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### RESEARCH ARTICLE

#### "KNOWLEDGE, ATTITUDES AND PRACTICES REGARDING CERVICAL CANCER AND HUMAN PAPILLOMA VIRUS AMONG PHYSICIANS IN ARAR CITY, SAUDI ARABIA"

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#### Abstract

**Background:** In the Kingdom of Saudi Arabia (KSA), cervical cancer ranks the 9<sup>th</sup> most diagnosed cancer among females aged 15-44 years and according to the World Health Organization (WHO) recent figures, it ranks the 6<sup>th</sup> leading cause of cancer-related mortalities in this age group in Saudi Arabia.

**Objectives:** To assess the knowledge, attitudes and practices of the primary health care physicians towards the Cervical Cancer and Human Papilloma Virus and its prevention.

**Subjects and methods:** A descriptive cross-sectional facility based study was conducted in Arar city in a period from February to December, 2021 among all the primary health care physicians, in addition to gynecologist and pediatricians in Maternity and Child hospital. A comprehensive structured English self-administered questionnaire to assess the levels of knowledge and attitudes regarding cervical cancer and the two major preventive strategies (the Pap smear and HPV vaccine) was used for data collection.

**Results:** The study included 128 physicians. Females represented 61.7% of them. Their age ranged between 24 and 56 years with an arithmetic mean  $\pm$  standard deviation (SD) of 31.6  $\pm$  6 years. The total knowledge score about cervical cancer prevention and screening ranged between 2 and 21 out of a maximum possible of 22 with a median (interquartile range "IQR") of 15 (12-17). The highest knowledge score was observed among family physicians (mean rank=72.90) whereas the lowest score was observed among pediatricians (mean rank=38.55),  $p < 0.001$ . The total attitude score ranged between 7 and 15 out of a maximum possible of 17 with a median (interquartile range "IQR") of 11 (9-12). Only 20.3% of the physicians reported a history of ever been vaccination against HPV. The age of vaccinated physicians was significantly lower than that of not vaccinated group (29.0  $\pm$  4.1 vs. 32.2  $\pm$  6.3),  $p = 0.014$ . Similarly, the years of experience of vaccinated physicians was significantly lower than those of not vaccinated group (3.5  $\pm$  3.0 vs. 5.9  $\pm$  5.2),  $p = 0.024$ . Almost half of physicians between R1 and R3 (46.2-55.6%) compared to only 4% of R4 and 4.9% of specialists reported history of being vaccinated against HPV,  $p < 0.001$ .

Knowledge about cancer cervix score was significantly higher among not vaccinated compared to vaccinated group (median scores were 16 and 14, respectively),  $p=0.018$ .

**Conclusion:** Knowledge of physicians in Arar regarding cancer cervix prevention and screening is moderate, favorable attitude towards the disease was observed, however, suboptimal uptaking of the HPV vaccine was observed.

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## Introduction:-

Cervical cancer is a malignant neoplasm occurring in the cervix of the uterus, which connects to the vagina.<sup>1</sup> Globally, cervical cancer is the fourth commonest and fourth leading cause of cancer-related deaths among the female population.<sup>2</sup> According to recent statistics, the rates of cervical cancer incidence are highest in Eastern Africa and lowest in Western Asia and the age-standardized incidence was estimated to be 12.1 per 100,000 females globally.<sup>3</sup>

In the Kingdom of Saudi Arabia (KSA), cervical cancer ranks the 9<sup>th</sup> most diagnosed cancer among females aged 15-44 years.<sup>4</sup> According to the World Health Organization (WHO) recent figures, cervical cancer ranks the 6<sup>th</sup> leading cause of cancer-related mortalities in this age group in Saudi Arabia.<sup>5</sup>

Human papilloma viruses (HPVs) are sexually transmitted pathogens commonly associated with anogenital warts and cervical cancers, where almost 99% of cervical cancer cases are associated with an infection with human papilloma virus.<sup>6</sup> Since HPVs are transmitted sexually, this leads to new pathways towards prevention.<sup>7</sup> The majority of sexually active couples in Saudi Arabia are legally married and the marriage has been registered in civil and religious courts. Passing a premarital screening examination that detects sexually transmitted infections and gene carriers of hematologic disorders, such as sickle cell anemia, is one of the key requirements of legal marriages in such countries. These regulations have been developed to regulate the transmission of sexually transmitted infections, including HPV.<sup>8</sup>

Authors believe that the public may view contracting a sexually transmitted infection, including HPV, as a taboo issue because of the existence of certain conservative cultures, not to be revealed to parents, partners or even primary health care (PHC) physicians. To the Saudi community, contracting HPV after marriage can also a mark of fornication. Therefore, addressing the underreporting of HPV infections in such populations is a great concern for both PHC doctors and researchers, and data on this matter remains scarce.

Countries apply numerous preventive measures to decrease the incidence of HPV and cervical cancers such as the premarital screening program. However, vaccination and cytology screening (Pap smear) might be of high preventive value in risk groups.<sup>9</sup> However, raising awareness among teenage and adult communities remains the most cost-effective method for preventing HPV transmission. Healthcare facilities are readily available free of cost in the KSA. It is important to assess and raise the awareness of healthcare providers on HPV and cervical cancer and teach them effective ways to deliver awareness to the public. Therefore, in this study, we will assess the knowledge, attitudes and practices of primary health care physicians regarding cervical cancer and HPV in the Northern Borders Province of Saudi Arabia.

As of June 2020, 107 (55%) of the 194 WHO Member States have introduced HPV vaccination. The Americas and Europe are by far the WHO regions with the most introductions, 85% and 77% of their countries having already introduced respectively. A record number of introductions was observed in 2019, most of which in low- and middle-income countries (LMIC) where access has been limited. Programs had average performance coverage of around 67% for the first dose and 53% for the final dose of HPV. LMICs performed on average better than high-income countries for the first dose, but worse for the last dose due to higher dropout. Only 5 (6%) countries achieved coverages with the final dose of more than 90%, 22 countries (21%) achieved coverages of 75% or higher while 35 (40%) had final dose coverage of 50% or less. When expressed as world population coverage (i.e., weighted by population size), global coverage of the final HPV dose for 2019 is estimated at 15%

**Methodology:-****Study design**

A descriptive cross-sectional facility based study was conducted among the primary health care physicians, gynecologist and pediatricians in a period from February to December, 2021.

