

Title: Hand, Foot and Mouth DiseaseNancy Verma¹, Shivani Bhandari¹¹Senior Lecturer, Department of Oral and Maxillofacial Pathology and Microbiology, Santosh Dental College, Ghaziabad.**Corresponding Author:**

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**Abstract**

Hand, foot, and mouth disease (HFMD) is a contagious viral infection primarily affecting young children but can also impact adults. Caused mainly by coxsackievirus A16 and enterovirus 71, HFMD is characterized by fever, sore throat, and a distinctive rash involving blisters on the hands, feet, and inside the mouth. Transmission occurs through contact with respiratory droplets, saliva, fluid from blisters, or fecal matter of infected individuals. Symptoms are typically mild, and most cases resolve on their own within 7–10 days. However, complications can arise, especially in cases linked to enterovirus 71, including viral meningitis, encephalitis, and other severe neurological symptoms. Management focuses on symptom relief, hydration, and isolation to prevent spread, as no specific antiviral treatment is currently available.

Keywords: Hand-foot-and-mouth disease, Epidemiological characteristic, Innate immune response, Sequelae, Treatment

Introduction

Hand, foot, and mouth disease (HFMD) is a common viral illness primarily affecting young children, though it can also occur in adults^(1,2). The disease is caused by enteroviruses, most often coxsackievirus A16 and enterovirus 71, and is characterized by fever, sore throat, and a distinctive rash with blister-like lesions on the hands, feet, and mouth. HFMD is highly contagious and spreads through close contact with infected individuals, respiratory droplets, or contaminated surfaces^(3,4).

Although typically mild, HFMD can lead to complications, particularly in cases associated with enterovirus 71, which has been linked to severe neurological issues like encephalitis and viral meningitis. Outbreaks of HFMD are common, particularly in childcare settings and schools, due to the ease with which the virus spreads among children in close quarters^(1,5). This disease often has a seasonal pattern, peaking in warmer months or tropical climates throughout the year.

The purpose of this article is to provide an overview of HFMD, including its epidemiology, symptoms, modes of transmission, and current approaches for prevention and management. Through increased awareness and proper hygiene practices, the spread of HFMD can be controlled, and the risk of severe complications minimized.

Etiology

Hand, foot, and mouth disease is a viral exanthem, and it is most commonly caused by the coxsackievirus of the *Enterovirus* family. Coxsackievirus A16 and enterovirus A71 are the serotypes most commonly implicated as causative agents⁽⁶⁾. Coxsackievirus A6 has recently emerged as another

cause of HFMD in the USA and worldwide. Coxsackievirus A10 has been implicated in severe disease. Coxsackievirus A4 to A7, A9, B1 to B3, and B5 have also been less commonly associated with HFMD.

Discussion

The discussion section of a review article on hand, foot, and mouth disease (HFMD) provides a comprehensive analysis of the current understanding, challenges, and future directions for research and management. Here's an outline of key points that can be included:

1. Epidemiological Trends

HFMD has emerged as a significant public health issue globally, with recurrent outbreaks affecting young children, particularly in densely populated regions in Asia. Discuss how demographic factors, climate, and geographical areas influence the frequency and severity of HFMD outbreaks. Highlight how understanding these patterns can aid in developing targeted intervention strategies⁽⁶⁾.

2. Pathogenesis and Viral Variants

Coxsackievirus A16 and enterovirus 71 are the most commonly implicated pathogens in HFMD, though other enteroviruses may also cause it. Enterovirus 71 is often associated with more severe clinical outcomes and complications, such as neurological involvement. Discuss the molecular mechanisms of infection, viral replication, and immune response in HFMD. Highlight how viral variants impact the severity, clinical manifestations, and management of HFMD⁽⁷⁾.

3. Clinical Manifestations and Complications

HFMD is primarily a self-limiting disease, presenting with fever, malaise, and characteristic lesions on the hands, feet, and oral mucosa. Discuss the variability in clinical presentations and emphasize the need for improved diagnostic.

Modes of Transmission

HFMD is primarily transmitted through several routes, including:

- **Direct Contact:** The virus spreads through close personal contact, especially through saliva, respiratory droplets, and fluid from vesicular lesions.
- **Fecal-Oral Route:** Enteroviruses that cause HFMD are shed in feces, enabling transmission through improper hand hygiene after using the toilet or changing diapers.
- **Contaminated Surfaces and Objects:** The virus can survive on surfaces and objects (fomites), making it easy for children to contract the virus by touching contaminated toys, utensils, or other items and subsequently touching their face.

