distribution of the data, we relied on the Kolmogorov-Smirnov test, which showed that the data followed the normal distribution. Then, we relied on parametric tests for inferential statistics, including the t-test and the ANOVA test, in order to measure the differences and variations in the degree of knowledge and acceptability attributed to demographic variables of the sample. The significance level was considered at ($P<0.05$).

2. Results

3.1. Distribution of socio-demographic characteristics of respondents (n= 229)

This study included 229 participants; 81.2% were mothers and 18.8% were fathers, and 52.4% of them were between the ages of (35-45) years, and (90.4%) of the participants were married.

Regarding educational level, most of the participants obtained a school certificate (38.9%), and among these participants (57.2%) are unemployed, and the majority of participants (47.2%) live in the Saudi Arabian Kingdom in the western region of AL Madinah as in table 1.

3.2.Knowledge of HPV

64% of participants knew that cervical cancer is caused by HPV, and 37% of people were aware that HPV is a prevalent STD, while only 6.1% of participants believed that preventing cancer The cervix begins to be vaccinated against the human papillomavirus, and 90.8% refuse it, which is a very large percentage, as shown in (Table 2).

Figure (1) illustrates that 64% of parents are aware that this virus causes cervical cancer, while only 6.1% of participants believe that prevention of this virus begins with receiving this vaccination and 90.8% refuse to receive the vaccination. This suggests that parents have very little understanding of the value of vaccinations.

3.3. Attitudes of HPV

Table (3) shows participants' attitudes towards HPV vaccination. A majority of the participants, namely 63%, held the view that females must receive the HPV vaccination in order to prevent genital warts and cervical cancer. Moreover, 52% of the respondents consider that HPV causes so few cancers in women that it is beneficial for them to be vaccinated. Nonetheless, 44% of respondents concurred that receiving an HPV vaccination is necessary to prevent the virus from spreading.

3.4. Acceptance of HPV

The replies from participants on their acceptability of the HPV vaccine are displayed in (Table 4). Of the participants, over half (55%) thought the vaccination was too new and had not been around long enough. Furthermore, 66% of respondents expressed anxiety regarding the effectiveness of the HPV vaccination, while 63% expressed concern regarding its safety. Moreover, 57% of respondents rejected HPV vaccination for moral or religious grounds, and around 33% of respondents were not aware that both men and women may receive the vaccine. About 29% of respondents knew about the HPV vaccine for men, and 51% felt more at ease giving it to women. However, 24% expressed worry about the vaccine's price.

This statistic summarizes the HPV vaccination prevalence among Medina's intermediate schoolgirls, with 63% of respondents stating that their daughter had not had the shot. Which is a percentage greater than half, and (26%) of the participants answered that their daughter received the vaccine, and (11%) of the participants preferred not to disclose that. Hence, these findings suggest that there was a low incidence of HPV vaccination among female middle school students in AL Madinah.

As shown in Figure 2, (63%) answered no, while (26%) of the participants answered yes, and this indicates that a large percentage of middle school female students did not receive the vaccination.

3.5. Differences in knowledge level and acceptability of HPV vaccination in relation to demographic characteristics (n=229)

T-test was used to identify differences in knowledge and acceptability regarding the gender of parents; The findings showed that there were significant differences between parents with moms being found to have greater knowledge about HPV than dads ($T = 1.29$; $P = 0.02$), as well as the presence of differences in the level of fathers' acceptance of the HPV vaccine in favor of fathers ($T = 2.607$; $P = 0.01$), where That ($P < 0.05$).

Table (5) also demonstrates that there were variations in the level of parental knowledge level favoring ages (> 45) (F = 1.303; P = 0.02); also, there were differences in parental HPV knowledge level favoring master's or PhD (F = 0.144; P = 0.01).
As for the acceptability of HPV vaccination, there were no statistically significant variations in the socio-demographic characteristics of the participants.

Table 1. Participants' sociodemographic characteristics (N=229)

All data are represented as numbers (N) and percentages (%).

