HSR (LONDON),
HOUGHTON STREET REVIEW JOURNAL
ISSN: 2058-5519|Impact factor-15.9
http://houghtonstreetreview.com/index.php/hsr

CERVICAL CANCER AND HEPATITIS B VIRUS INFECTION: PREVALENCE, INTERRELATIONSHIP, AND CONTEMPORARY ASPECTS OF PREVENTION

Mirzayeva Saidaxon Abdusalomovna

Professor, Department of Microbiology, Virology and Immunology

Andijan Branch of Kokand University

Andijan, Uzbekistan

E-mail: mirzayevasaidaxon999@gmail.com

No'monjonova Muhlisaxon

Medical Student, General Medicine Program

Andijan Branch of Kokand University

Andijan, Uzbekistan

E-mail: muxlisaxonnumonjonova973@gmail.com

Abstract: Cervical cancer and Hepatitis B virus (HBV) infection are among the most significant virus-associated public health challenges worldwide. Although persistent infection with high-risk human papillomavirus (HPV) is recognized as the primary cause of cervical cancer, increasing scientific evidence suggests that chronic HBV infection may influence cervical carcinogenesis through immune dysregulation, chronic inflammation, and impaired viral clearance. This study aimed to review the current evidence regarding the prevalence of cervical cancer and HBV infection, evaluate their potential epidemiological and biological relationship, and summarize contemporary preventive strategies. A comprehensive narrative review was conducted using peer-reviewed literature retrieved from PubMed, Scopus, Web of Science, Google Scholar, and publications of the World Health Organization. The reviewed studies indicate that persistent HPV infection remains the principal etiological factor for cervical cancer, whereas HBV may function as an indirect cofactor contributing to disease progression in certain populations. The analysis further demonstrates that universal HBV vaccination, HPV immunization, organized cervical screening programs, molecular diagnostic technologies, and public health education represent the most effective interventions for reducing the burden of both diseases. Despite considerable progress in prevention, substantial disparities continue to exist in low-resource regions due to limited healthcare access, inadequate vaccination coverage, and insufficient screening services. Continued epidemiological surveillance, multidisciplinary collaboration, and high-quality prospective research are required to clarify the relationship between HBV infection and cervical cancer while strengthening integrated prevention strategies. The findings of this review support the implementation of comprehensive public health programs that combine vaccination, early diagnosis, and evidence-based preventive interventions to improve women's health outcomes worldwide.

Keywords: cervical cancer, Hepatitis B virus, HBV infection, human papillomavirus, HPV, viral coinfection, cervical carcinogenesis, vaccination, cervical screening, molecular diagnostics, women's health, epidemiology, prevention, public health, viral oncology.

HSR (LONDON),
HOUGHTON STREET REVIEW JOURNAL
ISSN: 2058-5519|Impact factor-15.9
http://houghtonstreetreview.com/index.php/hsr

Introduction

Cervical cancer remains one of the leading causes of cancer-related morbidity and mortality among women worldwide, despite significant advances in screening, vaccination, and early treatment strategies. According to recent global estimates, cervical cancer is the fourth most common malignancy among women, with the highest burden occurring in low- and middle-income countries where access to preventive healthcare services remains limited [1]. Persistent infection with high-risk types of human papillomavirus (HPV), particularly HPV-16 and HPV-18, has been firmly established as the principal etiological factor in the development of cervical intraepithelial neoplasia and invasive cervical carcinoma. However, increasing evidence suggests that additional infectious agents and host-related factors may influence disease progression and clinical outcomes [2].Hepatitis B virus (HBV) infection is another major global public health concern. More than 250 million people worldwide are estimated to be living with chronic HBV infection, which is a well-recognized cause of chronic hepatitis, liver cirrhosis, and hepatocellular carcinoma. Although HBV primarily affects hepatic tissue, recent molecular and epidemiological studies have demonstrated that viral DNA may also be detected in several extrahepatic tissues, raising questions regarding its potential contribution to the pathogenesis of non-hepatic malignancies, including gynecological cancers [3].

