

Hand, Foot and Mouth Disease

INTRODUCTION

Hand, foot and mouth disease (HFMD) is a human syndrome caused by intestinal viruses of the Picornaviridae family. The most common strains causing HFMD are Coxsackie A virus and Enterovirus71 (EV71). It is a common viral illness of infants and children and is extremely uncommon in adults; however, still a possibility. Most adults have strong enough immune systems to defend the virus, but those with immune deficiencies are very susceptible.

It is often confused with foot-and-mouth (also called hoof-and-mouth) disease, a disease of cattle, sheep, and swine; however, the two diseases are not related—they are caused by different viruses. Humans do not get the animal disease, and animals do not get the human disease.

AETIOLOGY

HFMD is caused by viruses belonging to the enterovirus genus (group). This group of viruses includes polioviruses, coxsackie viruses, echoviruses, and other enteroviruses.

The most common cause of HFMD is Coxsackie virus A16. HFMD caused by Coxsackie virus A16 infection is a mild disease. Nearly all patients recover in 7 to 10 days without medical treatment. Complications are uncommon, but when they do occur, medical care should be sought. Rarely, the patient with Coxsackie virus A16 infection may also develop viral (“aseptic”) meningitis in which the person has fever, headache, stiff neck, or back pain and may need to be hospitalized for a few days.

Enterovirus71 or other enteroviruses have also been associated with HFMD and with outbreaks of the disease. HFMD caused by Enterovirus71 has shown a higher incidence of neurologic involvement. Fatal cases of encephalitis caused by enterovirus 71 have occurred during outbreaks.

To Summarise:

- Coxsackie virus A16→Mild Infection HFMD
- Enterovirus71→HFMD with severe neurologic involvement including fatal encephalitis
- Other enteroviruses

RECORDED OUTBREAKS

Individual cases and outbreaks of HFMD occur worldwide. In temperate climates, cases occur more often in summer and early autumn. Since 1997, outbreaks of HFMD caused by Enterovirus 71 have been reported in Asia and Australia.

- In 1997, 34 children died in an outbreak in Sarawak, Malaysia.
- In 1998, there was an outbreak in Taiwan, affecting mainly children. There were 405 cases with severe complications, and 78 children died. The total number of cases is estimated to have been 1.5 million.
- In 2006, 7 people died in an outbreak in Kuching, Sarawak (according to the *New Straits Times*, March 14).
- In 2007, April 15–21: 688 reported cases in Singapore.
- In 2007, May 30: Over 30 reported cases in the Maldives

- In 2008, an outbreak in China, beginning in March in Fuyang, Anhui, led to 25,000 infections, and 42 deaths by May 13th. Similar outbreaks were reported in Singapore (more than 2,600 cases as on April 20th, 2008), Vietnam (2,300 cases, 11 deaths), and Mongolia (1,600 cases).

SITUATION IN INDIA

- An outbreak of papulovesicular lesions on skin and oral mucosa of children occurred in Calicut, **India** from October to November 2003 affecting 81 children and was investigated by NICD team. All children recovered within 1-2 weeks. (Indian Journal of Pediatrics 2005: vol 72: Issue 1)
- In 2006, after an outbreak of Chikungunya in southern and some western parts of **India**, cases of HFMD were also reported.

ROUTE OF INFECTION

Infection is spread from person to person by direct contact with infectious virus which is found in the nose and throat secretions, saliva, blister fluid, and stool of infected persons. The virus is most often spread by persons with unwashed, virus-contaminated hands and by contact with virus-contaminated surfaces.

Infected persons are most contagious during the first week of the illness. They can still pass the infection to other people even though he/she appears well. Some persons who are infected and excreting the virus, including most adults, may have no symptoms. HFMD is not transmitted to/ transmitted from pets or other animals.

INFECTIVITY

It is moderately contagious and is spread through direct contact with the mucus, saliva, or feces of an infected person. It typically occurs in small epidemics in nursery schools or kindergartens, usually during the summer and autumn months. The incubation period is normally 3-7 days.

AGE GROUP

HFMD occurs mainly in children under 10 years of age, but it can occur in adults too. Everyone is at

risk of acquiring infection with viruses that cause HFMD, but not everyone who gets infected becomes ill. Infants, children and adolescents are more likely to be susceptible to infection and illness from these viruses because they are less likely to be immune to them than adults. Many adults have developed protective antibodies due to previous exposures to the viruses. Infection results in immunity to the specific virus, but a second episode of HFMD may occur following infection with a different member of the enterovirus group.

