

# Awareness of Cervical Cancer and Its Vaccine Among Reproductive Age Group Women

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## ABSTRACT

Cancer remains one of the most distressing diseases worldwide and is the second leading cause of death globally. It is characterized by the uncontrolled growth of cells that serve no beneficial purpose to the body. Cervical cancer ranks as the fourth most common cancer among women, with an estimated 604,237 new cases and 341,843 deaths in 2020, following breast, colorectal, and lung cancers. Notably, approximately 90% of these cases and deaths occurred in low- and middle-income countries. Cervical cancer develops in the cells of the cervix—the lower part of the uterus that connects to the vagina—and is primarily caused by persistent infection with high-risk types of the human papillomavirus (HPV), a sexually transmitted infection.

Most individuals become infected with HPV shortly after becoming sexually active. Fortunately, the cervix is easily visualized and sampled, which facilitates early detection through screening. Key strategies for the prevention and early detection of cervical cancer include HPV vaccination and screening for precancerous lesions. However, a lack of awareness about cervical cancer poses a significant barrier to early detection and timely intervention, particularly in countries like India, where limited access to screening facilities and low awareness levels among women remain major challenges.

Healthcare workers play a crucial role in promoting awareness and encouraging

preventive practices among the general public. Since its launch in 2006, the HPV vaccine has been a pivotal tool in reducing the incidence of cervical cancer. The World Health Organization (WHO) has prequalified four vaccines, all of which protect against HPV types 16 and 18—responsible for at least 70% of cervical cancers. Recent studies also suggest that a single vaccine dose may be as effective as the traditional two- or three-dose schedules in preventing high-risk HPV infections.

Without vaccination, the global burden of cervical cancer among girls born between 2005 and 2014 is projected to reach 11.6 million cases by 2094. Based on the findings of various studies and surveys, several policies can be recommended. First, it is essential to ensure the availability of cervical cancer screening facilities in all health centers. Second, increasing awareness among women, particularly during their visits to healthcare providers, is vital. Research from developing countries highlights gaps in knowledge and awareness, offering valuable insights for designing effective educational and outreach strategies to combat cervical cancer.

**Keywords:** Cervical cancer, cancer, human papillomavirus (HPV).

## INTRODUCTION

### Cancer and Cervical Cancer: Overview and Causes

Cancer is a disease characterized by the uncontrolled growth of cells and their potential to spread to other parts of the

body. It can affect nearly any part of the human body, which is composed of trillions of cells. Under normal conditions, cells grow and divide through a regulated process known as cell division, replacing old or damaged cells as needed. Each cell has a defined lifespan, and upon completing its cycle or becoming damaged, it dies and is replaced by new, healthy cells.

However, when this orderly process is disrupted, abnormal or damaged cells may grow and multiply uncontrollably. These cells can form masses of tissue known as tumors. Not all tumors are cancerous, but malignant tumors have the potential to invade nearby tissues and spread to distant parts of the body through the blood and lymphatic systems [1].

There is no single known cause of cancer. Scientists believe that it results from a complex interaction of multiple factors, which may include genetic predisposition, environmental exposures, and individual lifestyle or constitutional traits [2]. Several risk factors have been identified that can increase an individual's likelihood of developing cancer. These include:

- Tobacco use
- High alcohol consumption
- Unhealthy diet
- Lack of physical activity
- Exposure to air pollution or radiation
- Unprotected exposure to ultraviolet (UV) radiation
- Certain viral infections, including *Helicobacter pylori*, human papillomavirus (HPV), hepatitis B virus (HBV), hepatitis C virus (HCV), human immunodeficiency virus (HIV), and Epstein-Barr virus (EBV) [3].

### **Cervical Cancer and HPV**

Cervical cancer develops in the cervix, the lower part of the uterus that connects to the vagina. Nearly all cases of cervical cancer (approximately 99%) are linked to infection with high-risk types of human papillomavirus (HPV), a highly prevalent virus primarily transmitted through sexual contact [4]. Although most HPV infections

resolve spontaneously without causing symptoms, persistent infection with certain high-risk HPV types can lead to the development of cervical cancer.

HPV comprises a group of more than 200 related viruses that are widespread across the globe. At least 14 of these types are classified as high-risk due to their strong association with various cancers, particularly cervical cancer. Among these, HPV types 16 and 18 alone are responsible for approximately 70% of cervical cancers and precancerous cervical lesions [5]. In addition to cervical cancer, persistent HPV infection is also linked to cancers of the anus, vulva, vagina, penis, and oropharynx. HPV types are categorized into two groups based on their cancer-causing potential:

- Low-risk HPV types (e.g., 6, 11, 42, 43, and 44): These types are generally associated with benign conditions such as genital warts.
- High-risk HPV types (e.g., 16, 18, 31, 33, 34, 35, 39, 45, 51, 52, 56, 58, 59, 66, 68, and 70): These are strongly linked to the development of cervical cancer and other HPV-associated malignancies [6].