The possible relationship between cervical cancer and HBV infection has attracted increasing scientific interest over the past decade. Several epidemiological investigations have suggested that women with chronic HBV infection may have a higher prevalence of persistent HPV infection, cervical epithelial abnormalities, and cervical intraepithelial neoplasia compared with HBV-negative individuals. Proposed biological mechanisms include virus-induced immune dysregulation, chronic systemic inflammation, impaired viral clearance, and alterations in local immune responses that may facilitate persistent HPV infection and accelerate cervical carcinogenesis. Nevertheless, current evidence remains inconsistent, and the exact nature of this association continues to be debated [3].From a public health perspective, both cervical cancer and hepatitis B are largely preventable diseases. HPV vaccination, HBV immunization, organized cervical screening programs, molecular diagnostic techniques, public health education, and behavioral risk reduction strategies have substantially reduced disease incidence in countries with comprehensive prevention programs. Integrating preventive strategies targeting both viral infections may further strengthen women's health initiatives and contribute to reducing the global burden of virus-associated malignancies. A multidisciplinary approach involving vaccination, early diagnosis, regular screening, and health promotion is therefore considered essential for effective disease prevention [4].

Given the continuing global burden of cervical cancer and chronic hepatitis B infection, a comprehensive understanding of their epidemiology, potential interrelationship, and preventive strategies is of considerable clinical and public health importance. Therefore, the aim of this study is to review the current evidence regarding the prevalence of cervical cancer and hepatitis B virus infection, examine their possible biological and epidemiological association, and discuss contemporary approaches to prevention, early detection, and public health intervention.

Methodology

This study was conducted as a comprehensive narrative review aimed at evaluating the current evidence regarding the prevalence of cervical cancer and Hepatitis B virus (HBV) infection, their potential biological and epidemiological relationship, and contemporary preventive strategies. A

HSR (LONDON),
HOUGHTON STREET REVIEW JOURNAL
ISSN: 2058-5519|Impact factor-15.9
http://houghtonstreetreview.com/index.php/hsr

systematic search of the scientific literature was performed using internationally recognized electronic databases, including PubMed, Scopus, Web of Science, Google Scholar, and the World Health Organization (WHO) digital library. Peer-reviewed articles, systematic reviews, meta-analyses, epidemiological studies, and international clinical guidelines published primarily between 2015 and 2025 were considered for inclusion. Landmark studies published before this period were also reviewed when they provided important historical or scientific context. The literature search employed combinations of the following keywords: cervical cancer, human papillomavirus, HPV, Hepatitis B virus, HBV infection, coinfection, viral carcinogenesis, screening, vaccination, prevention, and women's health [4].Studies were selected according to predefined inclusion criteria. Eligible publications included original clinical investigations, observational cohort studies, case-control studies, cross-sectional surveys, systematic reviews, and evidence-based recommendations that examined the epidemiology of cervical cancer, chronic HBV infection, possible interactions between HBV and HPV infections, or preventive interventions such as vaccination and cervical screening. Publications lacking sufficient methodological quality, duplicate reports, conference abstracts without full manuscripts, or studies unrelated to the research objectives were excluded from the review. The methodological quality of selected studies was critically evaluated by considering study design, sample size, statistical methodology, diagnostic criteria, and relevance to the research questions [5].

The collected evidence was synthesized using qualitative comparative analysis. Epidemiological findings describing disease prevalence, demographic characteristics, regional variations, viral coinfection rates, and associated risk factors were compared across different populations. Particular attention was given to studies investigating immunological mechanisms, chronic inflammation, viral persistence, and molecular pathways that may explain the possible relationship between HBV infection and cervical carcinogenesis. In addition, current preventive strategies, including HPV vaccination, universal HBV immunization, cervical cytology, HPV DNA testing, public health education, and integrated screening programs, were systematically evaluated to identify evidence-based approaches for reducing disease burden [5].To improve the reliability of the review, data from international organizations, including the World Health Organization, the International Agency for Research on Cancer (IARC), and major professional societies, were compared with findings from peer-reviewed scientific literature. Whenever conflicting evidence was identified, priority was given to high-quality systematic reviews, meta-analyses, and multicenter cohort studies with large sample sizes. The evidence was organized into thematic categories covering disease epidemiology, biological association, risk factors, diagnostic approaches, vaccination strategies, and preventive interventions to provide a comprehensive understanding of the current scientific knowledge regarding both conditions [6].

Because this investigation was based exclusively on previously published scientific literature, no human participants were directly involved, and no personal clinical data were collected. Consequently, institutional ethical approval and informed consent were not required. Nevertheless, the review was conducted in accordance with internationally accepted principles of scientific integrity, transparency, accurate citation practices, and evidence-based reporting. This methodological approach ensures that the conclusions presented in this article are supported by high-quality scientific evidence and reflect the current understanding of the relationship between cervical cancer and Hepatitis B virus infection while highlighting contemporary approaches to prevention and public health management [6].

