



## HPV among men – what knowledge we have in this field

### HPV wśród mężczyzn – jaką wiedzę mamy w tej dziedzinie

Jakub Fiegler-Rudol<sup>1</sup> , Katarzyna Kryszczyšin-Musialik<sup>2</sup> , Karolina Lau<sup>2</sup> 

<sup>1</sup>Students' Scientific Club at the Department of Environmental Medicine and Epidemiology,  
Faculty of Medical Sciences in Zabrze, Medical University of Silesia, Katowice, Poland

<sup>2</sup>Department of Environmental Medicine and Epidemiology, Faculty of Medical Sciences in Zabrze,  
Medical University of Silesia, Katowice, Poland

#### ABSTRACT

The human papillomavirus (HPV) is a common sexually transmitted DNA virus. The resulting infection may be asymptomatic or manifest itself through benign symptoms such as warts, affecting the genitals and skin. It is a common etiological factor associated with various cancers, most notably cervical cancer. The prevalence of genital HPV in healthy men is high and can be higher than in women in certain populations. The virus is transmitted sexually. Contraceptive methods do not protect against transmission as it can be transmitted through the skin of the scrotum. Rates vary drastically based on factors such as the country of residence, socioeconomic status, ethnicity as well as the screening methods used. Population factors affect HPV vaccine acceptance. The awareness about HPV has improved over the past two decades, with women historically being more informed. However, awareness is still inadequate, especially among certain demographic groups. Despite men currently showing similar awareness levels to women, a significant percentage have not been vaccinated. Not only are men an important vector for infection, but HPV is correlated with several cancerous changes observed among men. Attitudes towards HPV vaccination differ, with some influenced by vaccine hesitancy, which itself is correlated with knowledge. These individuals face higher risks due to lower vaccination rates for HPV.

#### KEYWORDS

HPV, epidemiology, sexual health

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**Address for correspondence:** Jakub Fiegler-Rudol, Studenckie Koło Naukowe przy Katedrze i Zakładzie Epidemiologii i Medycyny Środowiskowej, Wydział Nauk Medycznych w Zabrzu, Śląski Uniwersytet Medyczny w Katowicach, ul. Jordana 19, 41-808 Zabrze, tel. +48 664 195 878, e-mail: s88998@365.sum.edu.pl



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## STRESZCZENIE

Wirus brodawczaka ludzkiego (*human papillomavirus* – HPV) jest powszechnym wirusem DNA przenoszonym drogą płciową. Zakażenie może przebiegać bezobjawowo lub z łagodnymi objawami, takimi jak brodawki narządów płciowych i skóry. Jest to powszechny czynnik etiologiczny związany z różnymi nowotworami, szczególnie z rakiem szyjki macicy. Częstość występowania HPV narządów płciowych u zdrowych mężczyzn jest wysoka i w niektórych populacjach może być wyższa niż u kobiet. Wirus jest przenoszony drogą płciową. Metody antykoncepcyjne nie chronią przed transmisją, gdyż wirus może być przenoszony przez skórę moszny. Ryzyko różni się w zależności od czynników, takich jak kraj zamieszkania, status społeczno-ekonomiczny, pochodzenie etniczne, a także stosowane metody przesiewowe. Czynniki populacyjne wpływają na akceptację szczepionki przeciwko HPV. Świadomość dotycząca wirusa HPV w ciągu ostatnich dwóch dekad wzrosła, przy czym kobiety są obecnie lepiej poinformowane. Jednak świadomość ta jest nadal niewystarczająca, zwłaszcza wśród niektórych grup demograficznych. Mimo iż mężczyźni wykazują obecnie podobny poziom wiedzy w tym zakresie jak kobiety, znaczny odsetek z nich nie został zaszczepiony. Mężczyźni są nie tylko ważnym wektorem infekcji; HPV jest też skorelowany z kilkoma zmianami nowotworowymi obserwowanymi u mężczyzn. Postawy wobec szczepień przeciwko HPV są różne, a niektóre z nich wynikają z niechęci do szczepień, która z kolei jest powiązana z wiedzą. Osoby te są narażone na większe ryzyko ze względu na niższe wskaźniki szczepień przeciwko HPV.