Treatment

- Hand, foot, and mouth disease is a mild clinical syndrome and will resolve within 7 to 10 days. Treatment is primarily supportive. Pain and fever can be managed with NSAIDs and acetaminophen. Making sure the patient remains well-hydrated is important. Additionally, a mixture of liquid ibuprofen and liquid diphenhydramine can be used to gargle, which helps coat the ulcers, easing the pain. Steroids were found to increase the risk of severe HFMD⁽¹¹⁾.
- Over the past decade, researchers have developed specific treatments to manage enterovirus 71-induced hand, foot, and mouth disease because of its severe neurological complications. So far, no drug has been approved, but promising novel agents include molecular decoys, translation inhibitors, receptor antagonists, and replication inhibitors. An antiviral agent that has shown promise in the treatment of enterovirus 71 is pleconaril, an anti-picornaviral agent. However, there are currently no licensed antivirals for the treatment of HFMD⁽⁶⁾.

Differential Diagnosis

The differential diagnosis for HFMD should include conditions that present with maculopapular or vesicular rashes with or without oral lesions⁽¹³⁾. These conditions include^(12,13,14).

- Erythema multiforme
- Herpangina
- Herpes simplex
- Herpes zoster
- Kawasaki disease

- Toxic epidermal necrolysis (TEN)
- Viral pharyngitis
- Rocky Mountain spotted fever
- Varicella zoster infection (chickenpox)
- Steven–Johnson syndrome
- Monkeypox⁽¹³⁾.

Prognosis

The prognosis for most patients with hand, foot, and mouth disease is excellent. Most patients recover within a few weeks without any residual sequelae. Acute illness usually lasts 10 to 14 days, and the infection rarely recurs or persists. However, some patients with hand, foot, and mouth disease may develop serious complications, which include the following:

- Persistent stomatitis is associated with painful ulcers. The pain can be severe enough to limit food intake, and dehydration can result, especially in young children.
- Aseptic meningitis can occur, but this is more common with enterovirus 71. This particular virus is associated with a higher rate of neurological involvement compared to coxsackievirus. The individual may develop acute cerebellar ataxia, polio-like syndrome, encephalitis, benign intracranial hypertension, and Guillain-Barre syndrome. The virus is believed to induce damage to the gray matter, resulting in motor dysfunction⁽²³⁾.
- Coxsackievirus can rarely cause interstitial pneumonia, myocarditis, pancreatitis, and pulmonary edema⁽¹²⁾.
- Some studies indicate that coxsackievirus infections may also be associated with spontaneous abortions.

Complications

Pneumonia, myocarditis, pancreatitis, and pulmonary edema, as well as serositis involving other major organs, are rarely associated with HFMD. A large meta-analysis of children with HFMD suggested that lethargy, pneumoedema/pneumorrhagia, seizures, dyspnoea, and coma were risk factors for death in HFMD⁽¹⁴⁾. The case fatality rate associated with enterovirus 71 was found to be 1.7% in a systematic review and meta-analysis.

Conclusion

HFMD is a childhood exanthematous disease causing outbreaks that have become a major public health threat in recent years. Most of the cases have uncomplicated course, but few cases develop complications. Hence, it is important to be aware of the clinical features of this disease for correct diagnosis and appropriate treatment. The risk of an outbreak can be decreased by following the preventive measures protocol.

In summary, hand, foot, and mouth disease (HFMD) poses a persistent public health challenge, particularly affecting young children and frequently leading to outbreaks in settings like daycare centers and schools.

Preventive measures, including strict hygiene practices, surface sanitization, and isolating affected individuals, are effective for controlling spread in high-risk environments but require consistent implementation to be impactful. Despite these measures, the extended viral shedding period and high contagiousness among young children make HFMD difficult to contain solely through hygiene efforts.

Current efforts in vaccine development and antiviral research offer promise for more effective long-term management, especially in addressing severe cases and reducing transmission. Meanwhile, raising public awareness and educating caregivers on symptom recognition and hygiene practices are essential for reducing transmission. Continued research is needed to address gaps in our understanding of HFMD's pathogenesis and to inform evidence-based guidelines for diagnosis, treatment, and prevention.

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Conflict of Interest: Nil

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