

# A Prospective Observational Study on Hand, Foot, and Mouth Disease: Incidence of Secondary Bacterial Skin Infections

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**Abstract:** *Hand, Foot, and Mouth Disease (HFMD) is a common viral illness affecting children, often self-limiting with minimal complications. This prospective observational study aims to determine the incidence of secondary bacterial skin infections in children with HFMD and the clinical outcomes associated with these infections. A total of 150 children, aged 6 months to 11 years, were enrolled. Secondary bacterial infections were observed in 6 children (4%), of which 4 children (67%) presented with high-grade fever spikes. These infections were effectively managed with topical mupirocin and oral amoxicillin-clavulanate, with full recovery in one week. Children without secondary bacterial infections followed a typical HFMD course of less than one week, without complications. Interestingly, 10% of children did not present with intraoral lesions. These findings provide insight into the clinical characteristics of HFMD and the management of secondary bacterial skin infections.*

**Keywords:** Hand, Foot, and Mouth Disease, children, secondary bacterial infections, clinical outcomes, treatment

## 1. Introduction

Hand, Foot, and Mouth Disease (HFMD) is a viral illness primarily affecting young children, characterized by fever, oral ulcers, and vesicular rashes on the hands, feet, and buttocks. The disease is commonly caused by Coxsackievirus A16 and Enterovirus 71. While HFMD is usually self-limiting, complications such as secondary bacterial skin infections can occur, leading to additional morbidity. This study aims to evaluate the incidence of secondary bacterial skin infections in children diagnosed with HFMD and to describe the clinical management and outcomes of these cases.

## 2. Methods

This prospective observational study was conducted over a period of six months, involving 150 pediatric patients diagnosed with HFMD. The children, aged between 6 months and 11 years, were recruited from a pediatric outpatient clinic. Clinical diagnosis of HFMD was made based on the presence of characteristic skin lesions and/or intraoral ulcers. Patients were monitored for the development of secondary bacterial infections, defined by the presence of purulent discharge from skin lesions and/or fever spikes. The incidence of secondary bacterial infections, treatment modalities, and outcomes were documented.

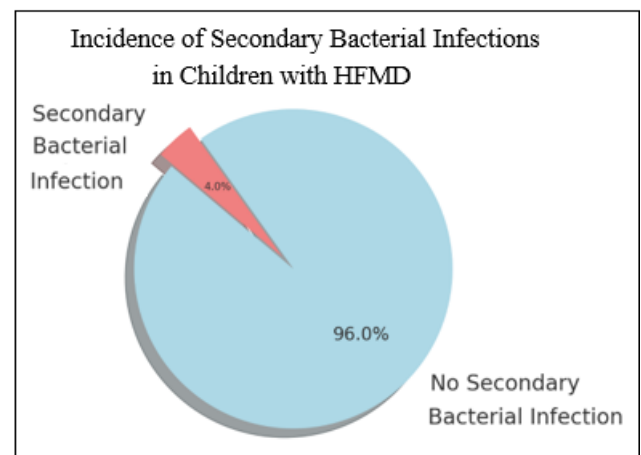
## 3. Results

Of the 150 children included in the study, 6 children (4%) developed secondary bacterial infections of the skin lesions. The presence of pus formation in the lesions confirmed the secondary bacterial nature of the infection. Among these 6 children, 4 (67%) experienced high-grade fever spikes. All affected children were treated with topical mupirocin and oral amoxicillin-clavulanate (amoxyclav). Clinical resolution of

symptoms was observed in all 6 children within one week of initiating treatment.

The remaining 144 children (96%) had an uncomplicated course of HFMD, with resolution of symptoms within one week without the need for antibiotics. Notably, 15 children (10%) did not present with intraoral ulcers, indicating variability in the clinical presentation of HFMD.

A pie chart depicting the incidence of secondary bacterial infections in children with HFMD is provided below (Figure 1). It shows that 96% of children did not develop secondary infections, while 4% did.



**Figure 1:** Incidence of Secondary Bacterial Infections in Children with HFMD

## 4. Discussion

The findings of this study suggest that secondary bacterial skin infections are an uncommon complication of HFMD, occurring in approximately 4% of cases. The presence of high-grade fever in the majority of these cases indicates a

systemic response to the bacterial infection, necessitating prompt intervention. The use of topical mupirocin and oral amoxycylav was effective in achieving clinical resolution, emphasizing the importance of early recognition and treatment of secondary infections to prevent further complications.