Characteristic	N	%
Gender of parent		
Father	43	18.8
Mother	186	81.2
Age (years)		
< 25	10	4.4
25 – 35	24	10.5
35 – 45	120	52.4
> 45	75	32.7
Marital status		
Married	207	90.4
Divorced	10	4.4
Widowed	12	5.2
Educational Level		
School certificate	89	38.9
Diploma	71	31
Bachelor's degree	53	23.1
Master's or PhD	12	5.2
Other	4	1.8
Occupation		
Student	3	13
Working	82	35.8
Retired	13	5.7
Unemployed	131	57.2
Place of residence		
North of AL Madinah	60	26.2
South of AL Madinah	28	12.2
East of AL Madinah	33	14.4
West of AL Madinah	108	47.2
Total	229	100 %

Table 2. Participants' knowledge about HPV vaccine

Item	True		False		Not sure	
	N	%	N	%	N	%
Cervical cancer can be caused by HPV.	147	64	15	7	67	29
Women in their 30s are more likely to have HPV.	89	39	20	9	120	52
The majority of HPV-positive individuals suffer symptoms.	72	31	43	19	114	50
4. One sexually transmitted illness is HPV.	85	37	51	22	93	41
Genital warts are caused by the same strains of HPV that cause cervical cancer.	72	31	29	13	128	56
In order to avoid cervical cancer, women should get tested for HPV before starting an HPV vaccination.	110	48	34	15	85	37
HPV vaccination is the first step in the primary prevention of cervical cancer.	14	6.1	208	90.8	7	3.1

Table 3. Participants' attitudes towards HPV vaccination

Item	Agree		Disagree		Not sure	
	N	%	N	%	N	%
Females may need to have the HPV vaccination in order to prevent genital warts and cervical cancer.	145	63	15	7	69	30
HPV causes so few cancers in women that it is beneficial for them to be vaccinated.	118	52	26	11	85	37
It makes no sense to immunise females because there are other ways to control cervical cancer and warts.	120	52	24	10	85	37
It will be essential to get vaccinated against HPV to protect against transmission of the virus.	101	44	29	13	99	43

Table 4. Participants' acceptance of HPV vaccination

Item	Agree		Disagree		Not sure	
	N	%	N	%	n	%
I believe that the vaccine against HPV is very recent and has not been available long enough.	127	55	27	12	75	33
I have concerns Regarding the safety of the HPV vaccination.	144	63	30	13	55	24
The effectiveness of the HPV vaccination worries me.	151	66	27	12	51	22
I oppose HPV vaccination due to moral or religious convictions.	130	57	36	16	63	28
I'm not aware that both men and women may receive the vaccination.	75	33	43	19	111	48
The HPV vaccination for women interests me.	117	51	55	24	57	25
The male HPV vaccination is something that interests me.	66	29	73	32	90	39
The price of the HPV vaccine worries me.	56	24	104	45	69	31

Rate of vaccination against HPV among schoolgirls	Yes		No		I do not wish to answer	
	N	%	N	%	N	%
Did the student (your daughter) get the HPV vaccine?	60	26	144	63	25	11

Table 5: Differences in the degree of knowledge and acceptability of HPV vaccination with respect to demographic characteristics (N = 229), T = T – test value , F = ANOVA Value

Factor		knowledge				acceptability			
		Mean.	S.D.	T	P - Value	Mean.	S.D.	T	P - Value
parents	Father	2.12		1.29	0.02*	2.06	0.556	2.607	0.01*
	Mother	2.99				1.85	0.473		

Factor		knowledge				acceptability			
		Mean.	S.D.	F.	P - Value	Mean.	S.D.	F.	P - Value
Age	< 25	1.78	0.618	1.303	0.02*	1.73	0.446	0.388	0.762
	25 - 35	1.91	0.577			1.86	0.481		
	35 - 45	2.01	0.604			1.90	0.523		
	> 45	2.10	0.523			1.89	0.466		
Marital status	Married	2.05	0.574	2.188	0.114	1.90	0.503	1.106	0.333
	Divorced	1.86	0.543			1.86	0.291		
	Widowed	1.72	0.604			1.68	0.484		
Educational Level	School certificate	2.02	0.599	0.144	0.01*	1.85	0.503	0.472	0.756
	Diploma	2.02	0.520			1.94	0.466		
	Bachelor's degree	1.99	0.606			1.88	0.529		
	Master's or PhD	2.05	0.718			1.81	0.542		
	Other	1.20	0.416			2.00	0.306		
Occupation	Student	1.94	0.769	0.172	0.915	1.83	0.641	0.239	0.869
	Working	2.05	0.576			1.92	0.501		
	Retired	1.97	0.538			1.81	0.391		
	Unemployed	2.00	0.586			1.88	0.503		
Place of residence	North of AL Madinah	2.05	0.535	1.925	0.126	1.97	0.397	1.849	0.139
	South of AL Madinah	2.22	0.633			1.96	0.589		
	East of AL Madinah	1.88	0.562			1.95	0.515		
	West of AL Madinah	1.99	0.577			1.81	0.507		