### **HPV Co-infections and Cervical Cancer Progression**

Studies have shown that co-infection with multiple types of human papillomavirus (HPV) can occur, with multiple infection rates reported as high as 39% [7]. The presence of multiple HPV genotypes has been associated with increased severity of cervical disease. Among patients with normal cytology or atypical squamous cells of undetermined significance (ASCUS), multiple HPV genotypes—usually including at least one high-risk type—were identified in approximately 11.8% of cases. In comparison, such infections were found in 34.5% of patients with mild or moderate dyskaryosis. Interestingly, the prevalence of multiple HPV genotypes was significantly lower in cervical carcinoma tissue samples, at only 4.4% [8]. Most multiple infections involve two genotypes; however, cases with

three, four, or even five HPV types have also been observed [7, 9].

### **Symptoms and Detection of Cervical Cancer**

Cervical cancer typically develops slowly and often presents no symptoms in its early stages, making early detection difficult. It can take several years for the disease to progress to a stage where symptoms become noticeable. Therefore, the most effective method for prevention is routine screening to detect abnormal cervical cells before they develop into cancer.

Early signs and symptoms of stage 1 cervical cancer may include:

- Abnormal, heavy, watery, or bloody vaginal discharge, possibly with a foul odor
- Vaginal bleeding after sexual intercourse, between menstrual periods, or after menopause
- Heavier and longer menstrual periods than usual

If the cancer spreads to surrounding tissues or organs, symptoms may become more severe and include:

- Pain or difficulty during urination, possibly with blood in the urine (hematuria)
- Diarrhea, rectal pain, or rectal bleeding during bowel movements
- Fatigue, weight loss, and loss of appetite (anorexia)
- General malaise or a persistent dull backache
- Swelling of the legs
- Pelvic or abdominal pain [10]

### **Global Burden of Cervical Cancer**

Cervical cancer is the fourth most common cancer among women worldwide. Women living with HIV are particularly vulnerable, being six times more likely to develop cervical cancer than HIV-negative women. It is estimated that approximately 5% of all cervical cancer cases are directly attributable to HIV infection [11].

In 2020, approximately 604,237 new cases of cervical cancer were diagnosed globally,

accounting for 6.5% of all cancers in women. An estimated 341,843 women died from the disease, with 90% of these deaths occurring in low- and middle-income countries where access to preventive measures, screening, and treatment remains limited [12]. Alarming, current statistics show that more women are dying from cervical cancer than from childbirth.

In the United States, the American Cancer Society estimated that in 2022, approximately 14,100 new cases of invasive cervical cancer would be diagnosed, and about 4,280 women would die from the disease [13].

### **Cervical Cancer in India: Current Status and Prevention Strategies**

In India, cervical cancer remains a significant public health challenge. According to government data, an estimated 127,526 new cases of cervical cancer were reported in 2022. and approximately one-fourth of global deaths occur each year as a result of the disease. However, these figures likely underestimate the true burden due to underdiagnosis and underreporting. In 2020, Globocan reported an age-standardized incidence rate of 18 per 100,000 women and a cumulative risk of 2.01%. Among women aged 30–69 years, cervical cancer accounts for 17% of all cancer-related deaths in the country [14].

The primary causative agent in about 95% of cervical cancer cases is the human papillomavirus (HPV), transmitted mainly through sexual contact. In the Indian context, risk factors include:

- Early onset of sexual activity (often due to early marriage)
- Multiple sexual partners
- Multiple childbirths
- Smoking
- Poor genital hygiene
- Co-infection with other sexually transmitted diseases [14]

While cervical cancer rates have declined significantly in many developed countries, owing to widespread screening and vaccination programs, the burden remains

disproportionately high in developing nations, including India [15].

### **Prevention of Cervical Cancer**

Cervical cancer is largely preventable through two main strategies:

1. HPV vaccination for young girls
2. Regular screening for women above the age of 30 [16]

### **Screening**

Cervical cancer screening involves the detection of pre-cancerous or cancerous changes in cervical cells, often through HPV testing or cytology (Pap smears). Screening is targeted at asymptomatic women, who may otherwise feel healthy. Detecting high-risk HPV infections or pre-cancerous lesions early enables timely treatment and significantly improves chances of cure.

The World Health Organization (WHO) now recommends the use of HPV testing—either HPV DNA or HPV mRNA—for primary screening:

- HPV DNA tests detect high-risk HPV strains responsible for most cervical cancers.
- HPV mRNA tests identify HPV infections that have begun to cause cellular transformation, providing an indication of disease progression [17].

### **Pap Smear (Papanicolaou Test)**

The Pap smear, introduced by Dr. George Papanicolaou in 1949, remains a foundational tool for cervical cancer screening. It involves microscopic examination of cervical cells to identify abnormalities, particularly in the transformation zone, where most cervical cancers originate. Despite its limitations in sensitivity compared to HPV testing, the Pap smear has significantly reduced cervical cancer incidence and mortality—by an estimated 50% to 66%—since its implementation [18].