**Study setting**

The study was carried out at 11 PHCCs and Maternal and Child health hospital (MCH) in Arar city, which is the capital of Northern Borders Province with a population of 145,237, according to 2004 census.<sup>18</sup>

**Study subjects**

All health care physicians who are working at in PHCCs, including general physicians, family medicine residents, family medicine consultants and specialist, in addition to the gynecologist and pediatricians in MCH, Arar city were invited to participate in the study.

**Inclusion criteria:**

- Physicians who are working at PHCCs& MCH
- Physicians who are available at the time of data collection and voluntary willing to participate in the study.

**Exclusion criteria:**

- Physicians who are absent during the study time
- Physicians refused to participate

**Sample size calculation**

Sample size was calculated from a total population of 161 primary health care physicians and gynecologist in 11 PHCCs and gynecologist and pediatricians from MCH, Arar city.

The calculation methodology of sample size for population survey was used "Raosoft, Sample size calculator."<sup>19</sup> According to this methods a minimum of 114 participants is needed; given that the margin of error alpha ( $\alpha$ ) = 0.05, the confidence level is = 95%, and the response of distribution = 50%. With addition to 10% (11.4) non response rate, the sample size became 125 physicians.

**Study tool and procedure**

1. This study was conducted using a comprehensive structured English questionnaire, which has been developed based on previously validated questionnaires.<sup>4, 13, 15</sup>
2. The questionnaire was filled voluntarily through a self administration technique.
3. The study tool consists of three main domains to assess the levels of knowledge and attitudes regarding cervical cancer and the two major preventive strategies (the Pap smear and HPV vaccine). These domains are distributed as follows
  - a. Socio-demographic characteristics: This includes participant's age, qualifications, year of experiences.
  - b. The knowledge including knowledge about cervical cancer and its risk factors and curability, awareness regarding the Pap smear and its potential in the screening procedures, and about HPV vaccine.
  - c. The attitudes and beliefs domain, including the circumstances of undergoing a Pap smear, such as whether going to a male doctor to perform the test, the influence of other persons on the attitude, and the barriers that may hinder performing the test.
4. The answers to questions were collected in a specifically-designated Excel spread sheet.

Responses to knowledge questions were scored as a score of "1" was assigned to every correct answer while a score of "0" was assigned to every incorrect or don't know answers. Total score was computed and tested for its distribution using Shapiro-Wilk test and accordingly, used for comparisons.

**Ethical approval**

The study proposal was submitted to Alqassim research committee for ethical approval. Data were collected after the ethical clearance, also permission to collect the study data was obtained from the Directorate of Health Affairs in the Northern Border Area. Before enrollment, potential participants; researchers explained the purpose of the study and that participation in the study was voluntary. Furthermore, all participants were informed about the anonymity, confidentiality concern and the choice of voluntary discontinuation at any time without any consequence on their

present or coming work. If the participant verbally gives his/her consent; then he/she was enrolled in the research and asked to fill the required surveys.

### Statistical analysis

Data were analyzed using Statistical Package for Social Sciences (SPSS) software, version 26 for windows. Initially, data were cleaned and screened for mistakes, missing, and outliers. Then, all collected data were evaluated using descriptive statistics. All nominal and ordinal data were reported in frequencies and percentages. Meanwhile; the numerical data (knowledge and attitude scores) were examined first for distribution by using Shapiro-Wilk test and since they were abnormally distributed, median and inter quartile range were used for description. Mann-Whitney test was applied to compare between two groups whereas Kruskal-Wallis was applied to compare between more than two groups. Furthermore, a Spearman correlation test was used to study the association between continuous variables and  $p$ -value  $\leq 0.05$  was considered for statistical significance.

### Results:-

The study included 128 physicians. Their personal characteristics are presented in Table 1. Females represented 61.7% of them. Their age ranged between 24 and 56 years with an arithmetic mean  $\pm$  standard deviation (SD) of  $31.6 \pm 6$  years. Almost one-third of them (32%) were specialists whereas 8.6% were consultants. About two-thirds (67.9%) were family physicians whereas 21.9% were pediatricians. Their years of experience ranged between one and 31 years ( $5.4 \pm 4.9$  years).

**Table 1:-** Personal characteristics of the participants (n=128).

	Frequency	Percentage
<b>Gender</b>		
Male	49	38.3
Female	79	61.7
<b>Age (years)</b>		
Range	24-56	
Mean $\pm$ SD	$31.6 \pm 6.0$	
<b>Level of practice</b>		
R1	13	10.2
R2	9	7.0
R3	14	11.0
R4	25	19.5
GP	15	11.7
Specialist	41	32.0
Consultant	11	8.6
<b>Specialty</b>		
Family Medicine	87	67.9
Pediatrics	28	21.9
Obstetrics and Gynecology	13	10.2
<b>Years of experience</b>		
Range	1-31	
Mean $\pm$ SD	$5.4 \pm 4.9$	

