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BRIEF REVIEW

The Need for Increased HPV Vaccination Awareness and Access

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Abstract

Human papillomavirus (HPV) in the genital region is a frequently occurring sexually transmitted disease that can result in genital warts and various types of cancer. Most sexually active individuals acquire HPV at a certain point during their lifetime, but fortunately, several of the most harmful HPV types are preventable with vaccinations. All boys and girls aged 9 to 12 should get the HPV vaccine, although it can be given to individuals up to age 45. The HPV vaccine triggers an immune response that helps the body recognize and fight off the virus. There are currently two different HPV vaccines available: Gardasil and Cervarix. Gardasil guards against the two HPV strains that most commonly result in cervical cancer (CC) and various additional strains that can result in genital warts or other types of cancer. Cervarix only offers protection against the two forms of HPV that trigger CC. Mild side effects may occur, but more severe side effects are rare. Despite the availability of HPV vaccination, vaccination rates remain suboptimal in many countries. Raising awareness and expanding access to HPV vaccination are critical steps toward reducing HPV-related diseases. This article explores the basics of HPV and the role of vaccination in preventing its spread.(**International Journal of Biomedicine. 2023;13(2):202-204.**)

Keywords: HPV • genital infection • cancer • vaccination

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Introduction

Genital HPV is a transmittable disease that affects both women and men and is associated with various health conditions, including cervical, anal, and oropharyngeal cancer, as well as genital warts.[1] It is among the most prevalent sexually transmitted infections globally, with an expected 570,000 new cases of CC and 311,000 deaths annually worldwide.[2]

Fortunately, vaccination against HPV has been available since 2006, with the release of the first HPV vaccine. Currently, there are two types of HPV vaccines available: two quadrivalent vaccines that guard against HPV strains 6, 11, 16, and 18, and one bivalent vaccine that protects against HPV strains 16 and 18.[3,4]

Despite the availability of HPV vaccination, vaccination rates remain suboptimal in many countries.[5] Increasing awareness about the significance of HPV vaccination and improving access to vaccination is critical in reducing the burden of HPV-related diseases. In this review article, we will discuss genital HPV, its associated health consequences, and the significance of HPV vaccination in preventing HPV-related diseases.

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Genital HPV and Associated Health Consequences

There are about 150 forms of HPV, more than 40 of which can invade the genital region. Most people who contract HPV do not experience any symptoms, and their immune system clears the infection within 1-2 years. However, the virus persists in some cases and can lead to various health consequences.[1]

The most significant health consequence associated with genital HPV infection is the development of malignancy. HPV infection is the leading reason of cancer cervix, with HPV strains 16 and 18 being responsible for approximately 90% of all occurrences. Additionally, HPV infection is associated with other types of cancer, including oropharyngeal, anal, vulvar, and vaginal cancer.[1,6]

In addition to cancer, HPV infection can also cause genital warts, noncancerous lesions on the genitals or anus. Genital warts are often embarrassing and uncomfortable and can be challenging to treat.[7]

HPV Life Cycle, Immunogenicity, and Receptors

The life cycle of HPV begins when the virus attacks the basal epithelial cells. The virus enters the cell by binding to cell surface receptors, such as heparan sulfate proteoglycans, α6β4 integrins, and possibly others. Once inside the cell, the viral genome is delivered to the nucleus, where it is replicated and transcribed. The virus employs the host cell's machinery to create viral proteins, which are then assembled into new virus particles. The newly released virus particles infect other cells after being liberated from the host cell.[8]

The immune system is crucial in preventing HPV infection. HPV infection stimulates both innate and adaptive immune responses. Innate immune responses include the activation of natural killer cells, dendritic cells, and macrophages, while adaptive immune responses involve the production of antibodies and the activation of T cells. HPV-specific T cells have a significant function in HPV infection by recognizing and killing infected cells.[9]

HPV infects epithelial cells that express specific cell surface receptors, including heparan sulfate proteoglycans, α6β4 integrins, and possibly others. The viral capsid protein, L1, contains neutralizing epitopes that can induce the production of neutralizing antibodies. These antibodies can bind to the virus and prevent infection of susceptible cells.[10]

