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Physician's experience and opinions on base papillomavirus speedily: a cross-sectional study, Saudi Arabia

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Abstract: **Background In a transition period of prevention strategy against HPV infection and cervical cancer in Saudi Arabia, it becomes necessary to appraise physicians preparedness to undertake the inherent actions and responsibilities, by evaluating their knowledge and opinions regarding HPV infection and vaccine. Methods A cross-sectional study carried out between Jan 2017 and Nov 2018, included 2000 physicians working in 21 public centers from the five regions of Saudi Arabia. A self-administered questionnaire was used to assess physicians' perception about HPV infection prevalence 1 item, knowledge about HPV infection and vaccine 9 items, and opinions and attitudes toward vaccine 4 items. A knowledge score range 09 was calculated and adequate knowledge was assumed for a score median. Factors associated with opinions and attitudes were explored and multivariate regression was used to analyze independent factors of inadequate knowledge score median. Results Majority of the participants replied correctly to all knowledge questions, and 63. 0 perceived HPV infection as a frequently encountered infection. Median knowledge score was 8 and 62. 0 had adequate knowledge score 8. Inadequate knowledge was independently associated with Saudi nationality OR 1. 51, p 0.**

Keywords: **Human papilloma virus, Vaccine, Vaccination, Awareness, Knowledge, Attitude, Saudi Arabia, Physicians, Prevention.**

1. INTRODUCTION

Background

Human papilloma viruses HPVs are considered common pathogens that are disseminated through sexual intercourse. Several genotypes of HPV were identified, which are classified into low- or high-risk depending on their oncogenic potential on the infected cells. Low-risk genotypes are generally associated with anogenital warts, while high-risk ones are associated

with malignant tumors of the genital tract, notably cervical cancers and, to a lesser extent, endometrial and ovarian cancers 14. Global observations suggest that 75 of sexually active adults would contract an HPV infection during their lifetime 5. However, the incidence depends on several factors such as age, risky sexual behavior, and cultural norms 6. Consequently, HPV prevalence is relatively low among conservative cultures such as Saudi Arabia, where sexual relationships are committed to strict social and religious rules. However, an alarming increase in the incidence of HPV infections is reported in the last decade in Saudi Arabia, where, despite the conflicting results, up to 43 of cervical samples among healthy Saudi women are reported to be HPV DNA-positive 610. These data highlight a change in the epidemic trend of HPV in Saudi Arabia, besides a lack of reliable information to provide an accurate epidemiological picture. The major threat of HPV infections remains the cervical cancer among infected women. Cervix cancers ranked fifth most fatal and fourth most common cancers worldwide by the early 2010s 11. They occur most frequently between the age of 15 and 44 years 12. In Saudi Arabia, cervical cancers ranked eighth among the most common cancers in Saudi females 4, 13, and an HPV infection is incriminated in 8996 of cases, with HPV16 and 18 being the most common genotypes 14, 15. Therefore, the globally adopted strategy in cervical cancer prevention includes systematic HPV cervical screenings and vaccination against HPV. Majority of the developed countries recommended preventive vaccination against HPV as a routine vaccine for 1112 year old population.

II. METHODS

Design & population This cross-sectional study involved physicians from all regions of the Kingdom of Saudi Arabia, and was conducted between January 2017 and June 2018. Eligibility criteria applied for both gender, all nationality residents and junior and senior physicians, who were qualified by the Saudi Commission for Health Specialties and currently working at a governmental hospital or clinic in Saudi Arabia.

Sample size

Sample size was calculated to detect an unknown percentage P 50 of physicians with adequate knowledge, with 0. 03 precision, 80 statistical power and 95 confidence level, among a target population of 10, 641 physicians working in Saudi Arabia as estimated in 2017 25. The calculation used the formula n Z2 P1 - Pe2 . where Z value from standard normal distribution corresponding to desired confidence level Z 1.

Sampling technique

A stratified clustered sampling was used to randomly select a number of clinics clusters from each of the five regions strata of the Kingdom. The number of clinics by region was proportional to the number of big cities and to the total number of clinics as follows Eastern Al-Dammam city, 3 clinics, Western Tabuk, AlMadinah and Makkah cities, 10 clinics, Northern Arar, Sakakah and Hail cities, 3 clinics, Southern Abha, Najran, Al-Bahah and Jizan cities, 4 clinics and Central region Riyadh city, 3 clinics.

