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Benefits Of Hpv Vaccine On Cervical Cancer – A Litera-Ture Review

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ABSTRACT:

The aim of the researcher is to evaluate the benefits of HPV vaccine on Cervical Cancer. It is to determine how effective the vaccine is at preventing cervical cancer and related precancerous lesions. Cost effectiveness of strategies for cervical cancer prevention in India. About how much cervical cancer appropriately spreads and diagnosed with these diseases as results over three lacs deaths worldwide. Cervical Cancer screening: Past, Present, and Future. Human Papilloma Virus infection causes cervical cancer: Epidemiology and background. Human Papilloma virus Vaccine Efficacy and Effectiveness against cancer. Overview of the benefits and potential issues of the nonvalent HPV vaccine. Best Practice and research Clinical Obstetrics and Gynecology. Cost effectiveness of nonvalent HPV vaccination in the Netherlands. Updates on Cervical cancer prevention.

Keywords: Cost effectiveness, Prevention, HPV vaccine, Epidemiology.

I. INTRODUCTION:

Cervical cancer is a growth of cells that starts in cervix. The cervix is the lowest parts of the uterus that connects to the vagina. Various strains of the human papilloma virus, also called as HPV, play a role in causing most cervical cancers. HPV is a common infection that is passed through sexual contact. When exposed to HPV, body's immune system typically prevents the virus from doing harm. In a small percent-age of people, however, to virus survives for years. This contributes to the process that causes some cervical cells to become cancer cells. To reduce the risk of developing cervical cancer by having screening tests and receiving a vaccine that protects against HPV infection. When cervical cancer happens, it's often first treated with surgery to remove the cancer. Other treatments may include medicines to kill the cancer cells. It includes chemotherapy and targeted therapy medicines. Radiation therapy with powerful energy beams also may be used. Sometimes treatment combines radiation with low- dose chemotherapy. Most cervical cancer are caused by HPV.HPV is a common virus that passed through sexual contact. Leg swelling, Backache, Pain or bleeding after intercourse, Abnormal vaginal discharge. Menopause but bleeding, Abdominal pain are the main sign & symptoms of cervical cancer. One important strategy to

prevent cervical cancer by controlling the spread of HPV, is to increase the number of vaccinated individuals. For control-ling HPV, vaccination seems to be one of the best approaches. Merck and GlaxoSmithKline have developed two vaccines, Gardasil and Cervarix, respectively for treating HPV-induced cancers. These vaccines mainly target on type 16 and 18 HPV ailments. These vaccines are very effective in young females (aged 9-26) preferably before they become sexually active (Kaarthigeyan (2012)).

Additionally, Gardasil also protects against type 6 and 11 (Lowy et al. (2006)). Successful vaccina-tion can stop the spread of HPV by increasing virus-neutralizing antibodies in serum (Burd (2003)). How-ever, these vaccines have some side effects like pain and syncope which led some controversy in the Western countries recently (Reiter et al. (2009); Brinth et al. (2015)).

II. METHODOLOGY:

This review article follows a structured literature review approach to explore infertility as an inter-national health problem. A comprehensive search was conducted using various academic search engines and databases, including PubMed, Google Scholar, Scopus, Web of Science, and CINAHL. The selection criteria focused on peer-reviewed articles, systematic reviews, meta-analyses, and relevant reports published in the last 10 years.

III. SEARCH STRATEGY:

- **Keywords used:** Cost-effectiveness, prevention, HPV vaccine, Epidemiology, cervical cancer, screening, Human papillomavirus, vaccination cancer prevention, immunization, cancer prevention
- **Boolean operators** (AND, OR) were applied to refine the search.
- **Inclusion criteria**: Studies published in English, addressing literature review on epidemiology, screening of HPV virus and cervical cancer and benefits of HPV vaccine on cervical cancer.
- **Exclusion criteria:** Articles with limited accessibility, non-peer-reviewed sources, and studies lacking scientific rigor.

IV. DATA EXTRACTION AND ANALYSIS:

The literature review on the benefits of the HPV vaccine for cervical cancer prevention highlights its effectiveness, cost efficiency, and global impact. HPV vaccination, combined with regular screening, is the most effective strategy to prevent cervical cancer. Increased vaccine coverage, cost-effective implementation, and new screening technologies can further reduce mortality and disease burden worldwide.