***Statistically significant (P < 0.05).**

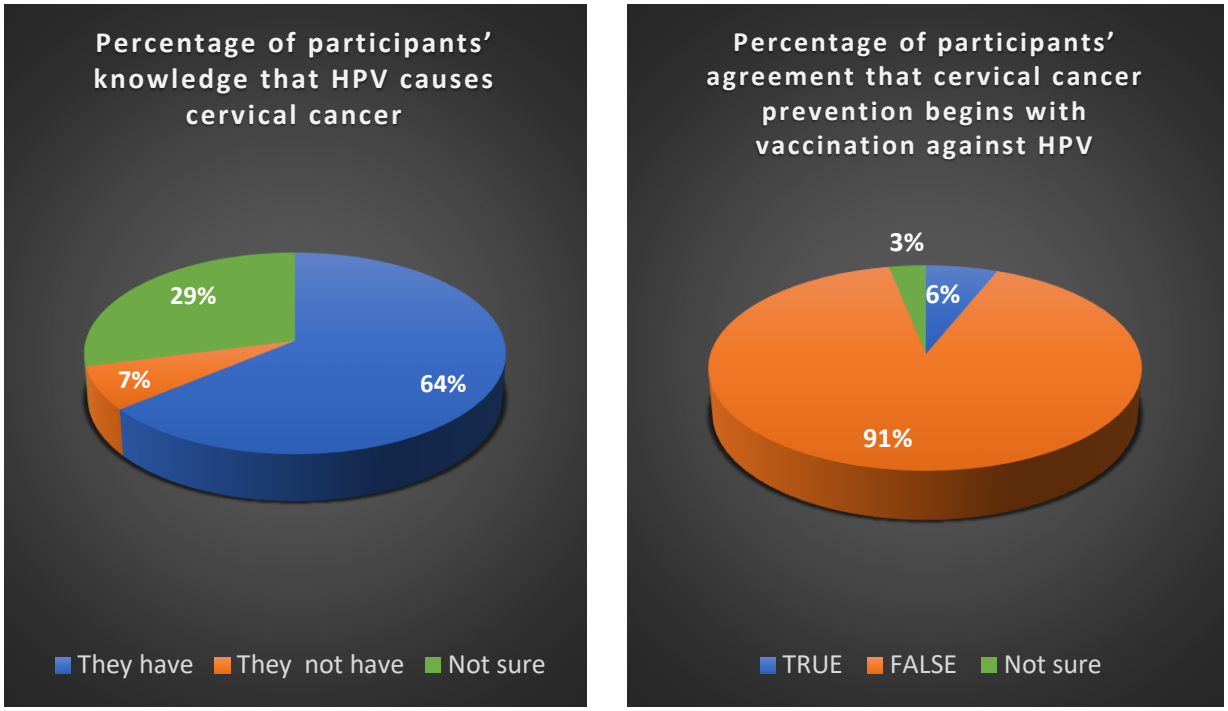

Figure 1: Shows Participants' knowledge about HPV.