Data collection

A self-administered questionnaire was designed for the purpose of this study it was redacted in English language and constructed in three sections. Section 1 covered the demographic characteristics including gender, age, nationality Saudi versus non-Saudi, marital status, level of practice resident, junior physician, and senior consultant, specialty and region. Section Two assessed physicians knowledge about HPV infection, screening and vaccination, such as whether HPV is sexually transmitted, whether it can affect males, females or both genders, and whether vaccine protects against all HPV serotypes, etc. 9 items. Additionally, a question about physicians perception about the epidemiological extent of HPV infection worldwide whether it is frequent or not was added to Section Two. Section three explored physicians opinions and attitudes towards HPV vaccination including whether they have already been vaccinated, their agreement to be vaccinated or to have their children future children vaccinated, and whether they are favorable to HPV vaccine inclusion in the Saudi immunization program 4 items. Additionally, reasons for eventual refusal of HPV vaccination for self or for own children were explored using a multi-response sub-questionnaire that included 6 optional reasons for refusal such as Im not under risk for HPV infection, lack of knowledge about the vaccine, vaccine side effects, etc.

Statistical analysis

Statistical analysis was performed with the Statistical Package for Social Sciences version 21. 0 for Windows SPSS Inc. , Chicago, IL, USA. Descriptive statistics were used to summarize participants charactereistics and patterns of answers to knowledge and opinion and attitude items. A knowledge score range 09 was calculated as the sum of correct answers given

by the participant regarding the 9 knowledge questions. Analysis of knowledge score distribution using Kolmogorov-Smirnov statistics 0. 215, p 0. 001 and Shapiro-Wilk statistics 0. 217, p 0. 001 indicated non normal distribution of the variable. Consequently, factors associated with knowledge were analyzed using two methods 1 nonparametric tests Mann-Whitney U test and KruskalWallis test, as appropriate to compare raw knowledge scores between different factors categories 2 chisquared test to compare the percentage of participants with adequate knowledge level, defined as knowledge score median value, between the factors categories.

III. RESULTS

Participants' characteristics

Two thousand completed questionnaires were retrieved, out of the 3600 distributed (response rate = 55.6%). Participants' demographic characteristics showed that more than half were females (52.8%), two-third were Saudi (67.0%), and more than three-quarter were aged 20–50 years (17.6% aged 20–30, 30.4% aged 31–40, and 25.4% aged 41–50) and married (79.4%). Professional characteristics showed majority of senior (50.2%) and Obstetrics-Gynecology (58.6%) consultants. Distribution by region showed highest percentage of Western region (57.4%), followed by Eastern and Central regions with 15.4% each (Table 1).

Table 1 Demographic characteristics of the participants

Parameter / category	Number ($N = 2000$)	Percentage
Gender		
Female	1056	52.8
Male	944	47.2
Nationality		
Saudi	1340	67.0
Others	660	33.0
Age groups		
20–30	352	17.6
31–40	608	30.4
41–50	508	25.4
51–60	420	21.0
Above 60	112	5.6
Marital status		
Single	268	13.4
Married	1588	79.4
Widowed	20	1.0
Divorced	124	6.2
Level of practice		
Resident	500	25
Junior	496	24.8
Senior	1004	50.2
Specialty		
Oby/gyn	1172	58.6
Non oby/gyn	818	42.4
Family Medicine	128	6.4
Medicine Radiology	336	16.8
Surgery / Anesthesia / Pathology	296	14.8
Pediatrics	52	2.6
Dentistry	16	0.8
Region		
Western	1148	57.4
Eastern	308	15.4
Northern	116	5.8
Southern	116	5.8
Central	308	15.4

Knowledge about HPV infection and vaccination While majority of the participants replied correctly to all knowledge questions, knowledge about HPV-related risk of cervical cancer (97.2%), sexual transmission mode (95.6%), and whether HPV infection may be asymptomatic (95.0%) totalized the highest correctness rates. The lowest correctness rate was observed for the item whether HPV vaccines protect against all HOP serotypes (67.0%). Further, 63.0% of the participants perceived HPV infection as a frequently encountered infection (Fig. 1). Regarding knowledge score, descriptive statistics showed mean = 7.65, SD = 1.45, median = 8, range = 2–9; consequently, 62.0% of the participants had adequate knowledge (score ≥ 8) (Results not presented).

Factors and predictors of knowledge Both nonparametric tests analyzing knowledge score and chi-square test analyzing the percentage of adequate knowledge level showed statistically significant differences in all demographic and professional factors (Table 2).

