

Awareness of human papillomavirus infection complications, cervical cancer, and vaccine among the Saudi population

A cross-sectional survey

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ABSTRACT

الأهداف: المعرفة بفيروس الورم الحليمي البشري، وسرطان عنق الرحم، والوعي باللقاح بين سكان المملكة العربية السعودية.

الطريقة: أجريت هذه الدراسة المستعرضة لعينة ملائمة تتكون من 1033 مشاركاً في أجزاء مختلفة من المملكة العربية السعودية في الفترة من أغسطس 2018 وحتى يناير 2019 باستخدام استبيان على الويب. تم توزيع هذا الاستبيان ذاتي الإدارة على جميع المشاركين. وشملت البيانات التي تم جمعها وعي مجموعة الدراسة بسرطان عنق الرحم، مسحة البابينيكولا، لقاح فيروس الورم الحليمي البشري.

النتائج: كان معدل الاستجابة 95% من الذكور والإناث على السواء. وجد أن ما يقرب أقل من 10% من مجموعة الدراسة قد سمعت عن فيروس الورم الحليمي البشري. كان الوعي والمعرفة السابقة بمسحة عنق الرحم كأداة فحص متغيرة تتراوح بين (5.9%) و (27.9%) من المشاركين الذكور والإناث، على التوالي، كان لديهم معرفة مسبقة عن هذا الاختبار. عندما تمت مقارنة الأفراد المشاركين من حيث معرفتهم لدور فيروس الورم الحليمي البشري في سرطان عنق الرحم والقضيب، وأفكارهم حول توافر لقاح فيروس الورم الحليمي البشري في المستشفيات، ودوره في الوقاية من سرطان عنق الرحم، واقتراحاتهم بأن هذا اللقاح يجب أن يقدم للمتزوجين وغير المتزوجين، لوحظ أنه لا توجد فروق ذات دلالة إحصائية ($p < 0.05$) بين مجموعات الذكور والإناث.

الخاتمة: هناك نقص في المعرفة ومعلومات خاطئة فيما يتعلق بسرطان عنق الرحم، مسحة عنق الرحم، فيروس الورم الحليمي البشري، وارتباطه بسرطان عنق الرحم. يمكن استخدام هذه البيانات كقاعدة من أجل صياغة برامج فعالة للتوعية السكانية بلقاح سرطان عنق الرحم.

Objectives: To determine human papillomavirus (HPV) infection, cervical cancer, and vaccine awareness among the Saudi population.

Methods: This cross-sectional study of a convenience sample comprising 1033 participants (males and females)

from different parts of Kingdom of Saudi Arabia was conducted between August 2018 and January 2019 using a web-based questionnaire. This self-administrated questionnaire was distributed to all participants. Collected data included age groups, cervical cancer, Papanicolaou (Pap) smear, and HPV vaccine awareness.

Results: The response rate was 95%. Approximately 50% of the participants were 15-22 years old, <3% were >46 years old, and <10% had heard of HPV. Awareness and previous knowledge of the Pap smear as a screening tool was variable with male (5.9%) and female (27.9%) participants, having knowledge of the test. There were no statistically significant differences ($p > 0.05$) between males and females in their knowledge of HPV's role in cervical and penile cancers, the HPV vaccine availability in the hospital, its role in cervical cancer prevention, and suggestions that this vaccine should be provided to married and non-married women.

Conclusion: There is a lack of knowledge and misinformation regarding cervical cancer, Pap smears, HPV, and HPV association with cervical cancer. These data can be used as a basis to formulate effective population awareness programs.

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Human papillomavirus (HPV) is considered to be a health burden that can lead to cervical, penile, and anal cancers.¹⁻⁴ Cervical cancer is one of the most prevalent diseases worldwide following HPV infections. Globally, 70% of cervical cancer cases result from HPV infections; however, other environmental factors contribute to the development of this type of cancer.⁵ Additionally, 84% of cervical cancer incidences have been reported in developing countries.⁶ Human papillomavirus is a DNA virus that belongs to the Papillomavirus family and it has >150 identified serotypes. Human papillomavirus is a non-enveloped virus that is 52-55 nm in size and contains circular double-stranded DNA and 7900 base pairs.⁷ Human papillomavirus is transmitted sexually and causes great health burdens in both men and women.² Homosexual men have a 4-time higher risk of developing HPV infections than heterosexuals, and this risk increases to 95% in human immunodeficiency virus (HIV)-positive individuals.^{4,8,9} Following HPV infection, seropositive men become highly susceptible to developing penile and anal cancer, and some studies have shown that HIV-HPV seropositive individuals are 60% more likely to develop cancer compared to healthy individuals.¹⁰ However, heterosexual HPV-seropositive individuals can transmit HPV to their female partners, which is associated with cervical cancer in these women.¹¹ In Kingdom of Saudi Arabia, the rate of cervical cancer in HPV-seropositive individuals was reported to be 92%, and the incidence of cervical cancer was approximately 2.1 per 100,000 women.¹ However, the lack of national screening programs can cause a reduction in knowledge concerning HPV-related clinical complications in HPV-seropositive individuals. The purpose of this study was to determine HPV awareness levels among male and female Saudi residents in different age groups. These results can aid in distributing HPV-related knowledge; thus, residents would be educated with respect to the dangers of HPV infections. Human papillomavirus incidence has increased over the past few years, as reported by the Centers for Disease Control and Prevention (CDC) in the United States of America. Human papillomavirus infection is common, and both genders will become infected at least once with one serotype during their lives.² These findings can be alarming to medical specialists and prompt them to provide proper HPV-related information to their

