

Clinical manifestations, complications and management of chickenpox infection in pediatric

Abstract

Chickenpox can be defined as a highly communicable viral infection caused by varicella zoster virus; most frequently influences pediatric in five to nine yrs old. The commonly occurred signs and symptoms of chickenpox are comprises vesicular rash appears on the scalp, face and trunk, and then disseminates distally to limbs (centrifugal distribution). The most common complications of chickenpox are bacterial soft-tissue infection, pneumonia, and encephalitis. Encephalitis is a most commonly occurred central nervous system complications expose the pediatric to other problems or death. The main goal chickenpox infection management in children is to alleviate the symptoms such as skin infections, fever, itching etc and making the children comfortable. Adequate intravenous acyclovir administration is crucial for successful management of chickenpox, but it must be administered within twenty-four hrs. after the onset of the disease. Management of chickenpox with oral acyclovir given within twenty four hrs of onset of rash may be more effective.

Keywords: chickenpox infection, clinical manifestations, complications, management, pediatric, bioavailability

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Gudisa Bereda

Department of Pharmacy, Negelle Health Science College, Ethiopia

Correspondence: Gudisa Bereda, Department of Pharmacy, Negelle Health Science College, Guji, Ethiopia, Tel +251913118492/+251910790650, Email gudisabareda95@gmail.com

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Abbreviations: DNA, deoxyribonucleic acid; HS, herpes zoster; IV, Intravenous; NSAIDs, non-steroidal anti-inflammatory drugs; SC, subcutaneous; VZV, varicella zoster virus; VZIG, varicella zoster immunoglobulin; ZnO, zinc oxide

Introduction

Chickenpox can be characterized as a highly contagious, widespread infectious disease; which are common benign childhood illness caused by Varicella-zoster virus, typically correlated with fever and characteristic exanthemata's vesicular skin rash.^{1,2} Chickenpox infection can cause significant morbidity in normal and immunosuppressant pediatric.³ Varicella-zoster virus can cause both chickenpox due to initial infection and herpes zoster or herpes as a sequence of endogenous reactivation of latent infection.^{4,5} Chickenpox commonly exposes pediatric, with a peak incidence in those aged less than ten years, but it can influence any age group.⁶ The incidence of chickenpox differs seasonally, with the highest incidence happening in winter and early spring.⁷ The chickenpox is transmitted worldwide most commonly via routes called; direct person-to-person open lesions contact such as with skin rash or by inhalation of aerosolized droplets from respiratory tract secretions of patients with chickenpox. Rarely, the infection is spread by the inhalation of aerosolized droplets from vesicular fluid of skin lesions of patients with chickenpox or disseminated herpes zoster.^{8,9} The period of transmission commences one to two days before any rash appears and continues for the first five to six days.^{10,11} The incubation period ranges from seven to twenty one days, during which time infected persons are asymptomatic.¹² The infective process commences when chickenpox inoculates the upper respiratory tract, from where it infects T-cells present in the reticuloendothelial system, such as the lymph nodes, permitting the virus to duplicate and sequencing in viremia.^{13,14}

Clinical manifestations

Chickenpox can be usually self-limiting in young pediatric and is characterized by low grade fever, malaise, an itchy and vesicular rash. Symptoms often appear 11 to 20 days after exposure to varicella zoster virus.¹⁵ The commonly occurred signs and symptoms of chickenpox are comprises vesicular rash appears on the scalp, face

and trunk, and then disseminates distally to limbs. Vesicles on mucous membranes, lowered urine output, history of contact with a person with chickenpox, dehydration, nausea, muscle aches, loss of appetite, headache, pruritus and fever.^{16,17} There are three phases of chickenpox clinical manifestations:

- I. Short prodromal illness (one to two days):** At this phase there is mild or moderate fever, loss of appetite, and anorexia nervosa.¹²
- II. Exanthematous phase:** At exanthematous phase rash appears from first day. Rash appear in croup as intensely pruritic erythematous macules, which converted into clear fluid-filled vesicles and crust within 24 to 48 hours. Lesions more commonly appear on the trunk and back.¹⁴
- III. Convalescent phase:** The situations can usually ameliorate within seven days.¹⁸

Complications

Chickenpox complications are more commonly occurred in very young or immunosuppressant individuals.¹⁹ The complications of chickenpox infection were considered to be based on the immune status, a relationship of varicella gangrenosa and an immunological disorder such as systemic lupus erythematosus and granulomatosis with polyangiitis.²⁰ The most common complications of chickenpox are bacterial soft-tissue infection, pneumonia, and encephalitis. Encephalitis is a most commonly occurred central nervous system complications expose the pediatric to other problems or death. The other rarely occurred complications of chickenpox are myocarditis, nephritis, nephrosis, osteomyelitis, arthritis, thrombocytopenic purpura, benign hemorrhagic varicella, orchitis, appendicitis, and subclinical hepatic involvement.^{21,22} The dermatological complications of chickenpox infection are superficial bacterial superinfection, sometimes leading to necrotizing fasciitis, hemorrhagic chickenpox, and Varicella gangrenosa.²³

Management

The treatment approach for chickenpox is based on age, immune status of pediatrics and clinical presentation of the disease. The main

goal of chickenpox infection management in children is to alleviate the symptoms such as skin infections, fever, itching and making the children comfortable.^{24,25} There is several management of chickenpox; which discussed in turn below.