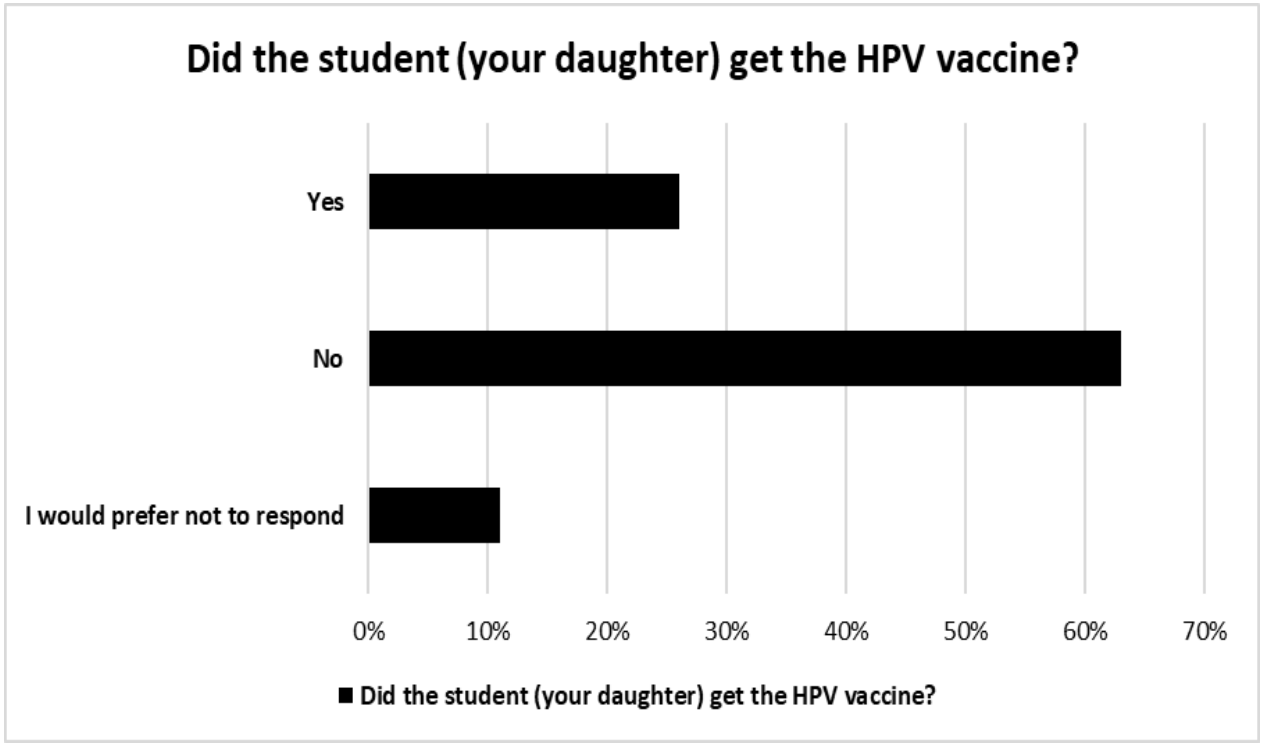

Figure 2: In AL Madinah, the HPV vaccination rate among female middle school students

3. Discussion

HPV is one of the viruses that cause cervical cancer, in addition to being a sexually transmitted illness. So, The Kingdom of Saudi Arabia has been interested in working on giving females aged (11:26 years) the HPV vaccine [9]. Accordingly, research was out in the Kingdom of Saudi Arabia's central and western areas [10, 17] showed that people were unaware about HPV and its problems. This is in line with the findings of the present study, which showed that only 42% of participants were aware of HPV and that only 37% understood it to be an STD. This result is supported by Darraj et al. (2022) [7], which revealed that only 20% of individuals had knowledge of the virus, and 50% did not agree that it was sexually transmitted.

More than two-thirds of the participants in this study agreed that there is a link between HPV and cervical cancer, and these results are similar to the study by Gari et al. (2023) [18] who found that more than 83% of the participants knew that HPV may be a risk factor for cervical cancer.

Additionally, this investigation revealed that (48%) of the participants agreed to have a test for girls before receiving the vaccine to prevent cervical cancer, and (37%) did not confirm the extent of their agreement or refusal to have their girls tested, which is similar to what was indicated by studies[19, 20, 21] that there is limited awareness Saudi Arabians of cervical cancer screening.

In terms of parental attitudes, 63% of parents believed that girls should be vaccinated to protect them from genital warts and cervical cancer. This outcome is in line with the findings of the study by Hussein et al. (2016) [8], which indicated that 64% of participants had an intention to receive the vaccine, while these results differ from the study by Akkour et al. (2021) [17], which found that 82% of participants didn't think genital warts are caused by HPV.

The current study also revealed that 52% of participants believed that this vaccination is useless, and that cervical cancer can be controlled in different ways, and 44% agreed that vaccination is necessary to prevent transmission of the virus. This is in line with several study findings Rutten et al (2017), Nickel et al., (2017) [22, 23] which indicated that initiation of taking the vaccine is associated with the degree of knowledge about HPV, indicating the impact of awareness of HPV on the vaccination rate.