**Epidemiology:**

HFMD is a highly contagious viral illness, primarily affecting children under the age of 5 years, although older children can also be affected. It is most commonly seen in regions with temperate climates and tends to occur in outbreaks, particularly in childcare settings. Coxsackievirus A16 and Enterovirus 71 are the most frequently implicated etiological agents, with Enterovirus 71 being associated with more severe complications, including neurological involvement.

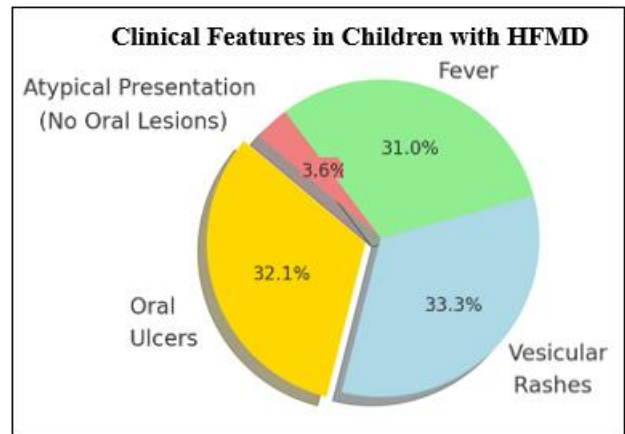
**Etiology and Pathology:**

HFMD is caused by a group of enteroviruses, with Coxsackievirus A16 and Enterovirus 71 being the most common causative agents. The virus is transmitted through direct contact with nasal secretions, throat discharge, saliva, fluid from vesicles, or stool of infected individuals. The incubation period ranges from 3 to 6 days. Pathologically, HFMD is characterized by the development of maculopapular and vesicular lesions on the hands, feet, buttocks, and oral mucosa. The skin lesions are initially erythematous macules that progress to vesicles, which may ulcerate.

**Clinical Features:**

The classic presentation of HFMD includes fever, malaise, sore throat, and the appearance of vesicular rashes on the hands, feet, and buttocks, along with oral ulcers. The oral lesions are often painful and can lead to difficulty in eating or drinking. In some cases, atypical presentations may occur, such as the absence of oral lesions, which was observed in 10% of the children in this study. Rare clinical features may include neurological complications such as aseptic meningitis or encephalitis, particularly in cases caused by Enterovirus 71.

A pie chart depicting the proportion of children presenting with typical and atypical clinical features is provided below (Figure 2). The chart shows the majority of children presenting with oral ulcers (90%), vesicular rashes (93%), and fever (87%), while 10% of the children had atypical presentations without oral lesions.