### **HPV Vaccination**

Currently, four HPV vaccines have been prequalified by the WHO, all of which offer protection against HPV types 16 and 18, which are responsible for at least 70% of cervical cancers. One of these is the 9-valent vaccine, which also protects against five additional oncogenic HPV types, covering up to 90% of cervical cancers. Additionally:

- HPV types 6 and 11, which cause anogenital warts, are also targeted by two of the available vaccines.
- For optimal effectiveness, the HPV vaccine should be administered before exposure to the virus—that is, before the onset of sexual activity.

As such, the WHO recommends vaccinating girls aged 9 to 14 years, when most have not yet become sexually active [17, 19].

### **Awareness and Knowledge of Cervical Cancer: Global and Local Perspectives**

Good knowledge and awareness serve as powerful tools in decreasing the burden of cervical cancer. Numerous studies from different countries have revealed significant disparities in women's knowledge regarding cervical cancer and its prevention. Unlike in developed nations, women in many developing countries exhibit poor levels of awareness and understanding about cervical cancer, its causes, and preventive strategies [20].

A study by Islam et al. highlighted that although nearly 90% of participants were aware of the term "cervical cancer," less than 10% had in-depth knowledge of its causes or preventive measures. Moreover, awareness of the HPV vaccine was extremely limited, especially among women in rural areas [21].

Similarly, a study conducted in Ethiopia examined health-seeking behaviors among women with cervical cancer. The findings revealed extremely low levels of awareness about the disease, with many women relying on traditional remedies, particularly in the early stages of illness. Key barriers to seeking treatment included lack of awareness, limited access to healthcare

services, social exclusion, and poor emotional support [22].

In many developing countries, including India, mothers' awareness of HPV and cervical cancer is inadequate. A study found that most mothers lacked sufficient knowledge about the causes and prevention of cervical cancer, which in turn made it difficult for them to communicate with their daughters about the disease [23].

In Tanzania's Kilimanjaro region, a population-based study among rural and urban women found an extremely low cervical cancer screening rate of 6%, aligning with the WHO's estimated 5-year screening rate of 5% for developing countries. Despite this, both rural and urban populations showed high acceptance of the HPV vaccine if it were to become available [24].

Biswas et al. (1997) observed that cervical epithelial cells are more susceptible to carcinogenic agents during adolescence, reinforcing the importance of early interventions. Early marriage and early pregnancies—common in India—expose young women to prolonged risk factors associated with cervical cancer [25].

Despite 87% of women being familiar with the term "cancer," awareness specific to cervical cancer remains low. One study reported that 96.4% of participants were unaware of its causes, 93.7% did not recognize its symptoms, and 96.4% had no knowledge of its prevention. Furthermore, 90.5% were unaware of the Pap test as a screening tool [26].

Even among healthcare professionals, awareness remains limited. A study conducted among staff nurses revealed that while 69% had some knowledge of cervical cancer, only 5% had ever undergone a Pap test themselves [27].

In India, early detection and screening continue to be major public health challenges due to both infrastructural limitations and low awareness among women [28]. Research by Bathija GV et al. demonstrated poor awareness of cervical cancer, with many women reporting no

knowledge of HPV vaccines or screening methods. The study also identified several barriers to screening, including insufficient resources, lack of knowledge, limited healthcare access, cultural and psychosocial factors, economic challenges, and weak community engagement [29].

Alarmingly, about 50% of women diagnosed with cervical cancer in India have never undergone a Pap test and typically seek medical care only at advanced stages of the disease [30].

## **CONCLUSION**

Cervical cancer is a highly preventable disease, especially through routine screening of women over 30 years and HPV vaccination of young girls before the onset of sexual activity. However, low awareness among women of reproductive age and among healthcare workers, combined with poor access to healthcare facilities, continues to hinder early detection and timely treatment in many low- and middle-income countries.

Improved awareness is critical. When individuals have a better understanding of cervical cancer, its causes, symptoms, and preventive measures, they are more likely to participate in screening and vaccination programs. Increasing awareness among women will also help guide the development of effective behavior change communication models aimed at reducing the disease burden.

To achieve this, there is a pressing need to:

- **Encourage open communication** within families, especially around cervical cancer and sexual health.
- **Utilize mass media** and public health campaigns to lead awareness efforts in an inclusive and culturally sensitive manner.
- **Foster collaboration** between governmental agencies, non-governmental organizations (NGOs), and healthcare institutions to create integrated awareness and prevention programs.

- **Involve community leaders and local influencers** to overcome cultural and social barriers.
- **Strengthen health systems** to ensure consistent access to screening and vaccination services, especially in rural and underserved areas.

Ultimately, reducing the incidence and mortality of cervical cancer will require a comprehensive, collaborative, and sustained public health effort focused on education, prevention, and equitable access to care.

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