Research Paper

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# Epidemiology and Clinical Profile of Hand, Foot and Mouth Disease Outbreak in Bangalore

Medical Science

**KEYWORDS :** Hand, foot, and mouth disease, Coxsackie A16, Enterovirus 71

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## ABSTRACT

*Objectives: To describe the epidemiology and clinical profile of cases of HFMD in an outbreak.*
*Design: Descriptive epidemiological study.*
*Setting: Tertiary care center in North Bangalore.*
*Methods: Patients attending to M.S.Ramaiah medical college hospital with features suggestive of HFMD were included in the study. The patient's demographic data, clinical features and examination findings were entered in to a predesigned format. The epidemiology and clinical features were analyzed using appropriate statistical methods.*
*Results: A total of 71 children were diagnosed as HFMD disease, 47 (66.2%) were boys and 24 (33.8%) were girls, fever was seen in 62 (87.3 %) of the affected children, anorexia and sore throat was seen in 47 (66.2 %) and 35 (49.3%) children respectively. Typical rashes were seen on hands in 67 (94.4%), 64 (90.1%) had rashes on feet, 58 (81.7%) had mouth ulcers, and 37 (52.1%) had rashes on buttocks. There was history of exposure to a HFMD in 46 (64.8%) of the children mostly at home in 19 (26.8%), at day care centers in 14 (19.7%) and in 13 (18.3%) at school. The disease lasted between 2 days to 8 days. There were no complications noted.*
*Conclusion: HFMD affected mainly children in the age group of 1-10 years, affected more boys than girls, complete recovery without any major complications was seen in the present outbreak. The characteristic clinical features will be helpful in early diagnosis of HFMD and will help in looking for any complications occurring in HFMD.*

**Introduction:**
Hand-Foot-and-Mouth Disease (HFMD) is a common viral disease of children below 10 years of age. Older children and adults are occasionally affected with a milder form of illness compared to younger children. HFMD is caused by coxsackie virus A 16, enterovirus 71 (EV71), it can also be caused by coxsackie A viruses 5, 6, 7, 9 and 10; and coxsackie B viruses 2 and 5 [1]. Severe infections have been associated with enterovirus 71 and coxsackie virus A 6. Since its discovery in 1969, EV71 has caused major outbreaks around the world, affecting mostly children. According to WHO, outbreaks of HFMD occur every few years in different parts of the world. But in recent years these have occurred in south east Asia mainly in China, Taiwan, Hong Cong, Japan, Korea, Malaysia, Singapore, Thailand, and Vietnam [2, 3, 4, 5]. An epidemic of enterovirus 71 (EV71) infections in Taiwan in1998 resulted in thousands of cases of HFMD or herpangina. Severe complications included CNS disease, myocarditis, and pulmonary hemorrhage [4]. About 90% of those who died were children 5 years of age or less and these deaths were associated with pulmonary edema or pulmonary hemorrhage. Many deaths have been reported due to severe outbreaks of HFMD from many Asian countries during the continuous surveillance since 1998 in Taiwan, it has been observed that the disease that was benign initially, acquired more virulence in the subsequent years. [6] A large outbreak of HFMD during June 2012 infected about 4,60,000 people and killed 132 in China's Hunan province.

The first ever epidemic of Hand, foot and mouth disease in India was observed in 2003 in the state of Kerala [7], after which it has been sporadically seen across India as a mild illness [8, 9, 10]. With increasing incidence of epidemics in India, we can expect more cases as well as more severe infections with life threatening complications in the forthcoming years. An epidemic of HFMD was seen recently in the city of Bangalore, India. The present study was undertaken during this outbreak to know about epidemiology and clinical profile of these cases.