Results

HSR (LONDON),
HOUGHTON STREET REVIEW JOURNAL
ISSN: 2058-5519|Impact factor-15.9
http://houghtonstreetreview.com/index.php/hsr

The analysis of the selected scientific literature demonstrated that cervical cancer and Hepatitis B virus (HBV) infection remain significant global public health problems, particularly in low- and middle-income countries where vaccination coverage and organized screening programs are still insufficient. The reviewed epidemiological studies consistently identified persistent high-risk human papillomavirus (HPV) infection as the primary etiological factor for cervical cancer, while chronic HBV infection continues to contribute substantially to global morbidity and mortality through chronic liver disease and hepatocellular carcinoma. Nevertheless, several recent investigations have suggested that women with chronic HBV infection may experience a higher prevalence of persistent HPV infection and cervical epithelial abnormalities than HBV-negative populations, although the magnitude of this association varies across geographical regions and study populations [7]The literature review identified several biological mechanisms that may explain the potential interaction between HBV infection and cervical carcinogenesis. Chronic HBV infection has been associated with persistent immune activation, altered cytokine production, impaired cellular immunity, and reduced viral clearance, factors that may facilitate the persistence of oncogenic HPV infection. Molecular studies have also reported the detection of HBV DNA in extrahepatic tissues, including cervical specimens, suggesting that HBV may indirectly influence the local microenvironment and contribute to cervical epithelial dysplasia. However, current evidence does not conclusively establish a direct causal relationship between HBV infection and cervical cancer development, indicating that additional prospective investigations are required to clarify this association [8].

Preventive interventions demonstrated substantial effectiveness in reducing the burden of both diseases. Countries with comprehensive HPV vaccination programs combined with organized cervical screening have reported considerable declines in cervical precancerous lesions and invasive cervical cancer incidence. Similarly, universal infant HBV vaccination has dramatically reduced the prevalence of chronic hepatitis B infection and its long-term complications in many regions. Integrated public health strategies involving vaccination, early diagnosis, health education, and regular clinical surveillance were consistently identified as the most effective approaches for minimizing virus-associated malignancies among women [9].

The review further demonstrated that advances in molecular diagnostics have significantly improved the early detection of both HPV- and HBV-related diseases. High-risk HPV DNA testing, liquid-based cytology, colposcopy, polymerase chain reaction (PCR)-based HBV detection, and quantitative viral load assessment have increased diagnostic accuracy while facilitating earlier clinical intervention. These technologies enable healthcare providers to identify high-risk individuals before the development of invasive disease, thereby improving treatment outcomes and reducing healthcare costs associated with advanced malignancies [9].Analysis of the reviewed evidence also highlighted considerable geographical disparities in disease burden. Higher cervical cancer incidence and HBV prevalence were consistently reported in Sub-Saharan Africa, East Asia, and several developing countries where access to vaccination, screening, and healthcare services remains limited. Conversely, countries implementing national immunization programs and organized cervical cancer screening demonstrated significantly lower disease incidence and mortality. These findings emphasize the importance of strengthening preventive healthcare infrastructure and expanding access to evidence-based screening and vaccination services worldwide [10].

HSR (LONDON),
HOUGHTON STREET REVIEW JOURNAL
ISSN: 2058-5519|Impact factor-15.9
http://houghtonstreetreview.com/index.php/hsr

Table 1. Summary of Major Findings Regarding Cervical Cancer and HBV Infection

Indicator	Observed findings
Primary cause of cervical cancer	Persistent high-risk HPV infection
Global HBV burden	More than 250 million people with chronic infection
Possible HBV–HPV interaction	Increased persistence of HPV infection in some HBV-positive populations
Major preventive strategies	HPV vaccination, HBV vaccination, cervical screening, health education
Advanced diagnostic methods	HPV DNA testing, PCR for HBV, liquid-based cytology, colposcopy
Regions with highest disease burden	Sub-Saharan Africa, East Asia, and many low- and middle-income countries

Overall, the reviewed evidence indicates that although persistent HPV infection remains the principal cause of cervical cancer, chronic HBV infection may contribute indirectly to cervical carcinogenesis through immunological and inflammatory mechanisms. Comprehensive prevention strategies combining vaccination, organized screening, molecular diagnostics, and public health education remain the most effective measures for reducing the global burden of both diseases and improving women's health outcomes [10].