RISK ASSESSMENT

Risk of Individual Infection: All those who get exposed to the virus are at risk but not everyone who is infected becomes ill. Young children under 5 years of age are most susceptible. The clinical manifestation of most cases is mild. Since enteroviruses are omnipresent, it is likely for adults and older children to have immunity. The main transmission route for Enterovirus71 is via respiratory droplets, contact with fluid in the blisters or contact with infected faeces. The risk of transmission can be minimized by avoiding contact with known infected individuals or activities that involve risk and by improving personal hygiene.

Risk of transmission: HFMD is a relatively common disease. There have been a number of outbreaks of EV71 HFMD in the Asia-Pacific region since 1997. Outbreaks have been reported in Bulgaria (1975), Malaysia (1997), Australia (1999), Singapore (2000) and other areas in the region. In China, an outbreak of HFMD due to EV71 was reported in Taiwan Province in 1998 with a total number of 129,106 cases of HFMD and Herpangina, of which 405 cases were severely ill and 78 cases were fatal.

CLINICAL FEATURES

HFMD is characterized by fever, sores in the mouth, and a skin rash. It begins with mild fever, poor appetite, malaise, and often a sore throat. One or two days after the fever begins, painful sores develop in the mouth. They begin as small red spots that blister and then often become ulcers. The sores are usually located on the tongue, gums, and inside of the cheeks.

Chief Symptoms:

- fever
- sore throat
- ulcers in the throat, mouth and tongue
- headache
- a rash with vesicles (small blisters, 3-7 mm) on hands, feet and diaper area. The vesicles are typically on the palmar side of the hands, the sole side of the feet and are very characteristic in appearance
- loss of appetite



The skin rash develops over 1 to 2 days, with flat or raised red spots and sometimes with blisters. The skin rash does not itch and is usually on the palms of the hands and soles of the feet. It may also appear on the buttocks or genitalia. A person with HFMD may have only the rash or only the mouth sores.

Severe cases are defined as having at least two of following clinical manifestations:

- Continuous high fever.
- Weakness, vomiting, irritability, etc.
- Abnormal White Blood Cell count (WBC).
- High blood glucose level.
- Poor blood circulation of limbs.

DIAGNOSIS

HFMD is one of the many infections that result in mouth sores. However, health care providers can usually tell the difference between HFMD and other causes of mouth sores by considering the patient's age, the symptoms reported by the patient or parent, and the appearance of the rash and/or sores.

Samples from the throat or stool may be sent to a laboratory to test for the virus involved in causing the illness, which may take 2–4 weeks to obtain the laboratory results, so health care providers usually do not order tests. The testing should be done for investigation of an outbreak, so that preventive measures can be initiated.

Sample collection

Samples to be collected:-

- Throat or fecal Samples: should be collected within 48 hours of illness.
- CSF can also be collected within 48 hours if patient has encephalitis
- Biopsy of Lesions
- Skin Scraping of lesions in Viral Transport Media.
- For Serology: 4-fold rise in level of neutralizing antibody in paired blood sample collected at an interval of 14 days ie, one acute sample at the onset of illness and second sample after ten days of illness

Transportation

Sample should be transported to the laboratory on ice for virus isolation/ serology within 24 hours. If the sample cannot be sent immediately, it may be stored at -20°C for 2-3 days and sent on ice to the laboratory at the earliest.

Tests carried out

Viral isolation on monolayer of vero rhabdomyosarcoma and MRC 5. If cytopathic effect is seen, Immunofluorescence test with enterovirus screening set (Panenterovirus, CBV, Echo, Poliovirus blends) may be done for confirmation.

In **India**, we need to be vigilant about the disease. Samples collected should be sent to the virology laboratory. The testing facility for this is available at National Institute of Communicable Diseases, Delhi and Enterovirus Research Centre, Mumbai.

TREATMENT

There is no specific treatment for HFMD. Individual symptoms, such as fever, lameness, and pain from the sores, may be eased with the use of medication. Symptoms can be treated to provide relief from pain from mouth sores and from fever and aches:

- Fever should be treated with antipyretics.
- Pain can be relieved with acetaminophen, ibuprofen, or other over-the-counter pain relievers.
- Mouthwashes or sprays that numb pain can be used to lessen mouth pain.
- Fluid intake should be emphasized to prevent dehydration. If moderate-to-severe dehydration develops, intra venous fluids can be administered.
- HFMD is a viral disease that is self limiting and takes its own time to subside, many doctors do not prescribe medicine for this illness, unless the infection is severe. Infection in older children, adolescents, and adults is normally very mild and lasts around 3 days or sometimes less.
- Only a very small section of people with infection require hospital admission, mainly as a result of neurological complications (encephalitis, meningitis, or acute flaccid paralysis) or pulmonary edema/pulmonary hemorrhage.