V. REVIEW OF LITERATURE:

The HPV vaccine is highly effective in preventing cervical cancer, especially when given before sexual activity. Studies show it reduces cancer cases by 60%-76%. Cost-effectiveness varies by country, with India and the Netherlands proving vaccination plus screening significantly lowers mortality rates. Advancements in screening technologies (Pap smear, HPV DNA testing, AI-assisted analysis) improve early detection. Countries with strong vaccination and screening programs report declining cervical cancer rates, aligning with WHO's goal of 90% vaccination and 70% screening. Overall, HPV vaccination combined with regular screening is the most effective strategy for cervical cancer prevention worldwide.

VI. MATERIAL METHOD & FINDINGS:

The study is mainly headed on the Benefits of HPV vaccine on Cervical Cancer. By reviewing around 10 Literature. Researcher divided them into 2 categories mentioned.

1. Benefit of HPV vaccine on the prevention of cervical cancer in worldwide.
2. Benefits of HPV vaccine and screening of cervical cancer.

Some of the significant reviews are as depicted in the following Table:

Table 1 Significant reviews Regarding the Benefit of HPV Vaccine on the prevention of Cervical Cancer in worldwide.

Author Name:	Statement:	Methodology:	Major Findings:	Conclusion:
Akashdeep Singh Chauhan, Shankar Prinja, Radhika Srinivasan, Bhavana Rai **Year:** 2020 **Country:** India	Cost effectiveness of strategies for cervical cancer prevention in India	• The study utilized a Markov model from a societal perspective to estimate lifetime costs and outcomes of various screening strategies—Visual Inspection with Acetic Acid (VIA), Papanicolaou (Pap) test, and HPV DNA testing—at different intervals for women aged 30-65. It also assessed HPV vaccination among adolescent girls	• Implementing screening strategies reduced lifetime cervical cancer cases (caused by HPV 16/18) by 20% to 61% and deaths by 28% to 70% compared to no screening. • Screening with VIA every 5 years was cost-effective, with an incremental cost of US$ 829 per Quality-Adjusted Life Year (QALY) gained. • HPV vaccination alone led to a 60% reduction in cancer cases and mortality. Combining vaccination with VIA screening every 5 or 10 years further reduced cancer cases by 69%-76% and deaths by 71%-81%.	• For India, screening with VIA every 5 years is recommended. Additionally, • HPV vaccination, alone or combined with VIA screening, is a cost-effective strategy for cervical cancer prevention.
Sarah L. Bedell, MD, Lena S. Goldstein, Amelia R. Goldstein, Andrew T. Goldstein, MD	Cervical Cancer Screening: Past, Present, and Future	• This review article examines the historical progression of cervical cancer screening	• The Papanicolaou (Pap) smear, introduced in the mid-20th century, significantly	• The integration of HPV screening, advanced diagnostic tools, AI-assisted image

Year: 2020 **Country:** USA		techniques, evaluates current practices, and discusses emerging technologies and strategies aimed at improving early detection and treatment.	reduced cervical cancer incidence and mortality through early detection of precancerous lesions. • The integration of high-risk human papillomavirus (HPV) testing has enhanced screening accuracy. Co-testing (Pap smear combined with HPV testing) and primary HPV testing are now standard practices, offering improved sensitivity in detecting high-grade cervical intraepithelial neoplasia.	analysis, and immediate treatment modalities represents a sensitive, efficient, and cost-effective model for cervical cancer prevention. • This approach holds promise for significantly reducing cervical cancer mortality worldwide, particularly in low-resource settings.
Terresa J Eun, Rebecca B Perkins. **Year:** 2020 **Country:** North America	Human Papilloma infection causes Cervical Cancer: Epidemiology And Background.	• The article provides a comprehensive review of the evolution of cervical cancer screening methods. • It examines historical approaches, evaluates current screening technologies, and discusses potential future advancements in the field.	• Cervical cytology, commonly known as the "Pap smear," has been the cornerstone of cervical cancer screening for decades. While effective, it requires frequent repetition due to limited sensitivity and reproducibility. • The integration of high-risk human papillomavirus (HPV) testing	• Cervical cancer screening has undergone significant transformations, transitioning from sole reliance on cytology to incorporating HPV testing. Ongoing research into new methodologies holds promise for more effective and accessible screening programs in the future.