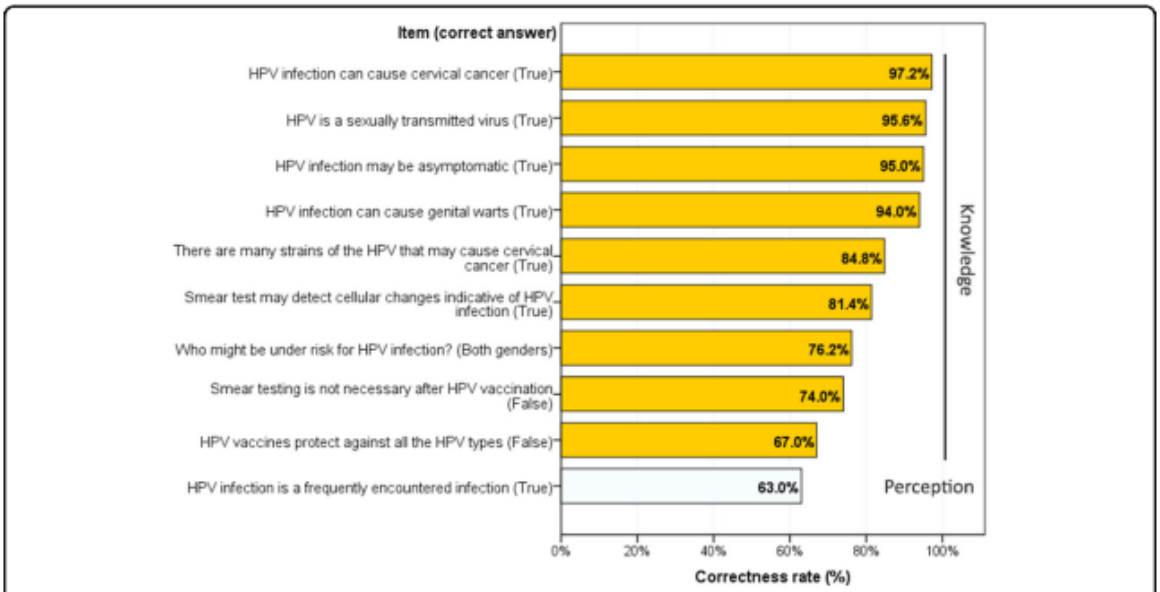

Fig. 1 Knowledge and perception among Saudi physicians about human papilloma virus (HPV) infection and vaccine. Bars represent the percentage of physicians who answered correctly to the given item

Table 2 Factors associated with knowledge about HPV infection and vaccine

Parameter / category	N	Knowledge score				Adequate knowledge (score ≥ 8)		
		Mean	Median	Range	*p*-value[1]	Freq.	%[§]	*p*-value[2]
Gender								
Female	1056	7.86	8	2–9		724	68.6	
Male	944	7.41	8	2–9	<.001*	516	54.7	<.001*
Nationality								
Saudi	1340	7.50	8	2–9		772	57.6	
Others	660	7.96	8	2–9	<.001*	468	70.9	<.001*
Age groups								
20–30	352	7.17	7	2–9		160	45.5	
30–40	608	7.82	8	3–9		392	64.5	
40–50	508	7.87	8	3–9		364	71.7	
50–60	420	7.55	8	2–9		252	60.0	
Above 60	112	7.64	8	3–9	<.001*	72	64.3	<.001*
Marital status								
Single	268	7.39	7	3–9		132	49.3	
Married	1588	7.69	8	2–9		1012	63.7	
Widowed	20	8.20	8	7–9		16	80.0	
Divorced	124	7.68	8	4–9	<.001*	80	64.5	<.001*
Practice level								
Resident	500	7.26	7	2–9		240	48.0	
Junior	496	7.75	8	3–9		332	66.9	
Senior	1004	7.80	8	2–9	<.001*	668	66.5	<.001*
Specialty								
Ob/gyn	1172	8.17	9	2–9		916	78.2	
Non ob/gyn	818	6.92	7	2–9	<.001*	324	39.1	<.001*
Region								
Western	1148	7.54	8	2–9		660	57.5	
Eastern	308	7.58	8	2–9		188	61.0	
North	116	7.97	8	6–9		72	62.1	
South	116	7.37	8	3–9		64	53.3	
Central	308	8.12	8	2–9	<.001*	256	83.1	<.001*