**Methods:** Patients attending M.S.Ramaiah medical college hospital with history suggestive of HFMD between July to September 2013 were included in the study. The history was collected from cases with emphasis on presenting symptoms, including contact history in the family, school or at day care centers. Detail clinical examination was done, and the patient's demographic data, symptoms and signs were recorded in a predesigned format. The diagnosis was made on typical clinical findings. Skin biopsy and histopathology or isolation of virus from clinical cases was not done in any of the cases. The epidemiology and clinical features were analyzed using appropriate statistical methods.

**Results:** A total of 71 children were diagnosed as HFMD disease, 47 (66.2%) were boys and 24 (33.8%) were girls [Table 1]. Age of the subjects ranged from 11 months to 12 years with mean age of 2.99 years. Most of the cases were seen in the age group of preschool or early school going children [Table 2]. Signs of HFMD included fever in 62 (87.3%); anorexia in 47 (66.2%) and sore throat was seen 35 (49.3%) of the children respectively. The typical rashes were seen on hands in 67 (94.4%) children, on feet in 64 (90.1%) children, mouth ulcers was seen in 58 (81.7%) children, and rashes on buttocks was seen in 37 (52.1%). The disease started as fever with erythematous maculopapular rash which rapidly enlarged and progressed to become papulovesicular lesions. Most of the skin rashes lasted between 3 days to 7 days. The rashes had a typical distribution involving hands, feet, buttocks and in some cases on the back [Figure 1, 2 and 3]. In few cases rashes were seen on the elbow, knees and trunk also. Vesicular skin lesions were seen predominantly in the dorsal surface of the hands and feet compared to more maculopapular lesions on the palmar and plantar surfaces of hands and feet. The oral lesions were small aphthus like ulcers, measuring 2-3 mm in size. The mouth ulcers involved

gums, tongue and buccal mucosa [Fig 3]. There was history of exposure to a HFMD in 46 (64.8%) of the children, out of which 19 (26.8%) had contact at home, 14 (19.7%) children had at day care centers and in 13 (18.3%) children had contact at school [Table 3]. The disease lasted between 2 days to 8 days [ fig 5]. There were no complications noted.

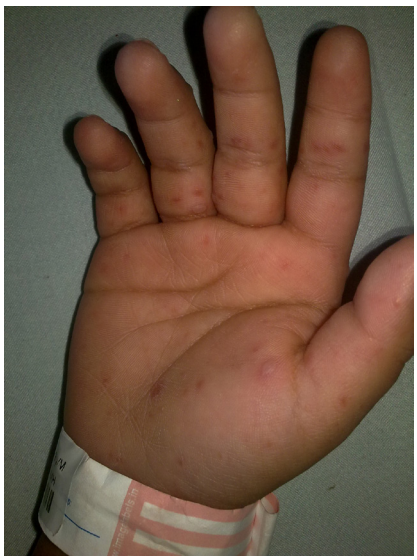

**Fig 1. Oval blisters on the palms.**

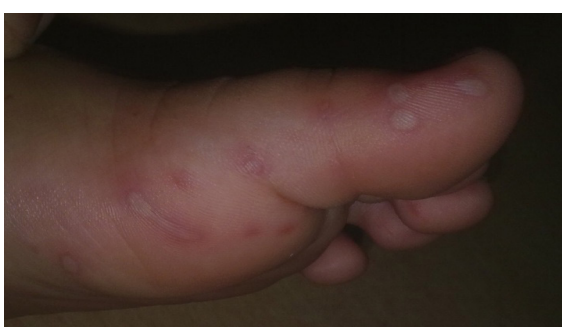

**Fig 2. Blisters on the feet in HFMFD.**

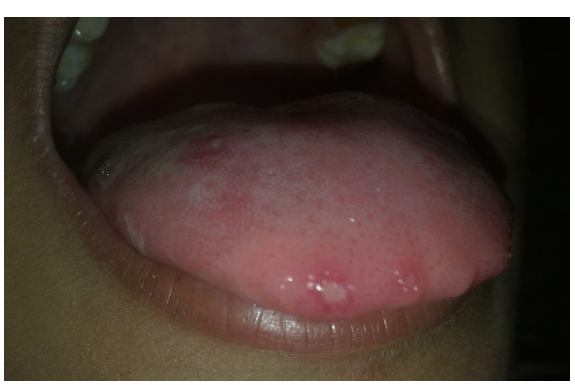

**Fig 3. Tender vesicles and erosions of the tongue in a child with HFMFD.**

**Table 1. Sex distribution:**

| Sex | No. (%) |
|---|---|
| Male | 47 (66.2) |
| Females | 24 (33.8) |
| Total | 71 (100) |