patients. Moreover, the patients can make their own health choice to undergo the laboratory test, acquire the vaccine, and take proper precautions to stay safe from HPV transmission.

Methods. This cross-sectional web-based study lasted from August 2018 until January 2019 and aimed to include approximately 1000 participants in different parts of Kingdom of Saudi Arabia to study HPV awareness within the general population. A web-based questionnaire was used instead of a paper-based questionnaire for ease of data collection, to increase in response rate, to provide enough time for participants to answer all of the questions, to provide privacy and anonymity for the participants, and to reduce the incidence of mistakes or damage to questionnaires that can occur with the paper-based forms.

Data collection. Data collection was performed via the distribution of the survey link via social media platforms such as Twitter. Questions included in the survey were designed according to the Health Information National Trends Survey (HINTS) recommendations to determine the awareness about HPV and its related cancers.¹² Exclusion criteria questionnaire with missing or invalid information were excluded from the study.

Questionnaire interview. A structured questionnaire was used for the study. The questionnaire was designed based on several earlier studies in different populations. Questions were categorised to investigate knowledge about HPV infection, Pap smear, cervical cancer, and HPV vaccines. The web-based survey was designed so that it did not conflict with Saudi Arabian culture, and a participant's private information, such as name, contact information, and address that could compromise the individual's privacy were not included. The current study analysed demographic characteristics of the study participants and 19 knowledge questions, including 12 questions on HPV and Pap smear general knowledge assessment and 7 questions on HPV infection, cervical cancer, and HPV vaccine. For most knowledge questions, respondents could choose only one of the 2 options, "yes" or "no".

Data analysis. The data were checked for completeness. Data analysis was performed using GNU PSPP 0.10.1-g1082b8 (PSPP Inc., Chicago, IL, USA). Categorical variables were expressed as frequencies and percentages. The level of HPV-related knowledge among female participants was compared with that among males, given that cervical cancer is primarily a female health problem. The differences in the answer distribution were analysed using Pearson's Chi-square

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test. A p -value=0.05 was considered significant.

Ethical considerations. The study received ethical approval from the Research Ethics Committee at Taif University, Taif, Kingdom of Saudi Arabia.

Results. Demographic characteristics. Among the 1060 web-based questionnaires that were completed, 1033 questionnaires were used in the analysis, after those with inconsistent information were excluded. Demographic characteristics of the participants are presented in Table 1. Among the surveyed participants, 357 (34.55%) were males and 676 (65.45%) were females, and 982 (95.0%) were Saudi. The response rate was 95% and included both male and female Saudis. Approximately 50% of the participants were between 15-22 years old and <3% were >46 years old.

Knowledge of HPV infection. Less than 16% of the study group had heard of HPV. Pap smear awareness and previous knowledge of this test as a screening tool were variable with male (5.9%) and female (27.9%) participants, having heard of the test. Sixty-six per cent and 53.5% of males and females knew that HPV is sexually transmitted. Only 4.2% of males and 11.8% of females, were aware of how an HPV diagnosis was made. Eighty seven point eight percent of males and 89.8% of females thought that testing for HPV should be added to premarital tests. More than one-third (37.0% of males and 37.4% of females) in the study groups said that HPV is an HIV subtype. More than 59% of the participants thought that HPV infects women more than men. Most females (79.4%) and males (66.3%) thought that HPV may lead to pregnancy complications. When participating individuals were compared in terms of their gender-based knowledge about HPV's role in cervical and penile cancer, availability of the HPV vaccine in the hospital, and the vaccine's role in cervical cancer prevention, both genders suggested that the vaccine should be provided to both married and non-married women. There were no statistically

significant differences ($p>0.05$) between males and females with respect to this suggestion (Table 2).