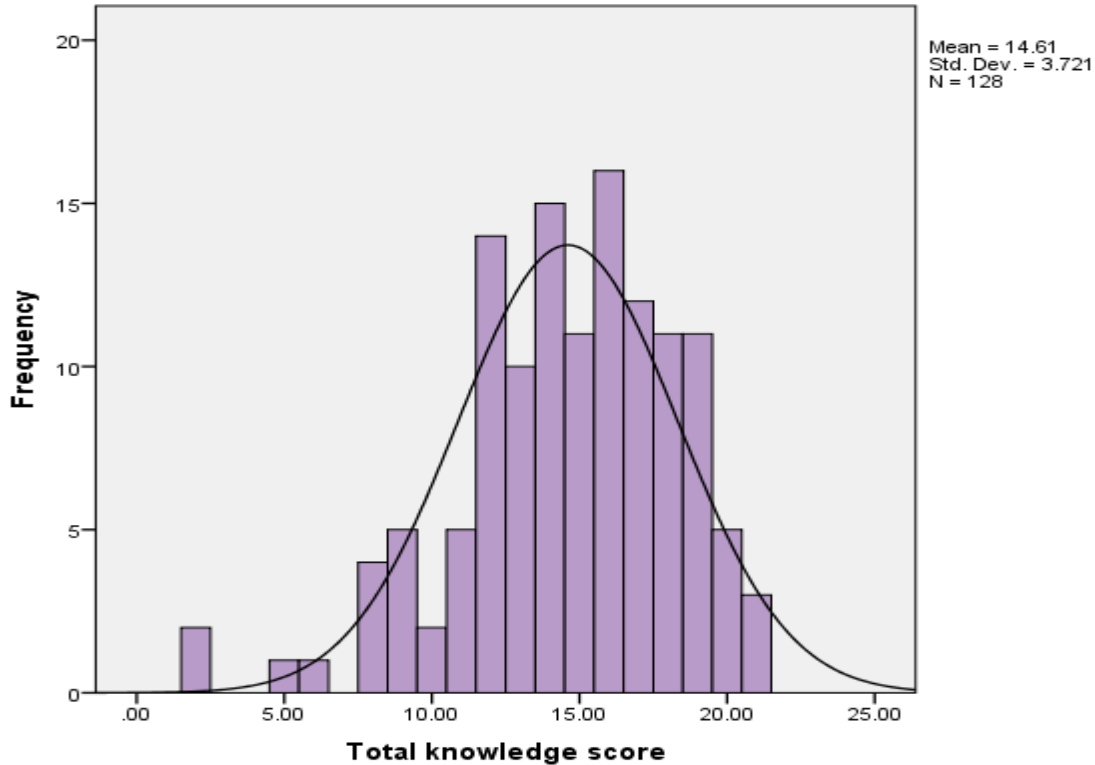
### Knowledge about cervical cancer

Majority of the physicians could recognize that HPV infection can cause cervical cancer (96.1%), it can cause a genital warts (91.4%), is a sexually transmitted virus (90.6%), HPV infection may be asymptomatic (87.5%), types 16 and 18 are associated with high risk of cervical cancer (85.9%) and smear test may detect cellular change indicative of HPV infection (84.4%). Regarding risk factors, the most frequently known were multiple sexual partners (83.6%), HPV infection (75.8%) and female (63.3%) whereas young age and Chlamydia infection were identified by only 30.5% and 27.3% of the physicians, respectively. Most of the physicians knew that cancer cervix may be fatal (82%) and Pap smear testing is technique available for HPV detection (82%) whereas only 40.6% and 39.8% knew that HPV vaccines doesn't protect against all the HPV types and Pap smear testing is required following HPV vaccination. Table 2

**Table 2:-** Responses of the participants to knowledge statements about cervical cancer (etiology, screening and prevention).

	Right answer	
	No.	%
HPV is a sexually transmitted virus (Yes)	116	90.6
HPV infection may be asymptomatic(Yes)	112	87.5
HPV can cause genital warts(Yes)	117	91.4
HPV infection can cause cervical cancer(Yes)	123	96.1
Smear test may detect cellular change indicative of HPV infection(Yes)	108	84.4
HPV type 16 and 18 are associated with high risk of cervical cancer(Yes)	110	85.9
Which is of the following considered risk factors for cervical cancer?		
Young age(Yes)		
Old age(No)	39	30.5
Female(Yes)	74	57.8
Multiple sexual partners(Yes)	81	63.3
HPV infection(Yes)	107	83.6
Chlamydia infection(Yes)	97	75.8
HIV infection(Yes)	35	27.3
Smoking(Yes)	66	51.6
	65	50.8
Cervical cancer can be fatal(Yes)	105	82.0
Cervical cancer is a common type of cancer in Saudi Arabia (Yes)	37	28.9
Pap smear testing is technique available for HPV detection (Yes)	105	82.0
Pap smear testing is not required following HPV vaccination (No)	51	39.8
HPV vaccines protect against all the HPV types(No)	52	40.6
HPV vaccination provide prevention against cervical cancer and genital warts(Yes)	87	68.0
The vaccine is recommended for young female and young male(Yes)	91	71.1
HPV vaccine can be administered from 9 years of age(Yes)	92	71.9

The total knowledge score ranged between 2 and 21 out of a maximum possible of 22 with a median (interquartile range "IQR") of 15 (12-17). It was abnormally distributed as the p-value of Shapiro-Wilk test was <0.001. Figure 1



**Figure 1:-** Frequency distribution of the total cancer cervix knowledge score among physicians, Arar city.

From Table 3, the highest knowledge score was observed among family physicians (mean rank=72.90) whereas the lowest score was observed among pediatricians (mean rank=38.55),  $p < 0.001$ . Physicians` gender and level of practice were not significantly associated with their level of knowledge about cervical cancer.

**Table 3:-** Factors associated with knowledge about cervical cancer among physicians, Arar city.

	Total knowledge score			p-value
	Median	IQR	Mean rank	
<b>Gender</b>				
Male (n=49)	15	12-17.5	63.07	0.730*
Female (n=79)	15	12-17	65.39	
<b>Level of practice</b>				
R1 (n=13)	15	12-15.5	56.81	0.103**
R2 (n=9)	13	11-14	40.06	
R3 (n=14)	14	11.75-17	56.86	
R4 (n=25)	16	14-18	74.68	
GP (n=15)	14	11-17	52.03	
Specialist (n=41)	16	13-18	71.78	
Consultant (n=11)	16	10-19	70.05	
<b>Specialty</b>				
Family Medicine (n=87)	16	14-18	72.90	<0.001*
Pediatrics (n=28)	12	11-14	38.55	
Obstetrics and Gynecology (n=13)	16	7-19	64.15	

IQR: Interquartile range

\*Mann-Whitney test

\*\*Kruskal-Wallis test

There was insignificant positive weak correlation between physicians` age and total knowledge score about cervical cancer (Spearman`s correlation coefficient (r)=0.048,  $p=0.590$ ) as illustrated in Figure 2.