			has enhanced screening accuracy. HPV testing offers higher sensitivity in detecting precancerous lesions compared to cytology alone.	
Shujuan Lin, Kai Gao, Simeng Gu Liuqing You, Sangni Qian, Mengling Tang, Jianbing Wang, Kun Chen, Mingjuan Jin **Year:** 2021 **Country:** China	Worldwide trends in cervical cancer incidence and mortality, with predictions for the next 15 years	• The study extracted cervical cancer incidence and mortality data from the GLOBOCAN 2018 database, analysing correlations with the Human Development Index (HDI). Temporal trends over the most recent decade were assessed using join point regression analysis in 31 countries with high-quality data. Future trends for the next 15 years were projected using an open-source age-period-cohort model	• Correlation with Socioeconomic Development: A negative correlation was observed between cervical cancer incidence and mortality rates and the HDI (r = -0.56 for incidence; r = -0.69 for mortality; P < .001). • Temporal Trends: Over the past decade, 12 countries exhibited stable incidence and mortality rates, while 14 countries saw a decrease in incidence, and 18 countries experienced a decline in mortality. • Predictions indicate that most countries will continue to experience stable or decreasing trends in cervical cancer incidence and	• The study concludes that the burden of cervical cancer is inversely related to socioeconomic development. Countries with effective cervical cancer screening programs and human papillomavirus (HPV) vaccination initiatives have achieved stable or declining incidence and mortality rates. • These findings underscore the importance of implementing and maintaining comprehensive cervical cancer prevention strategies worldwide.

			mortality over the next 15 years.	
Cody Palmera, Christiaan Dolk, Ugne Sabale, Wei Wang & Kunal Saxena **Year:** 2024 **Country:** USA	Cost-effectiveness of nonvalent HPV vaccination in the Netherlands.	• The researchers employed a validated deterministic dynamic transmission metapopulation model to evaluate the public health and economic outcomes of transitioning from the currently used bivalent HPV vaccine (2vHPV) to the nonvalent vaccine (9vHPV) in the Netherlands. The analysis spanned a 100-year period and considered various scenarios, including increased vaccination coverage and catch-up vaccination for individuals aged 26 years and younger.	• The study projected that, compared to the 2vHPV strategy, adopting the 9vHPV vaccine would prevent an additional 3,245 cases and 825 deaths from cancers attributable to 9vHPV strains, 4,247 cases and 190 deaths from recurrent respiratory papillomatosis, and 1,009,637 cases of anogenital warts. • The incremental cost-effectiveness ratio (ICER) was estimated at €4,975 per quality-adjusted life year (QALY) gained. The ICER remained relatively stable across various sensitivity analyses, with disease utility parameters exerting the most significant influence • In scenarios incorporating catch-up vaccinations for individuals up to 26 years old, the 9vHPV vaccine further	• The analysis suggests that transitioning from a bivalent to a nonavalent HPV vaccination strategy would be a cost-effective approach in the Netherlands, offering substantial public health benefits.

			reduced the incidence of cancers and anogenital warts compared to the 2vHPV vaccine.	
David Viveros-Carreño, Andreina Fernandes, Rene Pareja **Year:** 2023 **Country:** Columbia.	Updates on cervical cancer prevention	• A quasi-experimental study based on initial randomized controlled trials (RCTs) conducted in young women aged 15–26 years. Since efficacy trials were not feasible for the younger target group, surrogate outcomes such as cervical intra-epithelial neoplasia (CIN), cervical adenocarcinoma in situ, persistent HPV infections, antibody titters, and the incidence of anogenital warts were used. Licensing of HPV vaccines for young adolescents was based on bridging immunogenicity trials and safety data.	• Screening programs for vaccinated populations need new guidelines due to the negative impact of false positive results. • The European Society of Gynaecological Oncology (ESGO) and the European Federation of Colposcopy (EFC) emphasize the importance of updated screening strategies.	• Cervical cancer is preventable with a well-known etiological agent, effective vaccines, and screening strategies. Some knowledge gaps remain, such as the minimum required vaccine doses, post-treatment vaccination utility, and the use of self-sampling for HPV testing. The WHO strategy for cervical cancer eradication includes: 1. Vaccinating 90% of girls before age 15 2. HPV-based screening for 70% of women at 35 and 45 years
Paul A. Cohen ,Anjua Jhingran ,Ana Oaknin ,Lynette Denny **Year :** 2019	Cervical cancer.	• The study likely involved a comprehensive review of cervical cancer prevention, diagnosis, and	• Cervical cancer remains a significant global health issue, particularly in low-resource settings.	• Cervical cancer is preventable and treatable with effective vaccination, screening, and