[§]Percentages are calculated on the factor categories. Ob/gyn: Obstetrics-gynecology; * statistically significant result ($p < 0.05$); test used: [1] nonparametric tests (Mann-Whitney U test and Kruskal-Wallis test, as appropriate), [2] chi-square test

These showed higher knowledge levels among females, non-Saudi, widowed and married, senior consultants and Obstetrics-Gynecologists compared to their counterparts. Regarding age, younger (20–30 years old) participants had the lowest scores and totalized the lowest percentage of adequate knowledge. Regarding region, physicians from Central region (Riyadh) had the highest score (mean = 8.12 versus < 8) and percentage of adequate level (83.1% versus < 65%) compared to other regions. The multivariate model including all these factors showed that inadequate knowledge (score < 8) was independently associated with the physicians' nationality (Saudi: OR = 1.51, p = 0.003), practice level (resident: OR = 3.53, p < 0.001; junior OR = 1.67, p = 0.002), specialty (non Ob-Gyne: OR = 5.40, p < 0.001), and region (Western: OR = 2.54, Eastern: 3.22, Northern: 4.32 and Southern: 5.55); as well as age (Table 3).

Table 3 Independent factors of inadequate knowledge about HPV infection and vaccine

Predictor / category	OR	95%CI		*p*-value
Gender				
Female	*Ref*	–	–	–
Male	1.18	0.94	1.47	.151
Nationality				
Saudi	1.51	1.15	1.99	.003*
Others	*Ref*	–	–	–
Age groups				
20–30	*Ref*	–	–	.005*
30–40	1.22	0.82	1.83	.333
40–50	1.35	0.83	2.20	.228
50–60	2.08	1.25	3.44	.005*
Above 60	2.30	1.20	4.42	.012*
Marital status				
Single	1.42	0.84	2.42	.194
Married	1.14	0.73	1.79	.564
Widowed	0.40	0.11	1.41	.155
Divorced	*Ref*	–	–	.166
Level of practice				
Resident	3.53	2.35	5.33	<.001*
Junior	1.67	1.21	2.30	.002*
Senior	*Ref*	–	–	–
Specialty				
Ob/gyn	*Ref*	–	–	–
Non ob/gyn	5.40	4.31	6.76	<.001*
Region				
Western	2.54	1.78	3.63	<.001*
Eastern	3.22	2.13	4.87	<.001*
Northern	4.32	2.54	7.37	<.001*
Southern	5.55	3.29	9.36	<.001*
Central	*Ref*	–	–	–

Binary logistic regression; dependent variable: inadequate knowledge; OR: odd ratio; CI: confidence interval; *Ref*: category used as reference to calculate OR;
* statistically significant result ($p < 0.05$)

Opinions and attitude regarding HPV vaccine A minority of the participating physicians declared being already vaccinated against HPV (7.6%) and less than half opined that they agree to be vaccinated (41.2%); however, majority were favorable to vaccinate their children or own children (77.6%) and to include HPV vaccine in the local immunization program (69.6%). Reasons for HPV vaccine refusal among participants who disagreed to be or to have their children vaccinated (N = 1196) included the following: not being under the risk of HPV infection (58.5%); lack of knowledge about the vaccine (21.1%); being sexually inactive (14.7%); vaccine not being reimbursed by the government (8.7%); and fear from vaccine side effects (8.4%); while 10.0% had no reason for refusing (Table 4).

Factors associated with opinions and attitudes toward HPV vaccine The rate of HPV immunization was higher among younger 12. 5 followed by older 10. 7 physicians p 0. 001, single 10. 4 followed by married 7. 6 ones p 0. 044, those from ObGyn specialty 8. 9, p 0. 011 and those from the Western regions 10. 1, p 0. 001 compared to their counterparts.

Additionally, those who perceived HPV infection as being frequent had higher rate of immunization 8. 6 versus 5. 9 compared to their counterparts p 0. 032. On the other hand, no association with knowledge level was found p 0. 317. Other opinion and attitude parameters showed statistically significant associations with all or almost all demographic factors.