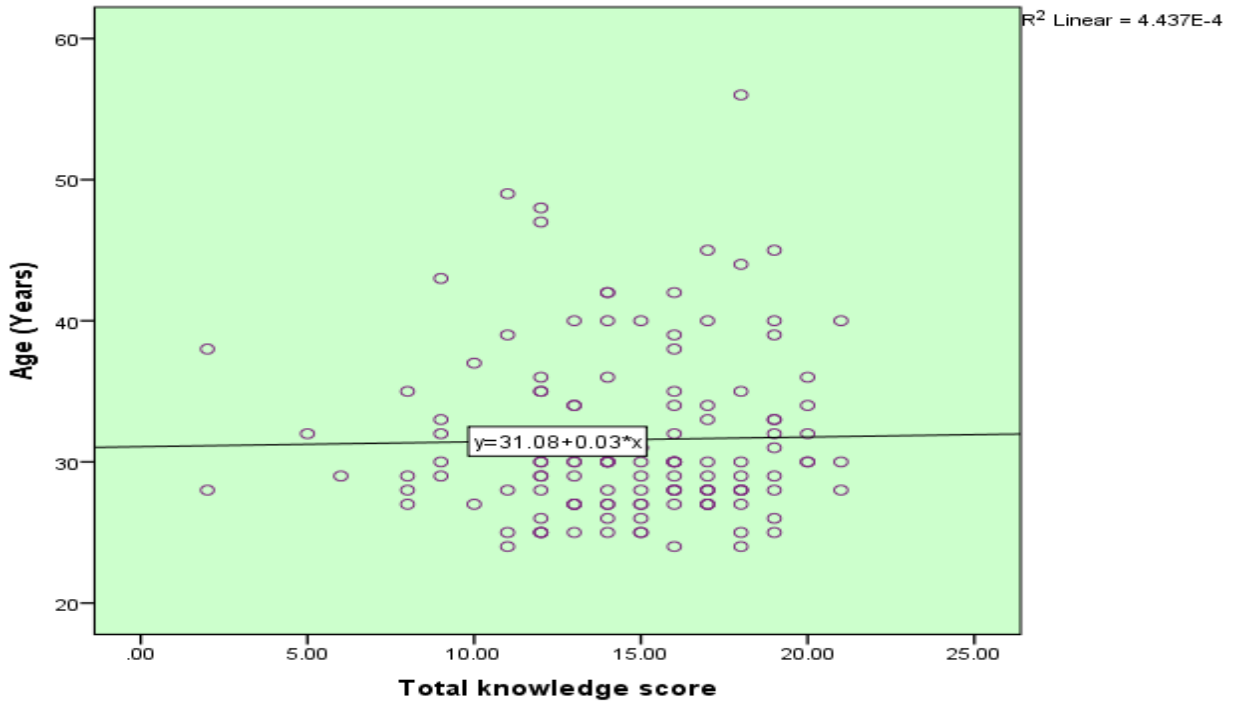


Figure 2:- Correlation between physicians' age and their total knowledge score about cancer cervix.

There was also insignificant positive weak correlation between physicians' clinical experience and total knowledge score about cervical cancer (Spearman's correlation coefficient  $(r)=0.154$ ,  $p=0.083$ ) as seen in Figure 3.

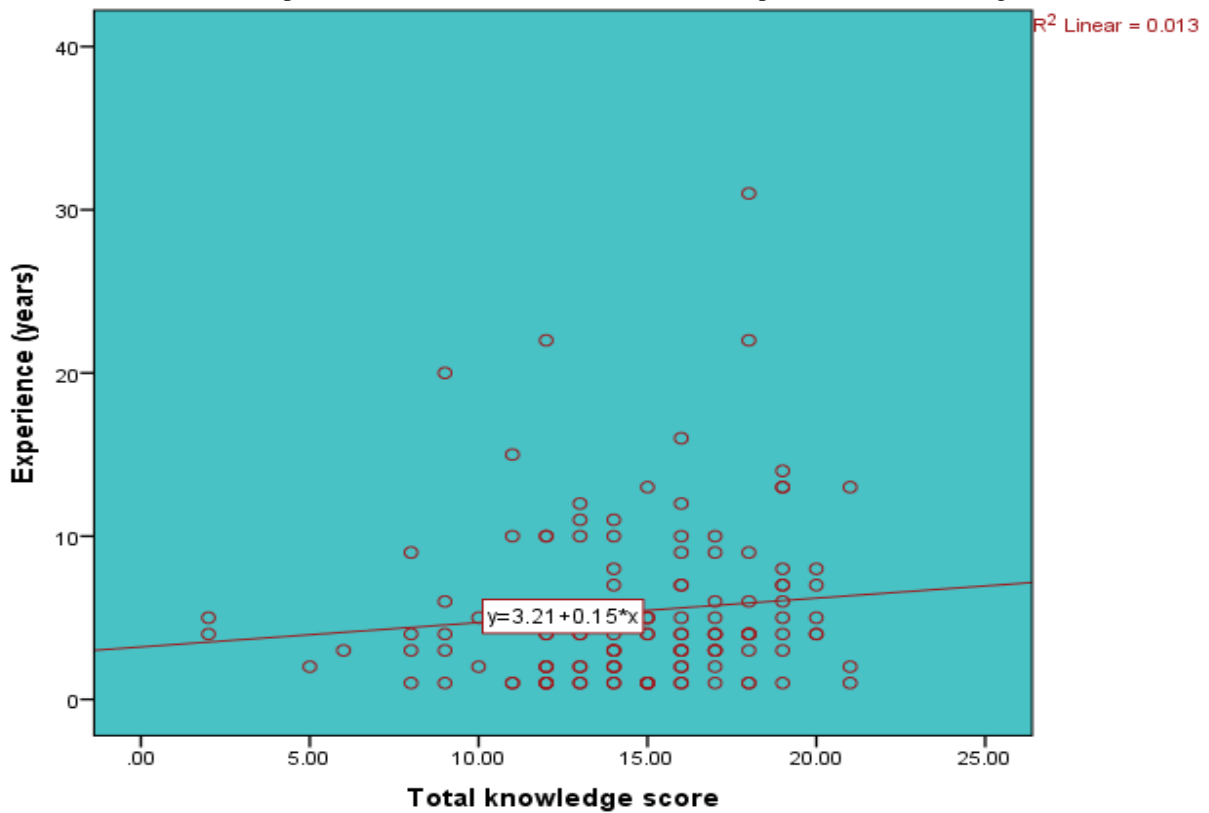
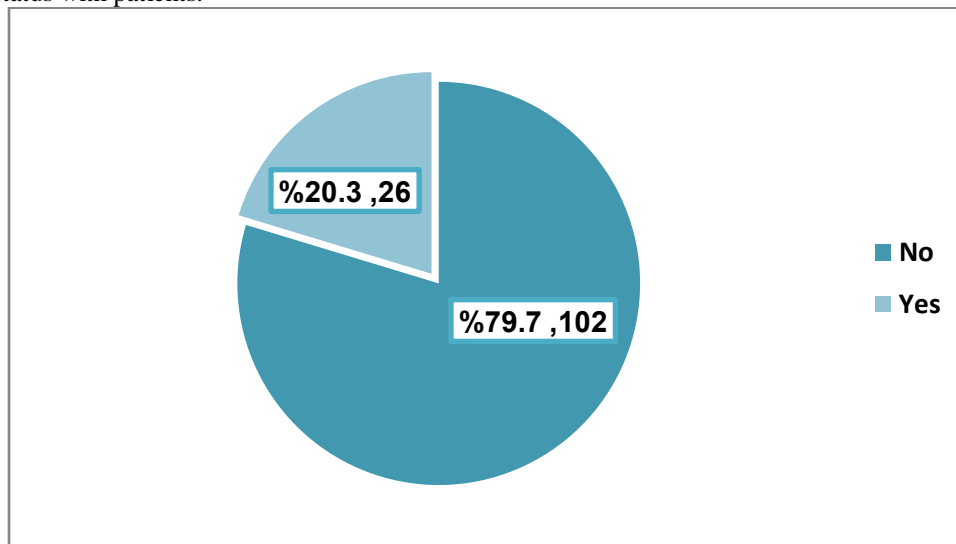