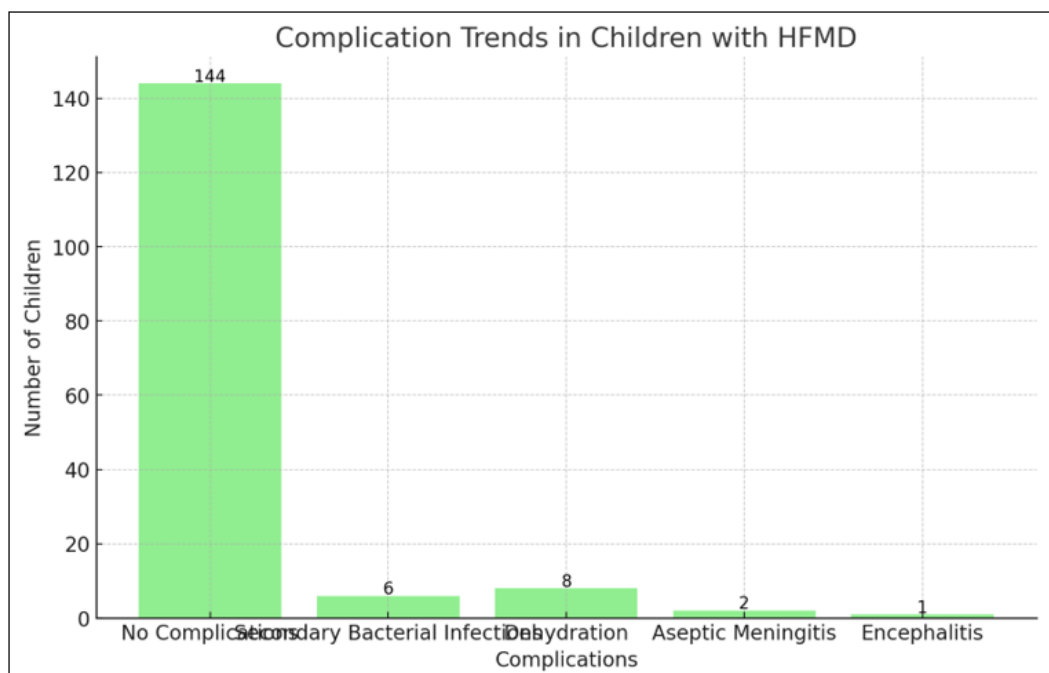


**Figure 2:** Clinical Features in Children with HFMD

**Complications:**

While HFMD is typically a benign, self-limiting illness, complications can occur. Secondary bacterial skin infections, as observed in this study, are one of the potential complications, especially when lesions are not properly cared for. Other possible complications include dehydration due to painful oral ulcers, aseptic meningitis, encephalitis, and, rarely, myocarditis. Secondary bacterial infections may present with pus formation, erythema, and fever, necessitating antibiotic therapy to prevent further spread.

A bar chart depicting the complication trends in children with HFMD is provided below (Figure 3). It shows the number of children experiencing various complications, including secondary bacterial infections (6), dehydration (8), aseptic meningitis (2), and encephalitis (1).

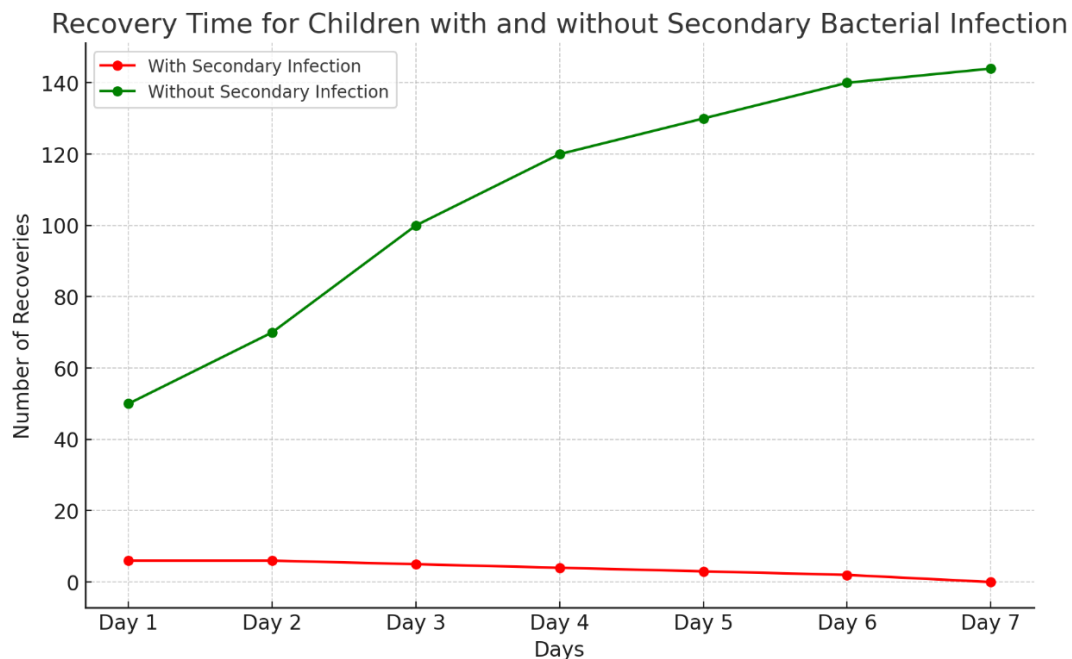


**Figure 3:** Complication Trends in Children with HFMD

**Management:**

Management of HFMD is primarily supportive, focusing on hydration, pain relief, and symptomatic treatment. Antipyretics such as acetaminophen or ibuprofen can be used to control fever and alleviate pain. Topical anesthetics may be applied to oral ulcers to reduce discomfort. In cases of

secondary bacterial infection, as noted in this study, topical mupirocin and oral amoxicillin - clavulanate were effective in achieving resolution. Good hygiene practices, including handwashing and avoiding close contact with infected individuals, are crucial in preventing the spread of HFMD.



**Figure 4:** Recovery Time for Children with and without Secondary Bacterial Infections

## 5. Conclusion

Secondary bacterial skin infections in children with HFMD are rare but can lead to significant clinical symptoms, including fever. Early identification and treatment with appropriate antibiotics lead to favorable outcomes. The majority of HFMD cases are uncomplicated, with spontaneous resolution within one week. Further research is needed to explore the factors predisposing certain children to secondary infections and to better understand the variability in clinical presentations.

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