

Understanding the Definition, Causes, and Prevention of Chickenpox

Arista Shofi Raihana¹

¹Faculty of Medicine Universitas Pembangunan Nasional Veteran Jawa Timur

Corresponding Author

Arista Shofi Raihana

Faculty of Medicine Universitas Pembangunan Nasional Veteran Jawa Timur

Rungkut Madya Street Number 191, Rungkut Kidul, Rungkut District, Surabaya, Jawa Timur 60293

Tel/Fax: +6287882678798

E-mail: asraihana2011@gmail.com

ABSTRACT

There are many cases of chickenpox in Indonesia. However, the number of people who do not understand and are unaware of chickenpox is quite large. The method used in this narrative review is by selecting a topic, determine keywords that will be used to search for international journals through several databases such as Science Direct, PubMed, and Google Scholar. Chickenpox is a disease that generally affects children with the main symptoms of skin rashes, fever, and headaches, and can cause severe complications in infected adults. It is treated with symptomatic treatment such as antipyretics and antihistamines for mild cases, antiviral therapy and intensive care for severe cases. Vaccination has been proven to be effective in preventing the spread of outbreaks as well as post-exposure vaccination to reduce the severity of the disease. Chickenpox is an infectious disease that often affects children and has a higher risk of complications if it occurs in adults. This disease is caused by the varicella-zoster virus and is characterized by common symptoms in the form of fever, skin rashes, and fluid-filled elasticity that spreads throughout the body. Prevention that has been proven effective in reducing the incidence, complications, and spread of chickenpox is vaccination. With chickenpox vaccination, it can prevent future shingles-related complications.

Keywords: Chickenpox; children; contagious; vaccine; varicella-zoster virus (VZV)

Introduction

Chickenpox, also known as varicella, is an acute and highly contagious infectious disease caused by the varicella-zoster virus (VZV), a member of the Herpesviridae family. The disease primarily affects children who have not previously been infected or vaccinated. However, adolescents and adults who lack immunity are also susceptible to infection. In fact, chickenpox tends to be more severe in adults than in children, with an increased risk of complications. The characteristic clinical manifestation of chickenpox is a pruritic

vesicular rash that typically begins on the face, scalp, chest, and back before spreading to other parts of the body. The rash usually develops in successive stages, resulting in the simultaneous presence of macules, papules, vesicles, and crusted lesions. In addition to skin manifestations, patients may experience fever, fatigue, headache, and general malaise.⁹ Despite advances in vaccination and healthcare services, chickenpox remains a public health concern in several regions, particularly in areas with limited access to vaccination, healthcare facilities, and adequate medical treatment.¹ The disease is transmitted primarily through inhalation of infectious respiratory aerosols and through direct contact with fluid from skin lesions. Consequently, chickenpox can spread rapidly among susceptible individuals, especially in households, schools, and other crowded environments.

Misconceptions regarding its mode of transmission may contribute to inadequate preventive practices. For example, some individuals may mistakenly perceive chickenpox as a hereditary disease rather than an infectious condition. In reality, chickenpox is acquired through exposure to VZV and is not inherited genetically from parents.⁷ Although chickenpox is generally self-limiting in otherwise healthy children, it can cause serious complications in certain individuals, including secondary bacterial skin and soft-tissue infections, pneumonia, encephalitis, and other neurological complications. Severe disease may occur in adults, pregnant women, newborns, and individuals with weakened immune systems. In rare cases, these complications can be life-threatening and may result in death.³ Therefore, appropriate prevention, early recognition, and adequate clinical management are essential to reduce the burden of the disease. Vaccination has substantially reduced the incidence of chickenpox and the risk of severe disease in populations where routine varicella immunization is implemented. Nevertheless, challenges remain in ensuring equitable vaccine access and coverage, particularly in underserved communities. Population mobility, urbanization, and close-contact settings may facilitate the transmission of VZV among susceptible individuals. In addition, public awareness, access to reliable health information, and adherence to appropriate infection-prevention measures remain important components of disease control. Given these considerations, a comprehensive understanding of chickenpox is essential to support effective prevention and control strategies. This narrative literature review aims to provide an updated overview of chickenpox, focusing on its definition, etiology, clinical manifestations, modes of transmission, potential complications, and preventive measures, particularly vaccination and public health interventions. By synthesizing relevant literature, this review is expected to improve understanding of the disease and highlight the importance of evidence-based approaches to reducing its transmission and associated complications.