Discussion

The findings of this review confirm that cervical cancer and chronic Hepatitis B virus (HBV) infection continue to represent major public health challenges worldwide despite considerable progress in vaccination, molecular diagnostics, and preventive healthcare programs. Persistent infection with high-risk human papillomavirus (HPV) remains the principal etiological factor for cervical cancer; however, the reviewed evidence suggests that chronic HBV infection may indirectly contribute to cervical carcinogenesis through immunological, inflammatory, and molecular mechanisms. Although several epidemiological studies have reported a higher prevalence of persistent HPV infection and cervical epithelial abnormalities among HBV-positive women, the current body of evidence remains insufficient to establish a definitive causal relationship. Differences in study design, geographic distribution, sample size, and diagnostic methodology may explain the inconsistent findings reported across the literature [11].The potential biological interaction between HBV and HPV represents an important area of ongoing scientific investigation. Chronic HBV infection is associated with long-term immune dysregulation, persistent systemic inflammation, altered cytokine production, and impaired cellular immune responses. These immunological changes may reduce the host's ability to eliminate persistent HPV infection, thereby increasing the likelihood of cervical epithelial dysplasia and malignant transformation. Furthermore, the detection of HBV DNA in several extrahepatic tissues

HSR (LONDON),
HOUGHTON STREET REVIEW JOURNAL
ISSN: 2058-5519|Impact factor-15.9
http://houghtonstreetreview.com/index.php/hsr

has generated new hypotheses regarding its possible involvement in virus-associated carcinogenesis beyond the liver. Nevertheless, additional molecular and longitudinal studies are required to clarify whether HBV plays a direct oncogenic role or functions primarily as an indirect cofactor that modifies host immune responses during HPV infection [12].

The present review also emphasizes the importance of comprehensive prevention strategies that address both viral infections simultaneously. Countries with national HPV vaccination programs, universal HBV immunization, organized cervical screening, and effective public health education have demonstrated substantial reductions in disease incidence and mortality. These findings support recommendations advocating integrated preventive healthcare services, particularly for women living in regions with high prevalence of both infections. Combining vaccination, HPV DNA testing, cervical cytology, HBV screening, and health promotion initiatives may substantially reduce the burden of virus-associated diseases while improving women's reproductive health outcomes [13].Despite encouraging progress, several barriers continue to limit effective disease prevention, particularly in low-resource settings. Limited healthcare infrastructure, insufficient vaccination coverage, socioeconomic inequalities, lack of public awareness, cultural barriers, and restricted access to molecular diagnostic technologies contribute to delayed diagnosis and poorer clinical outcomes. Strengthening healthcare systems, expanding vaccination programs, improving laboratory capacity, and increasing educational campaigns remain essential priorities for national and international public health authorities. In addition, healthcare professionals should receive continuous training regarding current screening recommendations, vaccination guidelines, and evidence-based management strategies for patients at increased risk of virus-associated malignancies [14].

Overall, the evidence reviewed in this study supports the growing recognition that cervical cancer prevention should extend beyond HPV infection alone and incorporate broader approaches addressing viral coinfections, immune health, and integrated preventive medicine. Future multicenter prospective cohort studies, molecular investigations, and randomized public health intervention trials are needed to clarify the precise relationship between HBV infection and cervical carcinogenesis while evaluating the long-term effectiveness of combined vaccination and screening strategies. Such evidence will contribute to the development of more comprehensive clinical guidelines and public health policies aimed at reducing the global burden of cervical cancer and chronic viral infections among women [15].

Conclusion

Cervical cancer and chronic Hepatitis B virus (HBV) infection remain among the most significant global public health challenges, particularly in low- and middle-income countries where access to vaccination, organized screening programs, and healthcare services is still limited. The present review demonstrates that persistent infection with high-risk human papillomavirus (HPV) continues to be the primary etiological factor in cervical carcinogenesis, whereas HBV infection may indirectly contribute to disease progression through chronic inflammation, immune dysregulation, and impaired viral clearance. Although current epidemiological and molecular evidence suggests a possible association between chronic HBV infection and persistent HPV infection, definitive proof of

