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Efficacy and Safety Profile of HPV Vaccination in the Prevention of Cervical Neoplasia

Two recent systematic reviews, conducted by researchers in the UK, analyzed an extensive dataset comprising over 132 million subjects. The analysis integrated both randomized controlled trials (RCTs) and large-scale population studies, offering a robust assessment of the impact of human papillomavirus (HPV) vaccination. The primary objective aimed to quantify efficacy in preventing cervical cancer and precancerous lesions, as well as to evaluate the safety profile.

Prophylactic Efficacy in Population Studies

The population-level analysis, which included 225 studies conducted in 46 countries, highlighted a significant inverse correlation between early vaccination and the incidence of cervical neoplasia.

- **Impact of Age at Immunization:** An 80% reduction in the risk of cervical cancer (Risk Ratio [RR] 0.20) was observed among subjects vaccinated by the age of 16. Preventive efficacy proved to be inversely proportional to the age at administration, with risk reductions being more modest in cases of late immunization (in late adolescence or adulthood).
- **Associated Pathology:** The study provided moderate-certainty evidence regarding the reduction in the incidence of precancerous cervical lesions and anogenital warts.

Results from Randomized Controlled Trials (RCTs)

A separate analysis of RCTs evaluated the performance of four WHO-approved vaccines (Cervarix, Gardasil, Gardasil-9, and Cecolin) across 60 clinical trials, totaling 157,414 participants.

- **Reduction of Dysplastic Lesions:** Although the duration of the studies did not allow for the observation of invasive cancer development, a 60% reduction in high-grade precancerous cervical lesions (RR 0.40) was found in women aged 15 to 25, over a six-year follow-up period.

Safety Profile and Pharmacovigilance

The analyzed data refute hypothetical associations between HPV vaccination and severe pathologies.

- **Absence of Serious Adverse Events:** A comparative analysis of 39 studies demonstrated that rates of serious adverse events show no statistically significant differences between vaccinated and control groups (RR 0.99), over a follow-up period of up to 72 months.
- **Invalidation of Negative Correlations:** No evidence was identified to support a causal link between vaccination and infertility, chronic fatigue syndrome (myalgic encephalomyelitis), Guillain-Barré syndrome, or complex regional pain syndrome.

Limitations and Future Research Directions

Although these reviews represent the most comprehensive current evidence, the authors, including Dr. Jo Morrison, highlight the need to expand research in low- and middle-income countries where screening is deficient. Additionally, longitudinal studies spanning decades are urgently needed to assess the impact on cancers with longer latency periods (vulvar, perianal, penile, and head and neck cancers).

Vaccine administration, particularly in preadolescence (up to age 16), induces a drastic reduction in the risk of cervical cancer and precancerous lesions, without being associated with significant risks of severe adverse effects. These data strongly support prioritizing early vaccination as a fundamental strategy in preventive oncology.

Adapted after /References - Mary Van Beusekom, MS, CIDRAP News - https://www.cidrap.umn.edu/ , 3.12.2025