Methods

The research uses a narrative literature review approach. Relevant literature was identified through searches of electronic databases, including PubMed and ScienceDirect. The literature search focused on articles relevant to the research topic. The inclusion criteria were articles published between 2019 and 2024, written in English, and addressing the subject of interest. The retrieved articles were screened for relevance and eligibility based on the predefined inclusion criteria. Articles that met these criteria were selected for further review and synthesized narratively to provide an overview of the available evidence, identify key findings, and discuss relevant developments related to the research topic.

Results and Discussion

Chickenpox is an infectious disease caused by varicella-zoster virus infection.⁷ The virus is easily transmitted through saliva droplets, or direct contact with fluids that come from the rash. The disease is characterized by fluid-filled bumps that feel very itchy throughout the body.⁹

Epidemiology of Chickenpox

Based on a study conducted by Kujur et al. (2022) in remote areas in India, dense environmental conditions, lack of public knowledge about disease prevention, and poor sanitation are the main factors contributing to the rapid spread of chickenpox.¹ In rapidly urbanizing areas, such as major metropolitan cities in China, the spread of chickenpox may be accelerated by high population density and inadequate public health surveillance.⁵ Children account for a substantial proportion of chickenpox cases and may transmit the infection to family members and other close contacts. A study by Wang et al. identified spatial patterns of chickenpox transmission in regions experiencing rapid population growth and high population mobility. Spatial analysis revealed "red zones," or areas with high transmission rates.⁵ These findings highlight the importance of considering environmental and demographic factors when developing targeted disease-prevention strategies. Strengthening public health education, improving disease surveillance, and identifying high-risk areas may help reduce transmission, particularly in densely populated communities and underserved regions.

Symptoms of Chickenpox

The main symptom of chickenpox is a skin rash that develops into fluid-filled vesicles, typically affecting the face, scalp, chest, back, and mucous membranes before spreading throughout the body.⁹ Mild to moderate fever, fatigue, discomfort, and weakness may occur one to two days before the rash appears.² Muscle pain (myalgia) and headache are also reported, particularly among adult patients.⁴ In individuals with compromised immune systems, gastrointestinal symptoms such as nausea, vomiting, or diarrhea may also occur.² Warning signs of complications include difficulty breathing, seizures, and decreased consciousness.^{2,9} The clinical presentation of chickenpox can vary depending on the

patient's age, immune status, and previous immunity to the virus. Recognizing the characteristic rash and accompanying systemic symptoms is important for early diagnosis, appropriate clinical management, and the prevention of transmission to susceptible individuals.

Impact and Complications of Chickenpox

Although chickenpox is generally self-limiting, it can occasionally lead to serious complications. A study by Widgren et al. reported that 10% of chickenpox cases in Sweden resulted in serious complications, including pneumonia and encephalitis, particularly among vulnerable groups.² Life-threatening complications may also occur, including sepsis resulting from secondary bacterial infections. Chickenpox in adolescents and adults may be more severe than in younger children.² According to Irham et al., genetic susceptibility to severe chickenpox may vary among populations.³ Certain genetic variants, including those involving human leukocyte antigen (HLA) genes, may influence the immune response to the varicella-zoster virus.³ These complications demonstrate that chickenpox should not be regarded as an entirely harmless childhood illness, particularly in individuals at increased risk of severe disease. Early recognition of clinical deterioration and timely medical intervention are essential to reduce the risk of long-term morbidity and mortality.

Vaccination and Its Implications Against Shingles

According to a study by Shrestha et al., the chickenpox vaccination program has been effective in reducing the incidence of chickenpox among children in Australia.⁴ However, the study also discusses the potential relationship between reduced exposure to circulating varicella-zoster virus and changes in the occurrence of shingles, particularly among older adults. Shingles develops when latent varicella-zoster virus reactivates in the body after the initial infection.⁴ Nevertheless, the relationship between childhood varicella vaccination and shingles incidence in older adults remains complex and should not be interpreted as a direct causal effect. Varicella vaccination remains an important preventive measure because it reduces the incidence of chickenpox and its associated complications, while shingles prevention in eligible adults should be considered separately according to relevant immunization recommendations.