PREVENTION

Specific preventive tools for HFMD are not available, but the risk of infection can be lowered by following good hygiene practices.

Preventive measures include:

- Washing hands frequently and correctly especially after changing diapers and after using the toilet.
- Children should be kept away from crowded public places (such as schools, preschools, play groups, markets and public transport) if they show signs of infection.

- Cleaning dirty surfaces and soiled items, including toys, first with soap and water and then disinfecting them by cleansing with a solution of chlorine bleach (made by adding 1 tablespoon of bleach to 4 cups of water; larger quantities can be made by adding ¼ cup of bleach to 1 gallon [16 cups] of water)
- Avoiding close contact (kissing, hugging, sharing eating utensils and cups, etc.) with persons with HFMD

VACCINATION

No vaccine is available to protect against the enteroviruses that cause HFMD,

COMPLICATIONS

Complications from the viral infections that cause HFMD are not common, but if they do occur, medical care should be sought.

Viral or “aseptic” meningitis rarely occurs with HFMD. Viral meningitis causes fever, headache, stiff neck, or back pain. The condition is usually mild and clears without treatment; however, some patients may need to be hospitalized for a short time.

Other more serious diseases, such as encephalitis (swelling of the brain) or a polio-like paralysis may occur very rarely but encephalitis can be fatal.

HFMD AND PREGNANCY

In adults, including pregnant women, the risk of infection is higher among those who do not have protective antibodies from earlier exposures to these viruses and for those who are constantly exposed to young children—the main spreaders of the infection.

Most enterovirus infections during pregnancy cause mild or no illness in the mother. Currently, there is no clear evidence that maternal enterovirus infection causes adverse outcomes of pregnancy, such as abortion, stillbirth, or congenital defects. However, mothers infected shortly before delivery may pass

the virus to the newborn. Babies born to mothers who have symptoms of enteroviral illness around the time of delivery are more likely to be infected. Most newborns infected with an enterovirus have mild illness, but, in rare cases, they may develop an overwhelming infection of many organs, including liver and heart, and die from the infection. The risk of this severe illness in newborns is higher during the first two weeks of life. Strict adherence to good hygiene practices by pregnant women may decrease the risk of infection during pregnancy and around the time of delivery.

HFMD IN CHILD CARE SETTINGS

There are no specific recommendations by CDC regarding the exclusion of children with HFMD from child care programs, schools, or other group settings. Excluding children from group settings during the first few days of the illness may reduce the spread of infection, but will not completely interrupt it. Exclusion of ill persons may not prevent additional cases since the viruses that cause HFMD can remain in the body for weeks after the patient's symptoms disappear. In that case, the infected person can still pass the infection to other people even though they appear well. Some persons who are infected and excreting the virus, including most adults, may have no symptoms. Some benefit may be gained by excluding children who have blisters in their mouths and drool or who have weeping lesions on their hands.

ADVICE FOR PARENTS

Parents are advised to consult a doctor early if their child has symptoms of HFMD. They should also be alert to any change in their child's normal behaviour, e.g. irritation and sleepiness. If they refuse to eat or drink, have persistent vomiting or drowsiness, parents should bring their child immediately to hospital.

If an outbreak occurs in a child care setting:-

- It is important to make sure that all children and adults wash their hands frequently and thoroughly, especially after changing diapers or using the toilet.

- Contaminated items and surfaces should be thoroughly washed and disinfected using a diluted solution of chlorine-containing bleach.

RESPONSE IN CASE OF AN OUTBREAK

Strengthening of disease surveillance

- A case definition is to be formulated for early detection of severe cases and for reporting, monitoring and treatment of severe cases.
- A HFMD reporting protocol should be developed, and daily reporting of HFMD should be performed at each level of health care facility.

Optimization of patient treatment and minimization of case fatalities

- Designation of specific hospitals for the treatment of EV71-infected patients: mild cases to be sent to nearby health care facilities and the treatment of severe cases should be at designated hospitals.
- Establishment or expansion of paediatric Intensive Care Unit (ICU) facilities.
- Organization of training for high-level national and state ICU staff.
- Formation of a specialized medical team and 24 hour on-duty service.
- Enhancement of monitoring and evaluation of severe cases based on clinical symptoms.
- Clinical monitoring for early detection of severe cases and early provision of interventions to minimize fatalities.

Establishment of patient triage system and control of nosocomial infections

- Consultation rooms should be established for febrile rash cases within fever outpatient clinics or paediatric wards to prevent cross-transmission among other sick children. Medical equipment should be sterilized for each patient.