Discussion. Worldwide, cervical cancer is a leading cause of morbidity and mortality, especially in developing countries because of ignorance about the disease and illiteracy.¹³ However, cervical cancer is a potentially preventable condition because cytological screening using the Pap smear helps to detect this disease in its early stages. Awareness of cervical cancer in Kingdom of Saudi Arabia is crucial and requires sound knowledge about the disease. Realisation and understanding are decisive elements that can prompt the adoption of healthy behaviours and increase advocacy for newly introduced preventive measures. Human papillomavirus infection is a well-known cause of cervical cancer, and there is evidence that HPV is a relevant factor in penile and other squamous cell carcinomas.¹⁴ This survey's results should help increase awareness of HPV and its complications, cervical cancer, and vaccinations in the Saudi population. Among 676 (65.45%) females and 357 (34.55%) males who participated in this survey, poor awareness and various misconceptions regarding HPV and cervical cancer prevention were detected. Because only 10.9% (39/357) of males and 15.0% (102/676) of females had previous knowledge about HPV and cervical cancer, these results are consistent with a similar study by Naing et al¹⁵ in which they reported that among their study group, few participants had good HPV-related knowledge (14%) and vaccine-related knowledge (8%). Baloch et al¹⁶ determined that 37.9% of women knew about cervical cancer and 16% knew about the HPV vaccine, and Yuanyue et al¹⁷ showed that 13-25% of women knew about cervical cancer and the HPV vaccine, in 2 Chinese studies. Thus, the level of knowledge about HPV and the HPV vaccine was low, and this was comparable to our findings, but there was a difference in the targeted study population. Caution is required when comparing the results of the present survey with those student-based studies because students in general and specifically those in health sciences likely have more frequent access to the Internet and other media compared to the general population. Thus, it is possible that they have increased access to some of the websites that provide contradictory and potentially inaccurate information about the HPV vaccine. For example, in Nigeria, only 17.7% of female students were aware of HPV.¹⁸ Al-sheikh's¹⁹ study and several others performed among students in many parts of the world reported an increase in HPV-related knowledge compared to our general population-based study group. Only 51.1% of Saudi students attending the Health Colleges of

Table 1 - Demographic characteristics of participants.

Characteristics	Males n= 357	Females n= 676
	n (%)	
Age		
15-22	178 (50)	379 (56)
23-30	121 (34)	240 (35.5)
31-45	53 (14.6)	47 (7.1)
>46	5 (1.4)	10 (1.4)
Nationality		
Saudi	340 (95.5)	642 (95)
Non Saudi	17 (4.5)	34 (5)

Table 2 - Knowledge assessment among study groups.

knowledge assessment (HPV related questions)	Gender				Males versus Females	
	Males		Females		Chi-Square	Asymp. Sig
	Yes	No	Yes	No		
	n (%)					
Previous knowledge assessment	39 (10.9)	317 (89.1)	102 (15.0)	574 (85.0)	273.27	0.4933
Is HPV a subtype of HIV?	132 (37.0)	224 (62.9)	253 (37.4)	423 (62.6)	33.265	0.000
Is HPV sexually transmitted?	235 (66.0)	121 (34.0)	362 (53.5)	314 (46.5)	4.68	0.330
Does HPV infect women more than men?	212 (59.5)	144 (40.5)	400 (59.2)	276 (40.8)	28.89	0.000
Can HPV leads to pregnancy complications?	236 (66.3)	120 (33.7)	537 (79.4)	139 (20.6)	136.07	0.000
Are you aware about HPV diagnosis?	15 (4.2)	341 (95.8)	80 (11.8)	596 (88.2)	346.155	0.000
Have you or someone of your family done Pap smear?	21 (5.9)	335 (94.1)	189 (27.9)	487 (72.1)	204.165	0.000
Do you think that HPV test should be added to premarital tests?	316 (88.7)	40 (11.3)	607 (89.8)	69 (10.2)	321.08	0.000
Does HPV lead to cervical cancer?	169 (47.5)	187 (52.5)	463 (68.4)	213 (31.6)	46.655	0.170
Does HPV lead to penile cancer?	144 (40.5)	212 (59.5)	354 (52.3)	322 (47.7)	7.25	0.109
Is there a vaccine for HPV?	34 (9.5)	321 (90.5)	142 (21.0)	534 (79.0)	172.105	0.000