### SŁOWA KLUCZOWE

HPV, epidemiologia, zdrowie seksualne

## INTRODUCTION

The human papillomavirus (HPV) is a DNA virus from the *Papillomaviridae* family. It is the most common sexually transmitted infection in the world among both sexes [1]. The primary mode of transmission is skin-to-skin contact, often during intimate sexual contact [2]. Two primary types can be distinguished: high and low-risk HPV. The latter is responsible for symptoms that do not cause serious health problems, such as warts (around the genitals, anus, mouth, or intraorally). High-risk HPV (types 16 and 18) is associated with a variety of cancers, including cervical, anal, penile, oropharyngeal, vaginal, or vulvar. Persistent infection with high-risk HPV is considered a major risk factor for developing these cancers [3]. HPV strains have been recognised as etiological factors in the development of laryngeal papillomatosis and leukoplakia. Most HPV infections are however asymptomatic, with about 90% resolving naturally without medical intervention within two years post-infection [4]. The HPV vaccine is a highly successful preventative intervention. It is now recommended for both sexes, typically starting preteen at age 11 or 12, but can be administered up to the age of 26. It is generally not advised for those around 26 years of age [5]. Countries around the world have expanded their vaccine programmes to include men.

The best prevention is undoubtedly safe sex practices. Using condoms consistently and correctly can reduce the risk of HPV transmission, but they do not provide complete protection as HPV can infect surrounding areas not covered by a condom. Refraining from multiple sexual partners will decrease the chances of infection significantly. Regular screening should be considered. Pap smears or HPV tests detect any abnormalities in the cervix that could be related to HPV

and could potentially become cancerous [6]. Currently, there is no treatment for the virus, but in most cases, the immune system can clear the infection over time. The resulting warts may be treated by freezing, topical treatments, or surgical removal. Most infected males never exhibit any symptoms, and a persistent infection usually manifests as genital warts. What is clear from epidemiological trends is that men are significant vectors in the transmission of HPV to women [7]. This is why it is increasingly important to assess men's attitudes towards this problem.

There are high and low-risk types, with high-risk strains (16 and 18) being oncogenic. Less frequently oncogenic are types 31, 33, 35, 39, 40, 43, 51, 52, 53, 54, 55, 56 and 58, which are sometimes classified as moderate risk [8].

The HPV vaccine has been used since 2006. Currently, three types of vaccines are registered and authorized in the European Union: bivalent (against HPV infections types: 16 and 18) Cervarix, quadrivalent (against HPV infections types: 6, 11, 16, 18) Silgard, and nine-valent (against HPV infections types: 6, 11, 16, 18, 31, 33, 45, 52 and 58) Gardasil9 [9]. Men should consider getting vaccinated as studies show that approximately 2% of men's cancers are related to HPV (mainly penile cancer, head and neck cancer as well as anal cancer). Men often act as an important reservoir of the virus transmitted to the partner [10].

## DISCUSSION

### Epidemiology of HPV among men

Generally, the prevalence of genital HPV infection in healthy men appears to be as high as or even higher than that in women. Over 90% of sexually active men and 80% of sexually active women will contract HPV at some point in their lives [11]. Existing literature



estimates the prevalence of genital HPV infection in men between 1.3% and 72.9% [12]. This variability can be attributed to differences in the studied populations, the specific anatomical sites examined (circumcised vs uncircumcised men), and the methods used for detecting HPV genetic material. There is also a considerable variation between countries. For American men aged 18 to 59, the occurrence of any type of genital HPV and high-risk strains (HR-HPV) was 45.2% and 25.1%, respectively [13]. In Oceania, it was 28% for any type of HPV and 19% for HR-HPV [14]. In Kenya, the respective rates were 53% and 32% [12]. These regional differences may be due to vaccine availability, unsafe sexual behaviour as well as a lack of awareness among different cultures [15,16]. For comparison, among women, the highest rates were observed in Oceania (30.9%) and Africa (21.1%). They were significantly lower in Europe (14.2%), America (11.5%), and Asia (9.4%) [17]. While these studies provide a good estimate of the general infection trend, more extensive cohort studies must be conducted to obtain accurate percentages.

It is difficult to estimate the rate globally, nevertheless, recent findings from an ongoing multinational prospective cohort study indicate that 50.5% of men tested positive for at least one known HPV type, whether oncogenic or not, and an additional 14.7% had a positive polymerase chain reaction (PCR) result for an undetermined/ unclassified HPV infection. HPV 16 was the most frequently detected type [18]. For asymptomatic men, the penile shaft, the glans penis, the prepuce, and the scrotum were the sites tested for genital warts. These areas accounted for over 95% of detected genital HPV infections. Therefore, they are seen as the best spots for identification [19].