**Table 2. Age distribution**

| Age (yrs) | Total ( N) | Total (%) |
|---|---|---|
| <1 | 7 | 9.9 |
| 1-5 | 60 | 84.5 |
| 5-10 | 4 | 5.6 |
| Total | 71 | 100 |

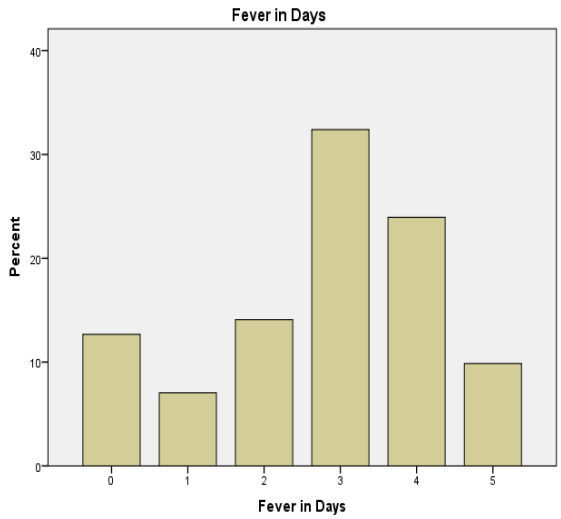


**Fig 4. Duration of fever in days in HFMD**

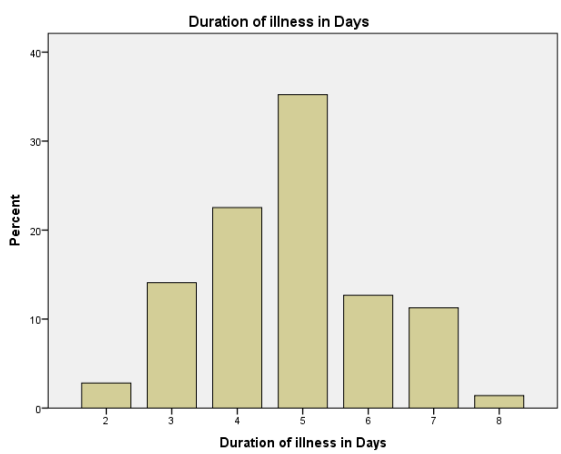


**Fig 5. Duration of illness in days.**

**Table 3. Clinical profile and source of contact of the patients.**

| | N (71) |
|---|---|
| Fever | 62 (87.3%) |
| Rashes- Hands | 67 (94.4%) |
| Feet | 64 (90.1%) |
| Buttocks | 37 (52.1%) |
| Mouth ulcers | 58 (81.7%) |
| Pain abdomen | 16 (22.5%) |
| Irritability | 21 (29.6%) |
| Anorexia | 47 (66.2%) |
| H/O contact | 46 (64.8%) |
| At Home | 19 (26.8%) |
| At School | 14 (19.7%) |
| At day care centers | 13 (18.3%) |

**Discussion:**
Entero viruses are a group of RNA viruses belonging to picorna viridae family with high mutation rate. The presence of multiple genotypes and sub genotypes of the EV 71 and CA 16 has resulted in repeated epidemics of HFMD in the past and are expected in the future. An outbreak is usually followed by a quiescent phase of few years. Children are the target population as well as reservoir of infection. Other infections caused by enteroviruses include herpangina, acute hemorrhagic conjunctivitis, childhood pneumonia, common cold and are one of the etiological agents in acute flaccid paralysis. Coxasackie B has been isolated at autopsy from the pancreas of few children presenting with insulin dependent diabetes mellitus. Other diseases that have been associated with EV infections include parotitis, bronchitis, bronchiolitis, croup, infectious lymphocytosis, polymyositis, acute arthritis and nephritis.