Table 4 Opinions and attitudes regarding HPV vaccination among Saudi physicians

Parameter / category	Number	Percentage
Attitudes ($N = 2000$)		
Already received HPV vaccine	152	7.6
Agree to be vaccinated	824	41.2
Agree to vaccinate own/future children	1552	77.6
Favorable to including the HPV vaccine in the Saudi immunization program	1392	69.6
Reasons for refusal ($N = 1196$, 59.8%)[a]		
Not under risk for HPV infection	700	58.5
Lack of knowledge about HPV vaccine	252	21.1
Vaccine has many side effects	100	8.4
Vaccine not reimbursed	104	8.7
Not sexually active	176	14.7
Do not know	120	10.0

[a]Refusal was defined as disagreement by the participant to be vaccinated or to have his/her children/future children vaccinated ($N = 1196$); and percentage for each reason was calculated on refusers. More than one reason may be provided by a participant

Table 5 Factors associated with attitude regarding HPV vaccination

Factor	Category	Already received HPV vaccine		Agree to be vaccinated		Agree to vaccinate own/ future children		Favorable to include HPV vaccine in Saudi program	
		%	*p*-value	%	*p*-value	%	*p*-value	%	*p*-value
Gender	Female	8.3		48.9		79.5		71.2	
	Male	6.8	.191	32.6	<.001*	75.4	.027*	67.8	.001*
Nationality	Saudi	7.5		42.4		75.5		67.2	
	Non-Saudi	7.9	.741	38.8	.124	81.8	.001*	74.5	<.001*
Age groups	20–30	12.5		54.5		83.0		70.5	
	30–40	7.2		51.3		83.6		72.4	
	40–50	6.3		40.9		76.4		72.4	
	50–60	4.8		23.8		68.6		66.7	
	Above 60	10.7	.001*	10.7	<.001*	67.9	<.001*	50.0	<.001*
Marital status	Single	10.4		55.1		82.1		71.6	
	Married	7.6		40.1		78.1		70.0	
	Widowed	0.0		0.0		80.0		60.0	
	Divorced	3.2	.044*	32.3	<.001*	61.3	<.001*	61.3	<.001*
Level of practice	Resident	8.8		63.2		85.6		75.2	
	Junior	5.6		34.7		75.8		66.9	
	Senior	8.0	.141	33.5	<.001*	74.5	<.001*	68.1	<.001*
Specialty	Ob/gyn	8.9		44.0		82.6		77.8	
	Non Ob/gyn	5.8	.011*	37.2	.002*	70.5	<.001*	58.0	<.001*
Region	Western	10.1		39.7		77.4		67.9	
	Eastern	1.3		37.7		71.4		61.0	
	North	6.9		55.2		75.9		75.9	
	South	3.3		43.3		66.7		76.7	
	Central	6.5	<.001*	44.2	.010*	89.6	<.001*	79.2	<.001*
Knowledge level	Adequate	8.1		41.3		83.5		76.1	
	Inadequate	6.8	.317	41.1	.917	67.9	<.001*	58.9	<.001*
Perception about HPV	True	8.6		41.3		82.9		76.5	
	False	5.9	.032*	41.1	.934	68.6	<.001*	57.8	<.001*

Percentages are calculated on the factor categories. Oby/gyn: Obstetrics-gynecology; * statistically significant result ($p < 0.05$); test used: chi-square

IV. DISCUSSION

Summary of findings Improving awareness and enhancing pro-HPV vaccination attitude among physicians constitute the cornerstone of successful prevention programs against HPV infection and cervical cancer epidemics. This nationwide survey puts another brick in the wall and paves the way or a national systematic vaccination program that is slow to appear. It showed that majority of physicians working in Saudi Arabia have adequate knowledge about HPV infection and vaccination, as demonstrated by the high mean and median knowledge score and more than 60 having adequate knowledge level. On the other hand, a minority declared being already immunized 7. 6, at the time of the survey, or favorable to receive the vaccine 41. 2, which contrasted with the majority being favorable to vaccinate their children 77.

Adequate knowledge to improve physicians' attitude regarding vaccination

A few studies have assessed the level of physicians knowledge about HPV infections and vaccines in conservative or Middle Eastern communities as Saudi Arabia. A recent study 2018 among Saudi primary health care physicians showed high knowledge scores about both HPV infection and vaccine, along with positive attitude regarding the necessity of the vaccine. However, only 16. 5 declared routinely providing vaccine recommendation to their patients and this was associated with higher knowledge score and better perception about the necessity of the vaccine 1. An earlier investigation 2011 among Saudi physicians regarding their practice in cervical cancer screening showed that half of the respondents only were favorable to recommend the vaccine to their patients, in addition to frequent misconceptions regarding cervical cancer 22. Regionally, a study from Kuwait showed relatively high knowledge levels about cervical cancer causal relationship with HPV, other risk factors, and clinical presentation. As well, moderate to high rates of knowledge were observed regarding cervical cancer screening and HPV infection pathogenesis and detection methods. Similar to our findings, majority of the Kuwaiti physicians 75 were favorable to systematic vaccination of schoolgirls 26. Comparable observations were reported in international literature. For example, a Mexican nationwide study demonstrated high levels of awareness among physicians about HPV-cervix cancer causal relationship with significantly better knowledge among Ob-Gyn specialists than GPs, notably regarding the pathogenic mechanisms of this relationship.