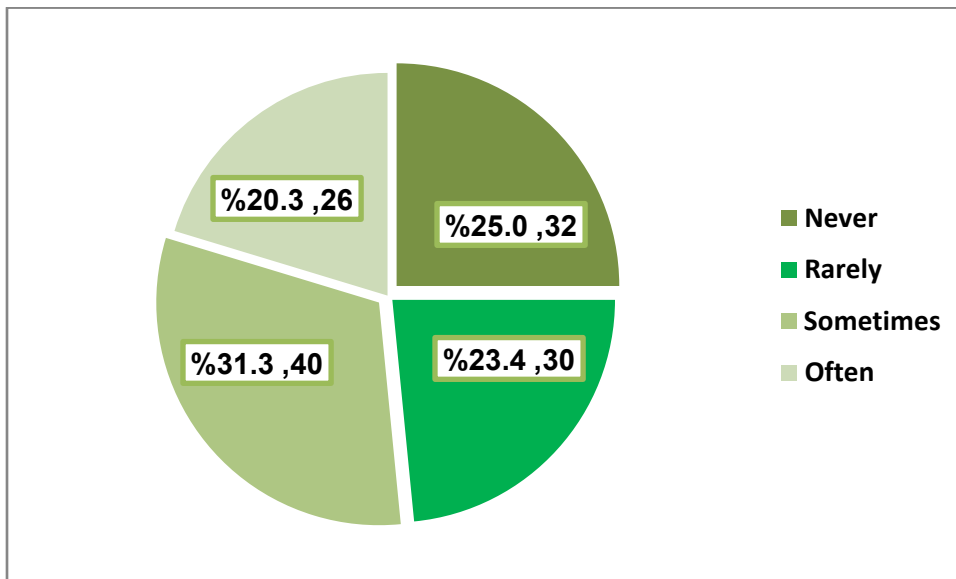
Figure 3:- Correlation between physicians' years of clinical experience and their total knowledge score about cervical cancer.

**Practice-related to cervical cancer**

As clear from Figure 4, only 20.3% of the physicians reported a history of ever been vaccination against HPV. Almost half of the physicians were either sometimes (31.3%) or often (20.3%) discussed immunizations or vaccination status with patients.



**Figure 4:-** History of ever been vaccinated against HPV among the physicians, Arar city.



**Figure 5:-** Frequency of discussing immunizations or vaccination status with patients among the physicians, Arar city.

The age of vaccinated physicians was significantly lower than that of not vaccinated group (29.0±4.1 vs. 32.2±6.3), p=0.014. Similarly, the years of experience of vaccinated physicians was significantly lower than those of not vaccinated group (3.5±3.0 vs. 5.9±5.2), p=0.024. Almost half of physicians between R1 and R3 (46.2-55.6%) compared to only 4% of R4 and 4.9% of specialists reported history of being vaccinated against HPV, p<0.001. Knowledge about cervical cancer score was significantly higher among not vaccinated compared to vaccinated group (median scores were 16 and 14, respectively), p=0.018

**Table 4:-** Factors associated with HPV vaccination among physicians, Arar city.

	HPV vaccination		p-value
	No	Yes	



	N=120 N (%)	N=26 N (%)	
<b>Gender</b>			
Male (n=49)	40 (81.6)	9 (18.4)	
Female (n=79)	62 (78.5)	17 (21.5)	0.667*
<b>Age (years)</b>			
Mean±SD	32.2±6.3	29.0±4.1	0.014**
<b>Level of practice</b>			
R1 (n=13)	7 (53.8)	6 (46.2)	
R2 (n=9)	4 (44.4)	5 (55.6)	
R3 (n=14)	7 (50.0)	7 (50.0)	
R4 (n=25)	24 (96.0)	1 (4.0)	
GP (n=15)	11 (73.3)	4 (26.7)	
Specialist (n=41)	39 (95.1)	2 (4.9)	
Consultant (n=11)	10 (90.9)	1 (9.1)	<0.001*
<b>Specialty</b>			
Family Medicine (n=87)	74 (85.1)	13 (14.9)	
Pediatrics (n=28)	19 (67.9)	9 (32.1)	
Obstetrics and Gynecology (n=13)	9 (69.2)	4 (30.8)	0.089*
<b>Years of experience</b>			
Mean±SD	5.9±5.2	3.5±3.0	0.024**
<b>Knowledge score</b>			
Median	16	14	
IQR	13-18	11.75-15.25	0.018 <sup>†</sup>

\*Chi-square test

\*\*Student's t-test

<sup>†</sup>Mann-Whitney test**Attitude towards cervical cancer**

From Table 5, it is shown that 58.6% either strongly or somewhat agreed that it is necessary to discuss issues of sexuality before recommending HPV vaccine to patients while 55.5% either strongly or somewhat agreed that It is more important for females to get the HPV vaccine than males. Almost two-thirds agreed that it is their responsibility to talk to patients about vaccine (70.3), the parent/patient had concern about the safety of the HPV vaccine (69.5%) and thought it takes time to talk about the vaccine with patients (64.1%). Also, about two-thirds thought that the most adolescent patients are at risk for cervical cancer (68.7%). Nearly one-third of the physicians provided the HPV vaccine for any of their patients (34.4%) and did Pap smear testing for any of their patients (36.7%).