In comparison to women, HPV infections in men may be more likely to persist. The general prevalence of oral HPV infection was notably elevated in men who have engaged in a substantial number (> 16) of oral sexual partners in their lifetime (29.8%), men who disclosed having sexual relations with other men (18.2%), and men with simultaneous genital HPV infection (19.3%) [20]. Conversely, short-lasting infections with documented regression of HPV were demonstrated in 49% of infected men and 31% of infected women [21]. The highest prevalence of HPV was observed among individuals aged 14 to 19 (46.6%), followed by those aged 30–34 (39.7%). Therefore, this age group and younger children must be adequately aware of the virus and its mode of transmission. As for the frequently oncogenic HPV 16, it was most prevalent in the 20–24 age group (9.0%) and the lowest rate was seen in individuals aged 50 to 54 (6.3%) [22].

### **Predisposing factors**

Several population factors have a profound impact on HPV vaccine acceptance. They can be divided into

predisposing, enabling, and need factors. Predisposing factors encompass elements such as race, age, parental education level, and sexual orientation, offering insights into the demographic and social structures that have an influence. Enabling factors encompass family-related aspects such as household income and insurance type (for individuals in the United States – US), as well as community-based factors such as regional location and accessibility to medical services. Need factors are perceived elements like vaccination history and personal health status, along with evaluated aspects, including abnormal pap smear results. Together, the aforementioned factors provide a comprehensive framework for understanding and addressing the diverse health and healthcare requirements within a given population [23].

The most frequently cited factor influencing health outcomes was race or ethnicity. Several studies revealed significant associations between race or ethnicity and vaccination. In the US, Hispanics were more likely to be vaccinated than non-Hispanics [24,25].

Concerning the parental education level, studies highlighted a significant correlation. Remarkably, girls whose mothers had attained higher levels of education exhibited elevated rates of being unvaccinated than other education groups [26].

When it comes to vaccination and HPV prevention based on sexual orientation, it was found that completely heterosexual males and mostly heterosexual males were only half as likely to have received even a single dose compared to gay males. In contrast, when compared to lesbians, no discernible disparities were noted for completely heterosexual or bisexual females. Mostly heterosexual females were still around 20% more likely to have received at least one dose [27].

### **Awareness among men**

In measuring awareness and knowledge, it is important to distinguish between perceived and measured knowledge. Many individuals claim to understand the virus, yet when asked to complete questions to determine their expertise, the results showed a significant overestimation of one's knowledge. 82.9% of males claimed to know about HPV, yet 90% of men indicated that they had never seriously thought about getting the vaccine. Only 24.8% of men thought they were at risk of HPV infection [28]. This is consistent with earlier research showing ongoing gaps in understanding how HPV spreads, the diseases it is linked to, and the best prevention methods.

Administering the HPV vaccine to both sexes is pivotal in combating the increasing rate of HPV-related cancers. It is one of the most important changes besides regular screening tests and sensible sexual behaviours. Therefore, it is important to address the disparities



between men and women in terms of HPV awareness, vaccination uptake, perceived and actual knowledge about HPV, as well as their beliefs.

A study conducted in 2019 assessing the knowledge of the virus and vaccine found that both male and female college students exhibited high levels of awareness (> 80%) [29]. There was no significant difference in awareness between genders, suggesting an overall improvement in HPV awareness. In a similar study conducted in 1999 at a Florida university, only 37% of students had heard of HPV [30]. In the past, women were more educated about HPV than men [31]. Although men's awareness of the virus is improving, efforts should be made to provide them with a detailed education about HPV. A study in 2019 concluded that college men (65%) were notably less aware of the HPV vaccine age recommendations compared to college women (51.6%) [32]. This lack of knowledge about the appropriate age for vaccination might prevent eligible men from starting the vaccination process, even if they are aware of HPV. Given recent changes in HPV vaccine guidelines, increased media coverage might lead to a rise in vaccination awareness. It is a worrying trend as young adults will not feel compelled to vaccinate their children if they lack sufficient knowledge [33].

A study conducted in Poland showed that the level of public awareness regarding HPV is inadequate. Surprisingly, men demonstrated higher levels of knowledge compared to women, while individuals with children exhibited the lowest level of awareness. This underscores the urgent need for a more extensive information campaign concerning preventive vaccinations. These campaigns serve as the most potent means of safeguarding both women and men, emphasizing the importance of their widespread implementation. 80% of the population was not aware of widespread HPV infections and 1/3 of the respondents thought that only girls should be vaccinated [34].

In less economically developed countries, such as Uganda, men expressed a willingness to actively support efforts for cervical cancer prevention among their wives and daughters. To enhance the uptake and acceptance of prevention measures, screening and vaccination initiatives should proactively engage men in awareness-building endeavours. This inclusive approach is pivotal in effectively combatting cervical cancer within the Ugandan population [35].