Country : USA		treatment strategies, including clinical trials, epidemiological data, and global health policies. It may have analysed the effectiveness of screening methods, vaccination programs, and treatment modalities for cervical cancer, focusing on best practices and future directions.	• HPV vaccination and screening are crucial in reducing cervical cancer incidence and mortality. • Challenges in implementing prevention strategies include access to vaccines, screening programs, and timely treatment. • Advances in treatment, such as radiotherapy and immunotherapy, show promise in improving patient outcomes	early intervention. • Expanding access to HPV vaccines, improving screening strategies, and ensuring appropriate treatment can significantly reduce the disease burden worldwide. • Collaboration between healthcare providers, governments, and organizations is essential to achieving global cervical cancer elimination goals.
Supitcha Kamolratanakul, Punnee Pitisuttithum **Year:** 2021 **Country:** Thailand	The study focuses on HPV vaccination, its effectiveness, and challenges in implementation, particularly in preventing cervical cancer.	• The research likely involved a review of HPV vaccine trials, immunogenicity studies, and public health data. It examined vaccine efficacy, safety, immunization schedules, and barriers to widespread vaccination adoption.	• HPV vaccines are highly effective in preventing HPV infections and related cervical cancer cases. • Challenges include vaccine accessibility, public awareness, and the need for optimal dosing schedules. • Immunogenicity studies suggest a potential for a reduced-dose schedule while maintaining effectiveness. • School-based vaccination programs improve coverage rates	• HPV vaccination is a critical tool in cervical cancer prevention. • To maximize its impact, efforts should focus on improving vaccine coverage, addressing accessibility issues, and optimizing vaccination schedules. • Public health initiatives must work towards increasing awareness and reducing barriers to vaccination, ultimately contributing to

			but require strong policy support.	the global goal of cervical cancer elimination.
Luciano Mariani, Mario Preti, Paolo Cristoforoni **Year:** 2017 **Country:** Italy	The study examines cervical cancer prevention strategies, including HPV vaccination, screening programs, and early treatment interventions.	• The research likely involved a review of epidemiological data, clinical trials, and public health policies related to HPV vaccination and cervical cancer screening. • It may have analysed the effectiveness of different screening techniques, vaccination programs, and early detection methods.	• HPV vaccination significantly reduces the incidence of HPV-related cervical lesions. • Regular screening remains essential, even in vaccinated populations, to detect non-vaccine HPV types. • Combining HPV testing with cytology improves early detection rates. • The success of cervical cancer prevention programs depends on high vaccine coverage and effective screening strategies.	• Cervical cancer prevention requires a combined approach of HPV vaccination and regular screening. • While vaccination reduces HPV infections, screening ensures early detection and timely treatment. • Policymakers should focus on increasing vaccine uptake and optimizing screening programs to further reduce cervical cancer incidence and mortality.
A Athanasiou MBBS, S. Bowden MBBS, M Paraskevaidi **Year:**2020 **Country:** United Kingdom	The study focuses on advancements in cervical cancer prevention, including HPV vaccination, screening strategies, and early detection methods.	• The research likely involved a review of clinical trials, epidemiological studies, and public health policies related to HPV vaccination and cervical cancer screening. It may have assessed the effectiveness of different screening technologies, vaccination programs, and	• HPV vaccination significantly reduces the incidence of high-risk HPV infections and cervical pre-cancer lesions. • HPV-based screening is more effective than traditional cytology in detecting pre-cancerous changes. • Self-sampling for HPV testing shows promise in increasing	• Cervical cancer prevention strategies should focus on increasing HPV vaccine coverage, improving screening methods, and integrating innovative technologies like AI. • Self-sampling could be a valuable tool to enhance screening accessibility,

		diagnostic approaches.	screening coverage, particularly in underserved populations. • Artificial intelligence (AI) and new biomarkers could enhance cervical cancer screening accuracy and efficiency.	ultimately contributing to the global goal of cervical cancer elimination.

VII. DISCUSSION:

After reviewing the various literature researchers found that majority of the studies showed positive effect benefits of HPV vaccine on the cervical cancer on different ages and the screening of the effect of HPV vaccine in population among worldwide. How much the spread of HPV virus among the worldwide and the prevention of cervical cancer through HPV vaccine.

VIII. CONCLUSION:

The main conclusion drawn in this present study was how much is the benefit of HPV vaccine for prevention of cervical cancer is done among worldwide and how many peoples got the positive effect of HPV vaccine among the countries population. And also the cost effectiveness and screening of HPV vac-cine among the worldwide through epidemiology.

CONFLICT OF INTEREST: None

SOURCE OF FUNDING: Self

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