**Table 5:-** Attitude of the participants towards cancer cervix, its prevention and screening.

	Strongly agree N (%)	Somewhat agree N (%)	Neutral N (%)	Somewhat disagree N (%)	Strongly disagree N (%)
It is necessary to discuss issues of sexuality before recommending HPV vaccine to patients	44 (34.4)	31 (24.2)	42 (32.8)	7 (5.5)	4 (3.1)
It is more important for females to get the HPV vaccine than males	47 (36.7)	24 (18.8)	46 (35.9)	4 (3.1)	7 (5.5)
			<b>Yes N (%)</b>	<b>No N (%)</b>	
Do you think it takes time to talk about the vaccine with patients			82 (64.1)	46 (35.9)	
Is the Parent/patient had concern about the safety of the HPV vaccine			89 (69.5)	39 (30.5)	
Do you think the parents' concern that the HPV vaccine encourages early initiation of sexual activity			61 (47.7)	67 (52.3)	

Do you think is not your responsibility because other physicians will give the vaccine	38 (29.7)	90 (70.3)
Do you think the most adolescent patients not at risk for cervical cancer	40 (31.3)	88 (68.7)
Did you provide the HPV vaccine for any of your patients?	44 (34.4)	84 (65.6)
Did you do pap smear testing for any of your patients	47 (36.7)	81 (63.3)

The total attitude score ranged between 7 and 15 out of a maximum possible of 17 with a median (interquartile range "IQR") of 11 (9-12). It was abnormally distributed as the p-value of Shapiro-Wilk test was 0.003. Figure 6

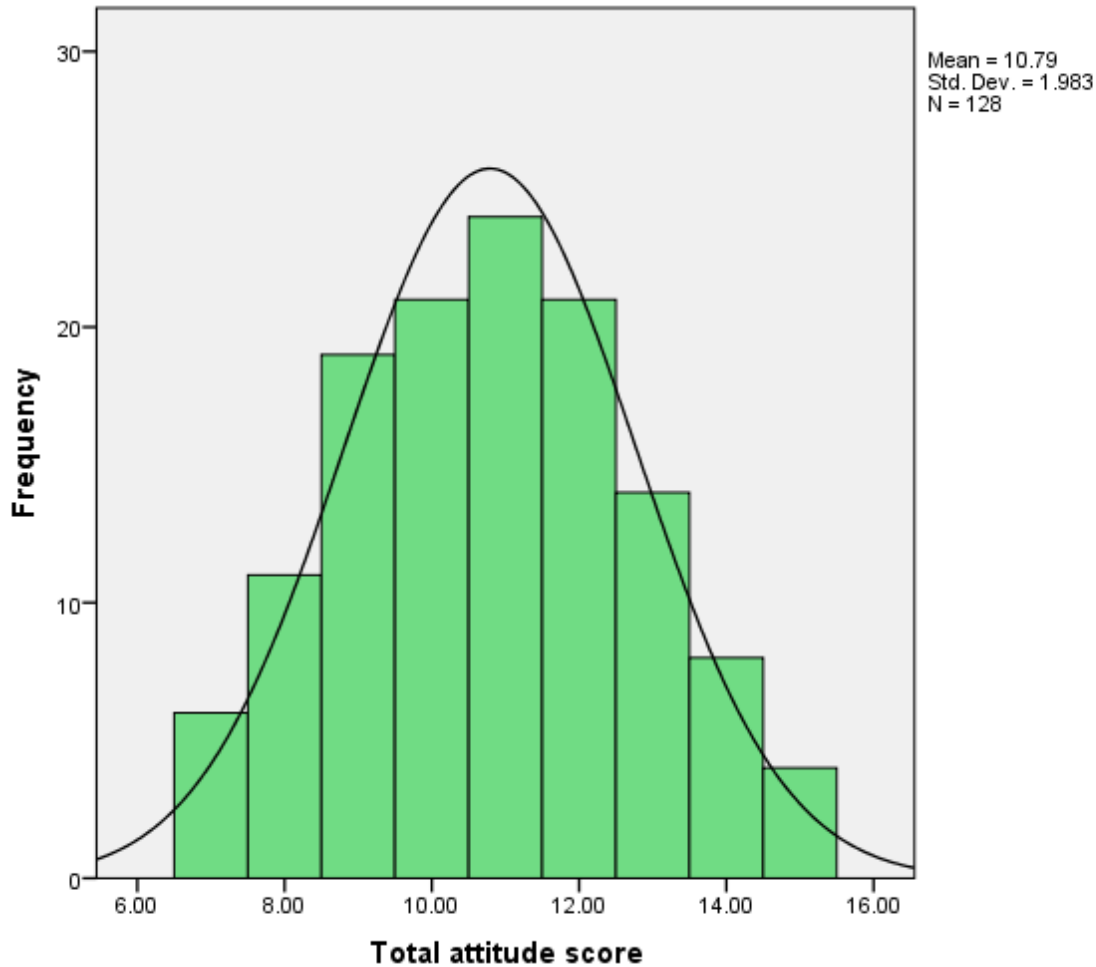


Figure 6:- Frequency distribution of the total cervical cancer attitude score among physicians, Arar city.

None of the studied factors (age, level of practice and specialty) was significantly associated with physicians` attitude towards cervical cancer prevention and screening. Table 6

Table 6:- Factors associated with attitude towards cancer cervix among physicians, Arar city.

	Total attitude score			p-value
	Median	IQR	Mean rank	
<b>Gender</b>				
Male (n=49)	11	9-12	61.49	0.465*
Female (n=79)	11	9-12	66.37	
<b>Level of practice</b>				
R1 (n=13)	11	9-12	65.58	
R2 (n=9)	12	10.5-13	82.61	