### **Varying attitudes towards the vaccine**

The study investigated attitudes toward HPV vaccination and their association with vaccination intentions and behaviours. Despite similar levels of awareness and knowledge between men and women,

over 70% of men had not been vaccinated. Only 26% of women and 4% of men had received all three doses of the HPV vaccine. While the participants generally held favourable attitudes towards vaccination (70%), vaccinated women were seven times more likely to view vaccination positively compared to unvaccinated women, a distinction not observed in young men. This suggests that men who did get vaccinated might not have received sufficient information about HPV or the vaccine at the time [29].

Initial vaccines were primarily promoted for girls, leading to earlier awareness and prevention among them. Studies among young men have reported varying levels of acceptability of the HPV vaccine. Vaccine hesitancy, likely influenced by parents, may account for attitudinal differences between those who initiated the vaccine series and those who did not [36]. There is also an altruistic motivation for men to get vaccinated, potentially protecting women through herd immunity. Given the rising incidence of HPV-related oropharyngeal cancer in men, there is an urgent need to improve vaccine uptake in men [37].

Individuals with negative attitudes towards HPV vaccination tended to be uninformed about HPV and were more likely to be unvaccinated. This aligns with recent research indicating that knowledge about HPV predicts attitudes towards vaccination. The positive correlation between a favourable attitude and vaccine uptake may be due to attitude-behaviour consistency. Those with positive attitudes were generally more knowledgeable and more likely to have received at least one dose of the HPV vaccine [38].

A meta-analysis revealed a moderate level of acceptance for the HPV vaccine among men (scoring 50.4 on a 100-point scale) in 22 studies comprising 8360 participants. The range of acceptance varied widely across studies, ranging from 8.2 to 94.0. As a reference, in a review of US studies centred on young women, acceptability was notably higher (ranging from 55.0 to 100.0), although the average acceptability score was not provided [39].

Gay and bisexual males would benefit from the vaccine to decrease anal cancer risk. In a study in the US, more than 57% of the total participants indicated familiarity with HPV in 2017. There were gradual increments in the proportion of respondents who were aware of HPV each year, and by 2020, over 79% of the respondents were knowledgeable about HPV in general. It is worth noting that other predisposing factors such as socioeconomic background and ethnicity mean that it is hard to find consistent trends for all men who have sex with men [40]. A different study conducted in the US discovered that merely 13% of gay and bisexual men between the ages of 18 and 26 had received any HPV vaccine doses [41].



## CONCLUSIONS

The human papillomavirus is a highly prevalent sexually transmitted infection. It is transmitted through intimate contact, leading to various health issues, including genital warts and certain cancers. There are high and low-risk types, with high-risk strains (16 and 18) being oncogenic. Less frequently oncogenic are types 31, 33, 35, 39, 40, 43, 51, 52, 53, 54, 55, 56 and 58, which are sometimes classified as moderate risk. While most HPV infections are asymptomatic and often clear on their own, some can persist and lead to undesirable health outcomes. The HPV vaccine is highly effective in preventing infections and is now recommended for both sexes, typically from age 9. In terms of prevalence among men, genital HPV infection is common, affecting over 90% of sexually active men. However, rates vary widely between different population groups and regions. Infections in men may be more likely to persist compared to women, and certain behaviours such as engaging in promiscuous sexual practices with a large number of

sexual partners can increase the risk. The most important risk factors for sexual HPV infections are early sexual encounters and a large number of sexual partners.

HPV vaccine acceptance varies among men and is influenced by factors including race, age, parental education, and sexual orientation. Studies have shown disparities in vaccine uptake based on these factors, emphasising the importance of targeted education programmes and outreach efforts.

In terms of awareness, both men and women have become more informed about HPV over the past two decades. Studies on college students show men now have a high level of awareness. Nevertheless, there is still room for improvement, especially regarding knowledge about the appropriate age for vaccination. Attitudes towards the vaccine vary, with women generally more likely to view it positively. Factors influencing attitudes include knowledge about HPV, with those more informed being more likely to have received the vaccine. Among men who have sex with men, awareness of HPV has increased over the years, but vaccine uptake remains relatively low.

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### Author's contribution

Study design – J. Fiegler-Rudol

Data collection – J. Fiegler-Rudol

Manuscript preparation – J. Fiegler-Rudol, K. Kryszczyzyn-Musialik

Literature research – J. Fiegler-Rudol

Final approval of the version to be published – K. Kryszczyzyn-Musialik, K. Lau

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