Treatment of Chickenpox

Treatment of chickenpox aims to relieve symptoms, prevent secondary infections, and reduce the risk of complications. Antiviral therapy, such as acyclovir, is most effective when initiated early, ideally within the first 24 hours after the onset of the rash, particularly in patients at increased risk of severe disease.¹ Prevention of secondary bacterial infections includes maintaining skin hygiene and avoiding scratching the lesions.⁹ Varicella-zoster immune globulin (VZIG) may be administered as post-exposure prophylaxis to eligible high-risk individuals when indicated.⁴ Antihistamines and calamine lotion may help relieve itching, while paracetamol can be used to manage fever.^{1, 6} Vaccination has also been shown

to reduce the incidence of severe chickenpox and its complications.⁵ Treatment decisions should be individualized according to the patient's age, clinical condition, immune status, and risk of complications. Patients who develop warning signs, such as breathing difficulties, altered consciousness, or persistent clinical deterioration, require prompt medical assessment rather than symptomatic treatment alone.

Conclusion

Chickenpox is an infectious disease that often affects children and has a higher risk of complications if it occurs in adults. Chickenpox can be transmitted through physical contact with the sufferer, exposure to fluids from fluid-filled skin rash, or from the air. This disease is caused by the varicella-zoster virus and is characterized by common symptoms in the form of fever, skin rashes, and fluid-filled elasticity that spreads throughout the body. Prevention that has been proven effective in reducing the incidence, complications, and spread of chickenpox is vaccination. With chickenpox vaccination, it can prevent future shingles-related complications. Complications of chickenpox such as encephalitis, pneumonia, and secondary bacterial infections are common in people with low immunity or have not been vaccinated. There are genes associated with the risk of chickenpox.

Declaration of Generative AI in Scientific Writing

The authors affirm that the usage of generative artificial intelligence tools, including ChatGPT and Grammarly Premium, is intended solely for assist with the language editing process, including grammar correction, vocabulary refinement, and improvements in clarity and readability. These tools were not used for generating content, data analysis, or interpretation. The authors are fully responsible for the accuracy and integrity of the content as well as the conclusions presented in this study

References

1. Kujur A, Kiran KA, Kujur M. An epidemiological study of outbreak investigation of chickenpox in remote hamlets of a tribal state in India. *Cureus*. 2022;14(6). doi: 10.7759/cureus.26454
2. Widgren K, Berg PL, Morner A, Lindquist L, Tegnell A, Giesecke J, Studahl M. Severe chickenpox disease and seroprevalence in Sweden – implications for general vaccination. *Int J Infect Dis*. 2021;111:92-8. Doi: 10.1016/j.ijid.2021.08.012
3. Irham ML, Adikusuma W, Lolita L, Puspitaningrum NA, Afief RA, Sarasmita AM, et al. Investigation of susceptibility genes for chickenpox disease across multiple continents. *Biochem Biophys Rep*. 2023;33:101419. doi: 10.1016/j.bbrep.2022.101419

4. Shrestha CA, Field E, Rajmohan M, Lambert BS. Assessing the impact of chickenpox and shingles vaccination using intermittent enhanced surveillance in Queensland, Australia. *Vaccine*. 2023;41(50):7539-47. doi: 10.1016/j.vaccine.2023.11.015
5. Wang L, Wang MM, Xu CD, Wang PH, You MY, Li ZH, Chen XM, Liu XY, Li XD, Wang YY, Hu YH, Yin DP. Spatial dynamics of chickenpox outbreaks in rapidly developing regions: implications for global public health. *Biomed Environ Sci*. 2024 Jul 20;37(7):687-697. doi: 10.3967/bes2024.068.
6. Qadir IM. Survey about awareness of chickenpox among biology students. *J Hum Virol Retrovirol*. 2019;7(1):7-8. DOI: 10.15406/jhvr.2019.07.00205
7. Lo Presti C, Curti C, Montana M, Bornet C, Vanelle P. Chickenpox: An update. *Med Mal Infect*. 2019;49(1):1-8. doi: 10.1016/j.medmal.2018.04.395
8. Chowdhury MK, Siddique A, Haque M, Ali S, Biswas S, Biswas P, et al. Life-threatening complications of chickenpox in a young adult. *J Med*. 2014;15:10.3329/jom.v15i1.19873.
9. Tarlow MJ, et al. Chickenpox in childhood. *J Infect*. 36:39-47. DOI: 10.1016/S0163-4453(98)80154-0
10. Welsby PD. Chickenpox, chickenpox vaccination, and shingles. *Postgrad MedJ*. 2006;82(967):351-2. doi: 10.1136/pgmj.2005.038984
11. Breuer J, Fifer H. Chickenpox. *BMJ Clin Evid*. 2011;2011:0912. PMID: 21486500; PMCID: PMC3275319.