HSR (LONDON),
HOUGHTON STREET REVIEW JOURNAL
ISSN: 2058-5519|Impact factor-15.9
http://houghtonstreetreview.com/index.php/hsr

a direct causal relationship remains insufficient.The analysis further indicates that integrated preventive strategies provide the greatest opportunity for reducing the burden of both diseases. Universal HBV vaccination, HPV immunization, organized cervical cancer screening, HPV DNA testing, cytological examination, early diagnosis, and comprehensive public health education have collectively demonstrated substantial effectiveness in decreasing disease incidence and improving clinical outcomes. Expanding access to these preventive interventions is particularly important in regions with high prevalence of viral infections and limited healthcare resources.Advances in molecular diagnostics, immunology, and epidemiological surveillance continue to improve the understanding of virus-associated carcinogenesis and facilitate earlier detection of high-risk individuals. Nevertheless, continued investment in healthcare infrastructure, professional training, vaccination programs, and public awareness campaigns remains essential for achieving sustainable disease prevention. International collaboration among clinicians, researchers, public health authorities, and policymakers will further strengthen evidence-based strategies aimed at reducing cervical cancer incidence and HBV-related complications worldwide.Future research should prioritize large-scale prospective cohort studies, multicenter clinical investigations, and molecular analyses to clarify the biological relationship between HBV infection and cervical carcinogenesis. Such studies will contribute to the development of more precise clinical guidelines and integrated preventive strategies, ultimately improving women's health and reducing the global burden of virus-associated diseases

References

1. World Health Organization. (2024). Cervical cancer. Geneva, Switzerland: World Health Organization.

2. World Health Organization. (2024). Human papillomavirus (HPV) and cervical cancer. Geneva, Switzerland: World Health Organization.

3. World Health Organization. (2024). Hepatitis B. Geneva, Switzerland: World Health Organization.

4. Sung, H., Ferlay, J., Siegel, R. L., Laversanne, M., Soerjomataram, I., Jemal, A., & Bray, F. (2021). Global Cancer Statistics 2020: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. CA: A Cancer Journal for Clinicians, 71(3), 209–249.

5. Arbyn, M., Weiderpass, E., Bruni, L., de Sanjosé, S., Saraiya, M., Ferlay, J., & Bray, F. (2020). Estimates of incidence and mortality of cervical cancer in 2018: A worldwide analysis. The Lancet Global Health, 8(2), e191–e203.

6. International Agency for Research on Cancer. (2022). WHO Classification of Female Genital Tumours (5th ed.). Lyon, France: IARC Press.

7. Terrault, N. A., Lok, A. S. F., McMahon, B. J., Chang, K. M., Hwang, J. P., Jonas, M. M., … & Wang, U. (2018). Update on prevention, diagnosis, and treatment of chronic hepatitis B: AASLD 2018 Hepatitis B guidance. Hepatology, 67(4), 1560–1599.

8. European Association for the Study of the Liver. (2017). EASL 2017 Clinical Practice Guidelines on the management of hepatitis B virus infection. Journal of Hepatology, 67(2), 370–398.

9. Schiffman, M., Doorbar, J., Wentzensen, N., de Sanjosé, S., Fakhry, C., Monk, B. J., Stanley, M., & Franceschi, S. (2016). Carcinogenic human papillomavirus infection. Nature Reviews Disease Primers, 2, 16086.

HSR (LONDON),
HOUGHTON STREET REVIEW JOURNAL
ISSN: 2058-5519|Impact factor-15.9
http://houghtonstreetreview.com/index.php/hsr

10. Bruni, L., Albero, G., Serrano, B., Mena, M., Gómez, D., Muñoz, J., … & de Sanjosé, S. (2023). Human Papillomavirus and Related Diseases Report. ICO/IARC Information Centre on HPV and Cancer.

11. Cohen, P. A., Jhingran, A., Oaknin, A., & Denny, L. (2019). Cervical cancer. The Lancet, 393(10167), 169–182.

12. Burd, E. M. (2016). Human papillomavirus and cervical cancer. Clinical Microbiology Reviews, 29(2), 371–393.

13. World Health Organization. (2020). Global Strategy to Accelerate the Elimination of Cervical Cancer as a Public Health Problem. Geneva, Switzerland: World Health Organization.

14. Bosch, F. X., Lorincz, A., Muñoz, N., Meijer, C. J. L. M., & Shah, K. V. (2002). The causal relation between human papillomavirus and cervical cancer. Journal of Clinical Pathology, 55(4), 244–265.

15. Franco, E. L., Duarte-Franco, E., & Ferenczy, A. (2009). Cervical cancer: Epidemiology, prevention and the role of human papillomavirus infection. CMAJ, 164(7), 1017–1025.