In terms of acceptance, 66% and 63%, respectively, acknowledged that they had doubts about the vaccine's efficacy and safety. This is in line with a study by Xie et al. (2021) [24] that found 44.5% of study participants had doubts about the vaccine's efficacy and safety. The current study also indicated that 38% of participants did not want to be vaccinated and thought that their girls were too young to be vaccinated, 57% of participants in the current study opposed vaccination for moral and religious reasons, which is consistent with results

of studies [7, 25] that indicated that 30% of individuals refused the vaccine for religious beliefs.

The findings also showed that 33% of sample were unaware that the vaccine was available to both men and women, about 29% expressed interest in the HPV vaccine for men, and 51% preferred women to receive the vaccine instead of men. Darraj et al. (2022) [7] found similar results, where it was noted that only 36% of participants were aware that both men and women could receive the vaccine.

Regarding the vaccine prevalence rate, only 26% of sample agreed that their daughter received the vaccination, and 63% disagreed that their daughter received this vaccine, indicating that the vaccine prevalence rate is low. This is in line with study finding Alaamri et al. (2023) [26] which indicated that 23.4% of participants refused to allow their daughters to receive the vaccination of HPV because they did not believe that the vaccination was necessary because their daughters were still young or unmarried, and 18.8% stated that they did not believe that the vaccine was safe.

The current study found a variation in the degree of knowledge between mothers and fathers ($T = 1.29$; $p = 0.02$) in favor of mothers; this aligns with the results of Al-Amri et al. (2023) who found that mothers' knowledge scores were 1.627 times greater than fathers' knowledge scores. There were also differences in fathers' vaccine acceptability ($T = 2.607$; $p = 0.01$) in favor of fathers; this is consistent with the results of the European survey [27] but contradicts what one study indicated that mothers are 1.259 times more accepting of the vaccine than fathers [26]. The researcher attributes this result to fathers being more fearful and aware of the seriousness of the relationship between HPV and cervical cancer, which made them more accepting of the vaccine than their mothers.

Our study also found a difference between parents' age and HPV knowledge ($F = 1.303$; $p = 0.02$) in favor of ages (>45); however, this contradicts a finding that higher knowledge was more associated with younger parent. This study also found a difference between parents' educational level and their HPV knowledge ($F = 0.144$; $P = 0.01$) in favor of master's or doctorate; this is consistent with the study by Al-Amri et al. (2023) which showed that fathers who did not attend university were 0.529 times less knowledgeable about HPV than fathers who had university or postgraduate degrees. This study found no relationship between parents' willingness to accept vaccination and their degree of education, and this result deviates from the findings of Al-Amri et al. (2023) who confirmed that fathers who did not attend university were less accepting of the vaccine than fathers who had graduated from university or obtained a postgraduate degree [26].

Limitations

This study's limitations are using of a cross-sectional design, as well as its being limited to a specific region and thus not representative of the Saudi population as a whole.

Conclusions

Through this study, it was found that low level of knowledge regarding HPV contributed to negative attitudes and low acceptance among parents of girls attending middle schools from the western part of Saudi Arabia. Therefore, information regarding the safety, effectiveness and availability of HPV vaccine should be made more accessible, as there was insufficient knowledge among parents about HPV and the value of the vaccination in preventing HPV infection and cervical cancer.

Recommendations

Considering the results of this research, the following are strongly recommended: information dissemination should be amplified to improve awareness of HPV and cervical cancer and raise vaccine acceptance. Furthermore, different strategies such as curriculum modifications and social media initiatives should be used. Also, physician recommendation has a significant impact on parents' decisions regarding their children's vaccination schedule. Furthermore, health authorities should take steps to educate the population about HPV infection and how to obtain effective protection. Finally, further research should be conducted to investigate women's awareness, knowledge, perspective and acceptance of HPV vaccine, and their awareness and knowledge of cervical cancer and the value of screening programs.

4. Declaration

Acknowledgements

The author would like to thank all participating parents for their valuable information provided during this study.

Ethical considerations

The Institutional Ethical Review Board approved this research, and prior to any data collection, all research subjects gave written informed permission, and the Declaration of Helsinki's rules were adhered to. Data were solely utilized for legitimate scientific study and were kept private., no other means of identification were included in the questionnaire, and each participant was free to withdraw at any stage.

Competing Interests

There is no conflict of interest between the author or any other person.

Availability of Data and Material

Data available at time of need

Funding

Self-funded

Abbreviations and Symbols

- HPV: Human Papillomavirus.
- STD: Sexually Transmitted Infection.

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