HPV - human papillomavirus

Princess Nora Bint Abdul Rahman University, Riyadh, Kingdom of Saudi Arabia, recognised cervical cancer as a preventable disease.¹⁹ A similar study conducted in Pakistan by Tahir Khan et al,²⁰ in Lahore city to assess the HPV knowledge, attitudes, and perceptions among university students found that nearly 57% of these students had already heard about HPV, 55% of the participating students in Pakistan stated that HPV is not a rare disease, and nearly 68% of these students did not believe that HPV occurs without any symptoms. Saudi and Pakistani students had better HPV-related knowledge than Nigerian students. This comparatively better knowledge could result from a higher rate of participation in and use of HPV information by health sciences students in these different countries. However, a study conducted at Keele University, England, reported that nearly 75% of female participants had heard of HPV.¹⁶ Despite being aware of HPV, only 27% reported that HPV causes cervical cancer.¹⁶ Similarly, a Malaysian study reported that around 80% of healthcare students knew that HPV causes cervical disease, and nearly 54.6% reported that HPV infects both men and women equally.²¹ However, only 37% of them considered HPV to be a frequently occurring illness.²¹ These findings show that HPV knowledge gaps exist everywhere and that inadequacy of HPV knowledge is a global issue. Among our study group, 0.9% of male and 27.9% of female participants, had heard of the Pap smear test, and males were better informed about HPV transmission via sexual intercourse. Conversely, a population-based study in the United States of America showed that >90% of participants had heard of HPV, and 74% of them knew that it is sexually transmitted.²² Misconceptions regarding the nature of HPV were

found in approximately 37.0% males. Females stated that HPV is a subtype of HIV; this finding may be explained because HIV may be equated with risky sexual behaviour. Our study group had limited knowledge regarding HIV and HPV infections and the relationship between them. In our survey, male participants (45.7%) appeared to be less aware of the HPV vaccine compared to the female group (61.0%). A similar study reported that 75% of the females were aware of the HPV vaccine compared to only 57% of males.²³ Overall, >88% of males and females agreed to the statement that HPV vaccines should be added to premarital tests. When participants were asked questions regarding their awareness about HPV diagnosis, availability of HPV vaccine, the capability of the immune system to remove HPV infections, and its association with penile cancer, a severe lack of knowledge was noted. For example, 4.2% of the males and 11.8% of the females, do not understand the diagnostic method, and 45% of the males and 61.0% of the females, were aware that cervical cancer is preventable by vaccination. This finding was much higher than that found by Touch et al,²⁴ who showed that only 35% of women were aware that the vaccine prevents cancer; however, there was poor awareness of the HPV vaccine among participants since only 9.5% of males and 21.0% of females were aware of the vaccine, and 19.4% of male compared to 16.5% of females reported that the immune system cannot remove HPV infection. These findings are worse than those in studies performed in developed countries.

Limitations. Our results may not be readily extrapolated to all Saudi population since the survey included only age group active in modern social communication tool as they constitute 50% of the study

participant. There may be age variation in the level of knowledge. National studies are needed to understand current HPV related education in other age groups and different professions particularly medical schools.

In conclusion, the results of this survey revealed that there is a poor understanding and misinformation among participants about the HPV-related complications, cervical cancer, and vaccinations. More than 39% of participants the study group were unaware that the HPV vaccine can prevent cervical cancer, and understanding about HPV, genital warts, and pregnancy complications was poor in most of the population. A preference was that the HPV vaccine should be added to premarital tests. These data can be used as a benchmark for formulating effective awareness about programs for introducing cervical cancer screening and HPV vaccine programs within the general population.