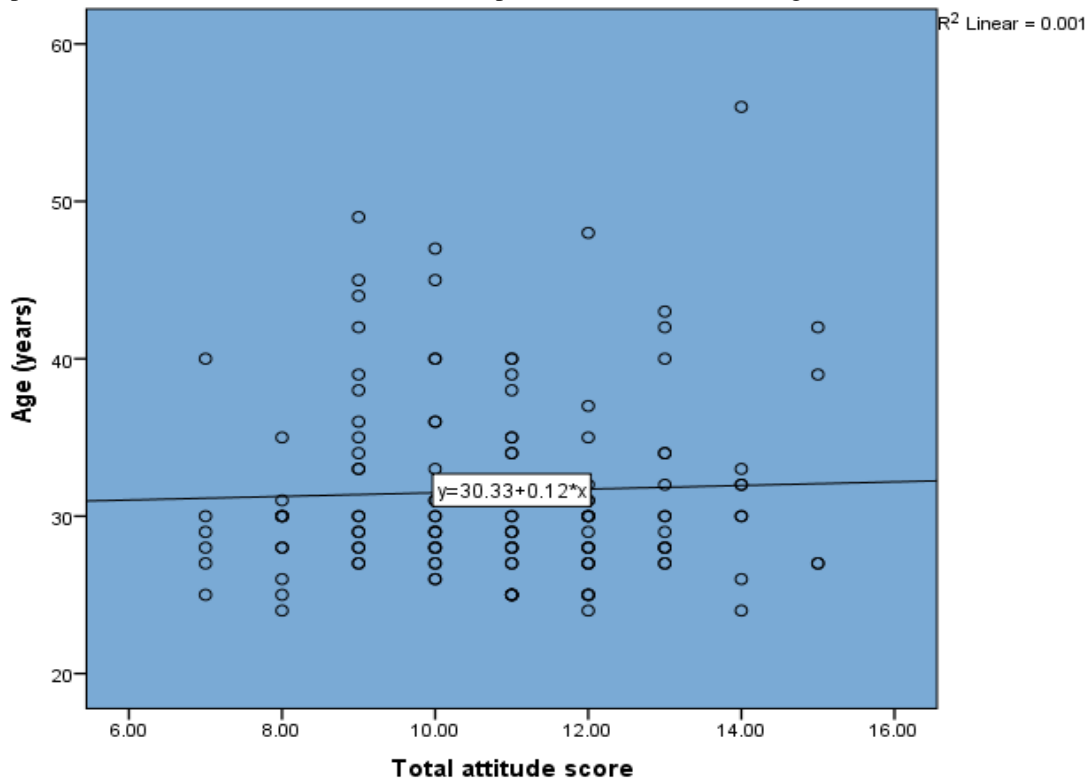
R3 (n=14)	11.5	9-12.25	68.86	
R4 (n=25)	11	9-12.5	61.74	
GP (n=15)	9	8-11	47.00	
Specialist (n=41)	11	9.5-12.5	64.11	
Consultant (n=11)	11	10-12	74.45	0.343**
<b>Specialty</b>				
Family Medicine (n=87)	11	9-12	62.51	
Pediatrics (n=28)	11	9-12	65.29	
Obstetrics and Gynecology (n=13)	11	10-13.5	76.15	0.454**

IQR: Interquartile range

\*Mann-Whitney test

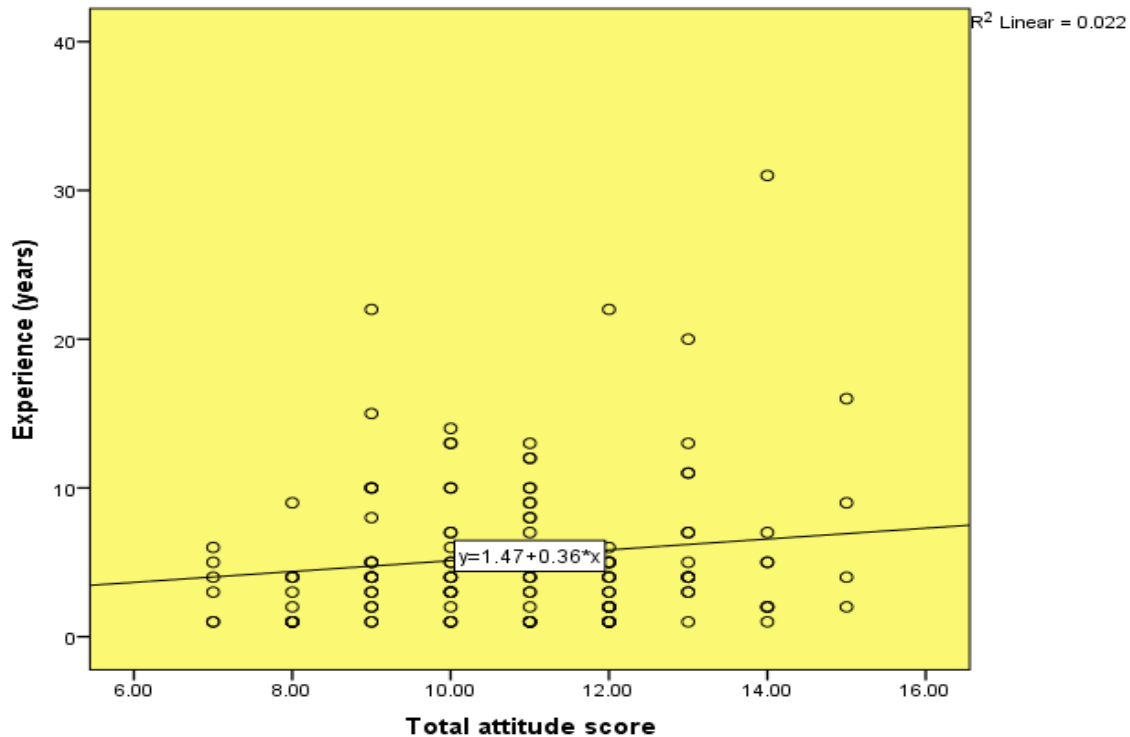
\*\*Kruskal-Wallis test

There was insignificant negative weak correlation between physicians` age and total attitude score about cervical cancer (Spearman`s correlation coefficient (r)=-0.009, p=0.917) as illustrated in Figure 7.



**Figure 7:-** Correlation between physicians` age and their total attitude score towards cervical cancer.

There was also insignificant positive weak correlation between physicians` clinical experience and total attitude score towards cervical cancer (Spearman`s correlation coefficient (r)=0.097, p=0.276) as seen in Figure 8.



**Figure 8:-** Correlation between physicians' years of clinical experience and their total attitude score towards cancer cervix.

### Discussion:-

Early screening is fundamental for preventing cervical cancer through detecting its premalignant forms<sup>38</sup>. Knowledge and attitude of primary care physicians towards prevention and screening of cervical cancer through HPV vaccine and Pap smear test, respectively is of extreme importance for women's health,<sup>20</sup> therefore, this study was conducted to assess the knowledge, attitudes and practices of the primary health care physicians towards the Human Papilloma Virus and its prevention as well as detection.