**Clinical features:** HFMD is usually a mild illness lasting 7 to 10 days. The infection spreads through direct contact with nasal or oral secretions or fecal contamination. The disease is highly infectious, with attack rates of close to 100% among young children. It has an incubation period of 3 to 5 days, with or without low-grade fever, sore throat and loss of appetite. Maculopapular, vesicular, and/or pustular lesions may occur on the hands and fingers, feet, and buttocks and groin; hands are more commonly involved than the feet (Fig.1 and 2). Lesions on the hands and feet are usually tender vesicles varying in size from 3 to 7 mm and are more common on dorsal surfaces but frequently also occur on palms and soles. Vesicles resolve in about 1 week without leaving scars. In some cases, fingernails have been reported to be shed in a few weeks after the infection has recovered. Buttock lesions do not usually progress to vesiculation. The oropharynx is inflamed and contains scattered vesicles on the tongue, buccal mucosa, posterior pharynx, palate, gingiva, and/or lips (Fig 3). These may ulcerate, leaving 4–8 mm shallow ulcers with surrounding erythema. Usually these oral lesions are painful.

**Diagnosis** of HFMD can be made in most cases by clinical presentation with certainity. HFMD can have a very distinctive set of clinical features which should raise a suspicion of the condition and remains the sole modality of diagnosis in resource constrained areas. Differential diagnosis includes papular urticaria, varicella and insect bites. Diagnosis of HFMD can be done on clinical grounds with high index of suspicion, viral cultures, neutralization with serotype specific anti-sera, RT PCR and nucleotide sequencing of VP1 genes. Isolation of virus in the cell culture is the most common procedure for diagnosis of infection. Cultures of stool, nasopharynx or throat samples from patients are often positive, culture of CSF, serum, fluid from body cavities or tissues are positive less frequently, but a positive result is indicative of disease caused by enteroviruses. It is important to culture multiple sites. Cultures are more likely to be positive earlier than later in the course of infection. Cultures may be negative because of presence of neutralizing antibodies, lack of susceptibility of the cells used, or inappropriate handling of the specimen. Coxasackie A may require special culture lines. Serotype identification is useful primarily for epidemiological studies and with few exceptions, has little clinical utility. The polymerase chain reaction (PCR) has been used to amplify viral nucleic acid from CSF, serum, urine, throat swabs and tissues. A single pair of PCR primers can detect more than 92% of serotypes that infect humans. Sequence analysis of partial viral particles can also be done.

**Treatment:** There is no specific treatment for hand, foot and mouth disease. However, some things can be done to relieve symptoms, such as Symptomatic treatment with paracetamol for pain and fever. Using mouthwashes or sprays of gels that numb mouth pain, if a person has painful mouth ulcers, it might be difficult to swallow. If a child cannot swallow enough liquids, IV fluids may be given in severe cases.

**Complications:** Complications from hand, foot, and mouth disease are not common. HFMD caused by enterovirus 71 is frequently more severe than that due to other viruses, with high rates of neurologic disease, including, in outbreaks, brainstem encephalomyelitis, neurogenic pulmonary edema, pulmonary hemorrhage, shock, and rapid death, especially in young children. Fingernail and toenail loss have been reported, occurring mostly in children within 4 weeks of their having hand, foot, and mouth disease. However, the nail loss is temporary and the nail grows back without treatment**.**