References

- Alsbeih G. HPV Infection in Cervical and Other Cancers in Saudi Arabia: Implication for Prevention and Vaccination. *Front Oncol* 2014; 4: 65.
- Centres for Disease Control and Prevention. What is HPV? [Internet]. [Accessed January 2019]. Available from: <https://www.cdc.gov/hpv/parents/whatishpv.html>
- Stratton KL, Culkin DJ. A Contemporary Review of HPV and Penile Cancer. *Oncology (Williston Park)* 2016; 30: 245-249.
- Hernandez AL, Efrid JT, Holly EA, Berry JM, Jay N, Palefsky JM. Risk factors for anal human papillomavirus infection type 16 among HIV-positive men who have sex with men in San Francisco. *J Acquir Immune Defic Syndr* 2013; 63: 532-539.
- Bruni L, Albero G, Serrano B, Mena M, Gómez D, Muñoz J, et al. Human Papillomavirus and Related Diseases in Americas. Summary Report [Internet]. HPV Information Centre; 2016 [27 January 2019]. Available from: <https://hpvcentre.net/statistics/reports/XMX.pdf>
- Ferlay J, Soerjomataram I, Dikshit R, Eser S, Mathers C, Rebelo M, et al. Cancer incidence and mortality worldwide: sources, methods and major patterns in GLOBOCAN 2012. *Int J Cancer* 2015; 136: E359-E386.
- Milner DA, editor. Diagnostic Pathology: Infectious Diseases. 2nd Edition. Elsevier Health Sciences; 2015. p.440.
- Goldstone S, Palefsky JM, Giuliano AR, Moreira ED Jr, Aranda C, Jessen H, et al. Prevalence of and risk factors for human papillomavirus (HPV) infection among HIV-seronegative men who have sex with men. *J Infect Dis* 2011; 203: 66-74.
- Smith JS, Melendy A, Rana RK, Pimenta JM. Age-specific prevalence of infection with human papillomavirus in females: a global review. *J Adolesc Health* 2008; 43: S5-S25, e1-e41.
- Frisch M, Glimelius B, van den Brule AJ, Wohlfahrt J, Meijer CJ, Walboomers JM, et al. Sexually transmitted infection as a cause of anal cancer. *N Engl J Med* 1997; 337: 1350-1358.
- Reiter PL, Brewer NT, Smith JS. Human papillomavirus knowledge and vaccine acceptability among a national sample of heterosexual men. *Sex Transm Infect* 2010; 86: 241-246.
- NIH. HPV and Cancer [Internet]. National Cancer Institute; [28 January 2019]. Available from: <https://www.cancer.gov/about-cancer/causes-prevention/risk/infectious-agents/hpv-and-cancer?redirect=true>
- Sankaranarayanan R, Ferlay J. Worldwide burden of gynaecological cancer: the size of the problem. *Best Pract Res Clin Obstet Gynaecol* 2006; 20: 207-225.
- ICO Information Centre on HPV and Cancer. Human papillomavirus and related cancers, Ecuador. [Internet]. HPV Information Centre; 2018 [8 January 2019]. Available from: https://hpvcentre.net/statistics/reports/ECU_FS.pdf
- Naing C, Pereira J, Abe T, Eh Zhen Wei D, Rahman Bajera IB, Kavinda Perera UH. Predictors associated with the willingness to take human papilloma virus vaccination. *J Community Health* 2012; 37: 288-293.
- Baloch Z, Yasmeen N, Li Y, Zhang W, Lu H, Wu X, et al. Knowledge and Awareness of Cervical Cancer, Human Papillomavirus (HPV), and HPV Vaccine Among HPV-Infected Chinese Women. *Med Sci Monit* 2017; 23: 4269-4277.
- Yuanyue L, Baloch Z, Shanshan L, Yasmeen N, Xiaomei W, Khan JM, et al. Cervical Cancer, Human Papillomavirus Infection, and Vaccine-Related Knowledge: Awareness in Chinese Women. *Cancer Control* 2018; 25: 1073274818799306.
- Makwe CC, Anorlu RI, Odeyemi KA. Human papillomavirus (HPV) infection and vaccines: knowledge, attitude and perception among female students at the University of Lagos, Lagos, Nigeria. *J Epidemiol Glob Health* 2012; 2: 199-206.
- Al-Shaikh GK, Almussaed EM, Fayed AA, Khan FH, Syed SB, Al-Tamimi TN, et al. Knowledge of Saudi female university students regarding cervical cancer and acceptance of the human papilloma virus vaccine. *Saudi Med J* 2014; 35: 1223-1230.
- Khan TM, Buksh MA, Rehman IU, Saleem A. Knowledge, attitudes, and perception towards human papillomavirus among university students in Pakistan. *Papillomavirus Res* 2016; 2: 122-127.
- Khoo CL, Teoh S, Rashid AK, Zakaria UU, Mansor S, Salleh FN, et al. Awareness of cervical cancer and HPV vaccination and its affordability among rural folks in Penang Malaysia. *Asian Pac J Cancer Prev* 2011; 12: 1429-1433.
- Ragin CC, Edwards RP, Jones J, Thurman NE, Hagan KL, Jones EA, et al. Knowledge about human papillomavirus and the HPV vaccine--a survey of the general population. *Infect Agent Cancer* 2009; 4: S10.
- Adjei Boakye E, Tobo BB, Rojek RP, Mohammed KA, Geneus CJ, Osazuwa-Peters N. Approaching a decade since HPV vaccine licensure: Racial and gender disparities in knowledge and awareness of HPV and HPV vaccine. *Hum Vaccin Immunother* 2017; 13: 2713-2722.
- Touch S, Oh JK. Knowledge, attitudes, and practices toward cervical cancer prevention among women in Kampong Speu Province, Cambodia. *BMC Cancer* 2018; 18: 294.