Non-pharmacological management of chickenpox infection

- I. Maintenance of personal hygiene:** Washing hands accordingly because washing the hands controls the transmission of the virus. Washing the hands and trimmed the nails short are the one way to lower the fates of trauma and infection that can be occurred due to scratching. Prohibit sharing of materials such as cups, eating utensils, and clothing with the infected individuals.²⁶
- II. Prevent dehydration:** Keep the children well hydrated by providing plenty of fluids in form of water, juices, soup, and fruits.²⁷
- III. Adequate rest:** Better if the children infected with chickenpox stay at home for five to ten days of rash appearances. Pediatric with chickenpox shouldn't go to school, kindergarten, or child care until the last blister has well dried.²⁸
- IV. Isolation:** If a rash develops, then continue isolation until all lesions are crusted or no new lesions appear within a 24 hours period and recommended as a children stay at home for five days.²⁵

Pharmacological management of chickenpox

- I. Mild antipyretic:** Acetaminophen is the recommended antipyretic for the management of chickenpox to alleviate or ameliorate the fever or sores (blisters) that develop on the skin. Acetaminophen is the preferred painkiller for the management chickenpox correlated with fever because of its very rare risk of NSAIDs induced skin blisters and rashes. NSAIDs are contraindicated for chickenpox infection due to their correlation with an increased risk of severe skin and soft tissue complications of varicella zoster virus infection, mostly in pediatric with chickenpox.^{29,30}
- II. Topical antipruritic agent:** Zinc calamine lotion can able to relieve itchiness and also inhibit further skin infections. Calamine lotion comprises skin-soothing properties, involving ZnO. To apply Zinc calamine lotion, use a clean finger or cotton swab, brushes the lotion on the itchy skin areas. Zinc Calamine lotion should not apply on face because it has drying properties, it can assist dry out pimples caused by excess oil readily.²⁹
- III. Antihistaminic drugs:** The symptom of chickenpox such as pruritus in the children population can be managed with oral anti-histamines. Oral anti-histamines comprises loratadine, cetirizine, fexofenadine, diphenhydramine perhaps support to minimize itching and inhibit excoriation from occurring. Lotions and creams that comprise anti-histamines shouldn't use for chickenpox.²⁵
- IV. Antiviral drug:** Acyclovir has low oral bioavailability, only 15 to 20% of the dose reaches the plasma. Adequate intravenous acyclovir administration is crucial for successful management of chickenpox, but it must be administered within 24 hours after the onset of the disease.^{31,32} Management of chickenpox with oral acyclovir given within 24 hours of onset of rash may be more effective. Acyclovir inhibits the replication of the varicella zoster virus, and has the potential to eradicate varicella zoster virus and relieve symptoms more rapidly.^{25,33} Acyclovir is phosphorylated by viral thymidine kinase to acyclovir monophosphate and then

by cellular enzymes to acyclovir diphosphate and triphosphate. Acyclovir triphosphate is a competitive inhibitor of viral DNA secretion and act as a chain terminator.³⁴

- V. Active immunization:** Varicella virus live vaccine is an active immunizing agent that is given to protect against infection caused by the VZV. The vaccine functions by causing the body to generate its own protection against the virus. Two doses (0.5ml) of varicella vaccine should be given subcutaneously separated by at least three months for children less or equal to 12 years. Two doses (0.5ml) of the single antigen varicella vaccine were given subcutaneously four to eight weeks apart for less than 13 years.¹⁸

- VI. Passive Prophylaxis:** Varicella zoster immunoglobulin is used to inhibit exposure of varicella virus in high-risk individuals such as adults, pediatric with immunocompromised, pregnant women, premature babies and babies younger than one year of age. VZIG should be administered within seven days of the onset of rash for neonates or weakened immune system contacts.¹⁸

Conclusion

Chickenpox infection is characterized as an acute common disease caused by the varicella zoster virus. Pediatric are most vulnerable to chickenpox infection. The commonly occurred signs and symptoms of chickenpox are comprises vesicular rash appears on the scalp, face and trunk, and then disseminates distally to limbs. The most common complications of chickenpox are bacterial soft-tissue infection, pneumonia, and encephalitis. The main goal of chickenpox infection management in children is to alleviate the symptoms such as skin infections, fever, itching etc. and making the children comfortable. Acyclovir has low oral bioavailability, only 15 to 20% of the dose reaches the plasma. Adequate intravenous acyclovir administration is crucial for successful management of chickenpox, but it must be administered within 24 hours after the onset of the disease.

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