**Prevention:** Good personal hygiene is important to prevent the spread of infection to others. The risk of infection can be lowered by washing hands often with soap and water, especially after changing diapers and using the toilet, disinfecting dirty surfaces and soiled items, including toys. Soiled items should be washed first with soap and water; then disinfected with a solution of chlorine bleach (made by mixing 1 tablespoon of bleach and 4 cups of water). Avoiding close contacts such as kissing, hugging, or sharing eating utensils or cups with cases of hand, foot, and mouth disease can reduce the transmission of the disease. Currently vaccines are being developed against HFMD caused by EV71 viruses. In a phase 3 trial of inactivated human EV 71 vaccine, involving 10,245 children aged between six and 35 months living in four different places in China, half were given two doses of the vaccine and half were given a placebo. During active surveillance, vaccine efficacy was 90% against EV71-associated hand, foot and mouth disease and 80·4% against EV71-associated diseases. The vaccine also demonstrated 100% efficacy against EV71-associated hospitalization, and the authors concluded that it could have a significant impact on public health by preventing severe outcomes of EV71 infection [11]. As HFMD can be caused by different variety of viruses, the impact of EV71 vaccine on public health needs to be ascertained.

The present study should increase the awareness about the disease, its severity and help in the early diagnosis and management of the cases and their complications.

**Conclusion:**
HFMD affected mainly children in the age group of 1-10 years; complete recovery without any major complications was seen in the present outbreak. The characteristic clinical features will be helpful in early diagnosis of HFMD and will help in looking for any complications occurring in HFMD.

## REFERENCE

1. Li L He Y, Yang H Zhu J, Xu X, Dong J, Zhu Y, et al. Genetic Characteristics of human Enterovirus 71 and Coxsackie virus A 16 circulating from 1999 to 2004 in Shenzhen, People's Republic of China. J Clinical microbial.2005; 43:3835-9. | | 2. Podin Y, Gias EL, Ong F, Leong YW, Yee SF, Yusof MA, et al . Sentinel surveillance for human enterovirus 71 in Sarawak, Malaysia: Lessons from the first 7 years. BMC Public Health 2006; 6:180. | | 3. Chan YF, AbuBakar S. Recombinant human enterovirus 71 in hand foot and mouth disease patients. Emerg Infect Dis 2004; 10:1468-70. | | 4. Chang LY, King CC, Hsu KH, Ning HC, Tsao KC, Li CC, et al . Risk factors of enterovirus 71 infection and associated hand foot and mouth disease/herpangina in children during epidemic in Taiwan. Pediatrics 2002; 109:e88. | | 5. Shah VA, Chong CY, Chan KP, Ng W, Ling AF. Clinical characterstic of an outbreak of hand foot and mouth disease in Singapore. Ann Acad Med Singapore 2003; 32:381-7. | | 6. Ho M, Chen ER, Hsu KH, Twu SJ, Chen KT, Tsai SF, et al. An epidemic of Enterovirus 71 infection in Taiwan. N Engl J Med.1999; 341:929-35. | | 7. Sasidharan CK, Sugathan P, Agarwal R, Khare S, Lal S, Jayaram Paniker CK. Hand-foot-and-mouth disease in Calicut. Indian J Pediatr 2005; 72:17-21. | | 8. Sarma N, Sarkar A, Mukherjee A, Ghosh A, Dhar S, Malakar R. Epidemic of hand, foot and mouth disease in West Bengal, India in August, 2007: A multicentric study. Indian J Dermatol 2009; 54:26-30. | | 9. Saoji VA. Hand, foot and mouth disease in Nagpur. Indian J Dermatol Venereol Leprol 2008; 74:133-5. | | 10. Dwivedi B, Kar SK. Hand, foot and mouth disease: A newly emerging infection in Orissa, India. National Med J India.2010; 23:313. | | 11. Feng-Cai Zhu, Fan-Yue Meng, Jing-Xin Li et al. Efficacy, safety and immunogenicity of an inactivated alum-adjuvant enterovirus 71 vaccine in children in China: a multicentre, randomised, double-blind, placebo-controlled, phase 3 trial. The Lancet June 2013, 381, Issue 9882, 2024 – 2032. | |