In the current study, more than 90% of the physicians could recognize that HPV infection can cause cervical cancer, and it is a sexually transmitted virus. Furthermore, most of them could recognize that HPV infection may be asymptomatic and they could identify the types associated with high risk of cervical cancer. The same good level of knowledge was observed in another recent Saudi study carried out by Almazrou S, et al (2020),<sup>4</sup> and another Canadian study carried out by Duval B, et al (2007).<sup>21</sup> However, another study carried out among primary care pediatricians in the United States of America (USA) revealed that almost one-third were unaware about the causative relationship between HPV and cervical cancer.<sup>22</sup> In 2019, another Saudi study carried out among female healthcare professionals (physicians, nurses and allied healthcare workers) showed poor knowledge regarding cervical cancer, fair knowledge of Pap smear testing as screening tool for cervical cancer.<sup>16</sup> In 2018, another Saudi study showed good knowledge about HPV infection and its vaccine especially for family physician as 98% confirmed that HPV vaccine prevent cervical cancer and genital warts.<sup>15</sup> Difference between these studies could be explained by using different tools to assess knowledge as well as different background characteristics of the physicians.

Regarding risk factors, the most frequently known in the current study were multiple sexual partners, HPV infection and female gender whereas young age and Chlamydia infection were identified by only 30.5% and 27.3% of the physicians, respectively. The same poor knowledge regarding some risk factors was observed in other studies carried out in Saudi Arabia,<sup>4</sup> and USA.<sup>22</sup> Awareness of the physicians regarding the fact that this disease affects younger women is very important in improving their attitude towards giving HPV vaccine at earlier age for both men and women as recommended by the United States Food and Drug Administration (FDA)<sup>23</sup> and the Advisory Committee on Immunization Practices (ACIP).<sup>24</sup>

Most of the physicians in the present study knew that cervical cancer may be fatal and Pap smear testing is technique available for HPV detection whereas only 40.6% and 39.8% of them knew that HPV vaccine doesn't protect against all the HPV types and Pap smear testing is required following HPV vaccination. It has been known that HPV vaccine protects against the commonest type not all types of HPV<sup>25</sup> and pap smear is still needed following HPV vaccination.<sup>26</sup>

Family physicians were more knowledgeable than pediatricians in the present study. The same has been reported in a recent Saudi study.<sup>4</sup> This could be explained by the fact that family physicians are more frequently caring for women who have developed the consequences of HPV infection than pediatricians who are caring only for certain age-group in the community.

In another Saudi study carried out by Almazrou S, et al (2020),<sup>4</sup> older, and more experienced physicians expressed higher knowledge level about cervical cancer than their peers; mostly due to their greater experience with HPV-related diseases. In the present study, age, experience as well as residency level were not associated with knowledge level about cervical cancer. This could be explained by the fact that we included only family medicine residents in the present study where there is very little variations regarding their age and experience.

The current study revealed that only 20.3% of the physicians reported a history of ever been vaccination against HPV, which is much lower than the rate of 80% recommended by the Healthy People 2020 goals.<sup>27</sup> Furthermore, almost half of the physicians were either sometimes or often discussed immunizations or vaccination status with patients, despite almost two-thirds of them agreed that it is their responsibility to talk to patients about HPV vaccine. On the other hand, nearly one-third of the physicians provided the HPV vaccine and performed Pap smear testing for any of their patients. It has been documented that physicians could induce great impact on the knowledge or beliefs of parents regarding HPV vaccine uptake for their adolescents.<sup>28-31</sup>

Fortunately, younger physicians, those of R1-R3 residency level and those with lower experience were more likely to uptake the HPV vaccine in the present survey compared to their counterparts. This finding indicate the favorable attitude of the new generation in Saudi Arabia towards uptake of HPV vaccine

Unexpectedly, more knowledgeable physicians were more likely to be not vaccinated against HPV compared to vaccinated group. This could be attributed to the fact that physicians who were more knowledgeable about risk factors of cervical cancer felt that they can be protect themselves without vaccination. In-depth investigation may be needed to more explain this finding.

In the current study, 58.6% of resident physicians agreed that it is necessary to discuss issues of sexuality before recommending HPV vaccine to patients while 55.5% agreed that It is more important for females to get the HPV vaccine than males. Almazrou S, et al (2020)<sup>4</sup> reported that the majority of physicians believed that it was important for women to receive the HPV vaccine and that they would allow their daughters to have the vaccine. This high acceptance of HPV vaccine has been observed in other studies carried out in Islamic countries; Turkey<sup>32</sup> and Malaysia.<sup>33</sup>

In the present study, physicians' gender, age and experience were not related to their attitude towards cervical cancer prevention and screening. In another Saudi study, there was a poor attitude towards HPV vaccine among male PHC physicians and old physicians.<sup>15</sup>

In this study, almost two-thirds of physicians believed that patients/their parents had concern about the safety of the HPV vaccine and there is no enough time to discuss this issue with patients. This could explain the relatively low uptake of the vaccine even among the physicians themselves. Almazrou S, et al (2020)<sup>4</sup> reported that the factors hindred uptaking of HPV vaccine were the physicians' and parents' concerns about vaccine safety and efficacy, and time constraints. In addition, other barriers for uptaking of HPV vaccine were reported such as communication with physicians regarding sexuality, lack of education and lack of parental awareness.<sup>23,24</sup>

### **Strengths and limitations**

Applying a valid tool used previously for data collection, inclusion of primary healthcare physicians, pediatricians and gynecologists and inclusion of enough sample were Strengths of the present survey. On the other hand, conduction of the study in only one Saudi city could impact the generalizability of findings over other cities. The

cross-sectional design applied in the present study is considered another limitation as it proves only association and not causality between dependent and independent variables.

### **Conclusion:-**

Knowledge of physicians in Arar regarding cervical cancer prevention and screening is moderate; however deficient areas were recognized particularly those related to the prevalence and risk factors of the disease. Family physicians were more knowledgeable than pediatricians in this regards. Generally, favorable attitude towards the disease was observed, however, time constrains and concerns about HPV vaccine safety and efficacy were reported and suboptimal provision of the HPV vaccine and Pap smear testing were reported. Suboptimal uptaking of the HPV vaccine was observed among the physicians themselves. Younger physicians, those of R1-R3 residency level and those with lower experience were more likely to uptake the HPV vaccine than others.

### **Recommendations:-**

Based on the study findings, the following are recommended:

- Enhancing the knowledge of the physicians in Arar city regarding magnitude and risk factors of cervical cancer through continuous medical education activities.
- HPV vaccine should be available to help in implementing an effective government vaccination program
- Encouraging physicians, particularly older ones to uptake HPV vaccine and recommend it seriously for patients and specify time to discuss this issue with patients.
- There is a need for the decision makers to include routine cervical cancer screening every three years into the health care for women aged between 21 and 65 years in the Kingdom of Saudi Arabia.
- Further longitudinal larger study including more physicians from other areas in the KSA to investigate more comprehensively this issue is highly recommended.

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