Barriers to vaccination to vaccinate vs to be vaccinated.

The other determining factor of physicians engagement in promoting HPV vaccine among their patients may be the presence of eventual barriers that stand between the theoretical knowledge and practice. In the present study, participants raised a number of reasons to explain their refusal to receive the vaccine or to have their children vaccinated. These included lowly perceived risk for HPV infection, lack of knowledge about the vaccine and concerns about the vaccine safety and cost. Similar to our findings, previously cited Indian study among medical and paramedical students showed that almost half of the respondents were reluctant to receive the vaccine, presenting concerns about side effects and cost of the vaccine or declaring being underexposed to the risk of contagion 34. Likewise, concerns about the vaccine safety were reported by majority of Italian nursing students, and positive attitude regarding vaccine safety was predicted by knowledge about HPV risk factors and vaccine efficacy in preventing cervical cancer. Other reasons behind refusal to be vaccinated among this population included uncertainty about the vaccine efficacy, fear of eventual adverse effects, and lowly perceived risk of contracting the infection 35. Other barriers were reported in an Indian study that investigated the factors associated with the intention to recommend HPV vaccine, where respondents worried about patients refusal of the vaccine and raised societal and cultural barriers that may impede communication with the parents of adolescent children and these worries were remarkably shared by ObGyn specialists 36.

The need for targeted educational interventions

The present study highlighted male, older, Saudi, and senior consultants in specialties other than ObGyn as the typical physician profile associated with adverse opinions regarding HPV vaccination and a presumably lower propensity to take part in vaccination campaigns and to promote HPV vaccination among patients and the population. Similar observations were reported locally, where better attitude regarding the vaccine was evidenced among female and younger PHC physicians, while male and older ones had comparably poorer perception of the importance of HPV vaccine 1. Such age and gender difference may be justified by females being more sensitive to cervical cancer issue and by a generation effect on the perception of the HPV epidemic and threat to the society. The observation about age may be supported by the paradoxical findings regarding the level of experience, which showed a higher acceptance rate among residents and junior doctors to receive the vaccine, to vaccinate their own children and to include the vaccine in the national program despite lower levels of knowledge compared to seniors. This may denote a transformation in the medical training content, providing

more attention to HPV infections and the importance of immunization to prevent cervical cancer. Regarding nationality, Saudi physicians had lesser knowledge scores and less favorable attitude regarding the inclusion of HPV vaccine in the Saudi immunization program, compared to non-Saudi ones.

Limitations of the study

The major strengths of this study were its sampling methodology including large sample size and physicians recruitment from the five regions of the country. However, it had some methodological issues that may limit the generalization of its findings. First, the cross-sectional design does not enable establishing a causal relationship between physicians levels of knowledge and opinions and attitude regarding the vaccine and vaccination program. Second, only physicians working in public sector were included, while those from private sector or academic filed were not included, which may have a significant impact on knowledge level as well as in vaccination and vaccine recommendation practice. Third, the questionnaire included basic questions and did not probe into advanced issues, which may result in overestimation of the knowledge level. Additionally, the questionnaire failed to explore the physicians practice in recommending the vaccine to their patients.

V. CONCLUSIONS

Majority of physicians from the Saudi public sector have adequate basic knowledge about HPV infection and vaccination, which was associated with more positive attitude regarding vaccine. A generational shift in opinions and attitude regarding HPV vaccine was observed, denoting an emerging awareness about the HPV threat to the society among younger physicians. On the other hand, lowly perceived risk for HPV infection, lack of knowledge about the vaccine and concerns about the vaccine safety and cost were frequently reported as reasons to refuse the vaccine by the physicians and were indicative of a general adverse attitude towards HPV vaccine that could downplay the physicians role in promoting the vaccine among patients. Therefore, more specific educational interventions are warranted to trigger an active engagement among physicians in the fight against HPV infection and cervical cancer. Such interventions should demystify the HPV vaccine by exposing its efficacy, availability and safety, along with providing practical information about the vaccination procedure, local policies and goals to achieve via the vaccination and screening campaigns.

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