The Fate of HPV Infection

The fate of HPV infection is determined by several factors, including the kind of HPV virus involved, the individual's immune system, and whether therapy is received.[9]

In many situations, HPV infections resolve independently, with no long-term health consequences. This is particularly true for younger people with strong immune systems. Most HPV-infected individuals will recover within two years and sometimes considerably sooner. Over 90% of HPV infections resolve without treatment within two years.[7]

However, certain HPV infections might persist and evolve into chronic ones. These ongoing infections may cause aberrant cell proliferation, which may ultimately result in cancer. This is why it is critical to get frequent screenings for CC and other HPV-related malignancies, particularly for those with persistent HPV infections (Table 1).[11]

Table 1.

Cancer sites, the associated HPV types, and the percentage of association.[14-17]

Cancer Site	Associated HPV types	Percentage of association
Cervical Cancer	16, 18, 31, 33, 35, 45, 52, and 58	>90%
Anal Cancer	16, 18, 31, 33, 35, 45, 52, and 58	>90%
Oropharyngeal Cancer	16 and 18	60-70%
Vulvar Cancer	16, 18, 31, and 33	50-70%
Vaginal Cancer	16 and 18	>80%
Penile Cancer	16, 18, 31, 33, 35, 45, 52, and 58	30-50%

There are also various therapies available for HPV infections and associated health issues. Medication to cure genital warts, surgery to remove aberrant tissue, and different medicines to treat cancer caused by HPV are presented in detail in the Advisory Committee on Immunization Practices (ACIP) Recommendations.[12]

In addition to these therapies, vaccinations are available to prevent specific forms of HPV infection. The HPV vaccination is extremely successful in preventing infections caused by the most prevalent strains of HPV that cause cancer and genital warts. Vaccination is advised for both boys and girls, and it is usually administered during early adolescence before sexual activity begins.[13]

HPV Vaccination in Preventing HPV-Related Diseases

HPV vaccination is an effective method of avoiding HPV infection and its associated health consequences. There are now two types of HPV vaccinations available: a bivalent vaccine against HPV types 16 and 18 and a quadrivalent vaccine against HPV strains 6, 11, 16, and 18. Both vaccinations have been proven safe and effective in preventing HPV infection and lowering the prevalence of HPV-related diseases.[13]

Numerous studies have shown that HPV vaccination could lower the risk of CC and other HPV-related malignancies. For example, a systematic review of real-world data found that the quadrivalent HPV vaccination was beneficial in lowering the prevalence of HPV-related diseases such as genital warts, CC, and other HPV-related malignancies. Additionally, a long-term follow-up study of a random clinical trial discovered that the bivalent HPV vaccination was highly efficient in limiting HPV type 16 and 18 infections and reducing CC incidence (Table 2).[20]

Table 2.

Types of HPV vaccines and their side effects.[13,19,20]

HPV Vaccine	Route Administration	Age Administration	Side Effects (potential)
Cervarix	Intramuscular injection	Recommended at age 9–25	Pain, swelling, and redness at the injection site; headache, fatigue, muscle pain, and gastrointestinal symptoms
Gardasil	Intramuscular injection	Recommended at age 9-45	Pain, swelling, and redness at the injection site; fever, headache, nausea, dizziness, and fainting

Furthermore, HPV vaccination can provide herd immunity when a significant proportion of the population is vaccinated. This reduces the overall prevalence of the disease, protecting unvaccinated individuals from HPV infection.[5]

In conclusion, genital HPV is a prevalent infection that can lead to various health consequences, including cancer and genital warts. The HPV vaccine is a safe and efficient way to limit HPV infection and reduce the incidence of HPV-related

diseases. Increasing awareness about the value of the HPV vaccine and improving access to vaccination is critical in lowering the incidence of HPV-associated disorders.

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Competing Interests

The authors declare that they have no competing interests.

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