Strengthening technical guidance, development of technical training and improvement of health-care workers' professional skills

- Guidelines should be developed for the diagnosis and treatment of HFMD cases, a sampling plan and HFMD prevention and control plan. National and local experts have to guide designated hospitals in establishing paediatric ICU and train health-care workers on clinical diagnosis, ICU treatment, and epidemiological and sampling skills.

Establishment of full scale prevention and control measures with focus on childcare centres and schools

- Emphasis should be placed on promoting health education, disseminating information leaflets, and increasing public awareness.
- On a daily basis, the teacher in charge should perform a clinical inspection of pupils in the morning, record absenteeism and reason for absence, and report daily to the local authorities. If children present with fever and rash, their parents should be informed immediately and should seek medical care. Subsequently, disinfection of the school building, tables, chairs and personal belongings should be conducted.
- Childcare centres should disinfect toys daily, and tables should be disinfected before and after meals. Before and after class, the classrooms and school building should be ventilated by opening doors and windows for over 30 minutes.
- When 3 or more febrile/rash cases are identified per class, it should be reported to the local authorities immediately. The class should be divided or dismissed in order to avoid a possible outbreak situation.

Establishment of HFMD medical assistance centre

- In order to ensure the prompt treatment of HFMD patients, especially severe cases, aim is to admit patients reporting for treatment. This measure also provides free treatment to severe HFMD cases from low income families and helps in surveillance of disease.

FREQUENTLY ASKED QUESTIONS

Q. 1. What is hand, foot, and mouth disease?

Hand, foot, and mouth disease (HFMD) is a common viral illness of infants and children. It is characterized by fever, sores in the mouth, and a skin rash.

Q. 2. Is hand, foot, and mouth disease the same as foot-and-mouth disease?

No. HFMD is often confused with foot-and-mouth (also called hoof-and-mouth) disease of cattle, sheep, and swine.

Q. 3. What causes HFMD?

HFMD is caused by viruses that belong to the enterovirus genus (group). This group includes polioviruses, coxsackie viruses, echoviruses, and enteroviruses. The most common cause of HFMD is Coxsackie virus A16, but sometimes HFMD is also caused by Enterovirus 71 or other enteroviruses.

Q. 4. Is HFMD serious?

HFMD is usually not serious. HFMD caused by Coxsackie virus A16 infection is a mild disease and nearly all patients recover in 7 to 10 days without medical treatment. Another cause of HFMD, Enterovirus 71 (EV71), may also cause viral meningitis and, rarely, other more serious diseases, such as encephalitis or a polio-like paralysis. EV71 encephalitis can be fatal.

Q. 5. Is HFMD contagious?

HFMD is moderately contagious. Infection is spread from person to person by direct contact with nose and throat discharges, saliva, fluid from blisters, or the stool of infected persons. A person is most

contagious during the first week of the illness. HFMD is not transmitted to or from pets or other animals.

Q. 6. How soon will someone become ill with HFMD after getting infected?

The usual period from infection to onset of symptoms (incubation period) is 3 to 7 days. Fever is often the first symptom of HFMD.

Q. 7. Who is at risk for HFMD?

Infants, children, and adolescents are more susceptible to infection and illness from these viruses because they are less likely than adults to be immune to them.

Q. 8. What are the risks to pregnant women exposed to children with HFMD?

The risk of infection is higher among those who do not have antibodies from earlier exposures to these viruses and for those who are exposed to young children—the primary spreaders of enteroviruses.

Q. 9. When and where does HFMD occur?

Individual cases and outbreaks of HFMD occur worldwide, and in temperate climates, they occur more frequently in summer and early autumn. In the recent past, major outbreaks of HFMD attributable to enterovirus 71 have been reported in some Asian countries and Australia.

Q. 10. How is HFMD diagnosed?

HFMD is one of many infections that result in mouth sores. Usually, the physician can distinguish between HFMD and other causes of mouth sores based on the age of the patient, the pattern of symptoms reported by the patient or parent, and the appearance of the rash and sores on examination. A throat swab specimen or stool specimen may be sent to a laboratory to determine which enterovirus caused the illness.

Q. 11. How is HFMD treated?

No specific treatment is available for this or other enterovirus infections. Symptomatic treatment is given to provide relief from fever, aches, or pain from the mouth ulcers.

Q. 12. Can HFMD be prevented?

Specific prevention for HFMD or other non-polio enterovirus infections is not available, but the risk of infection can be lowered by following good hygiene practices.

Q. 13. How should HFMD in the child care setting be handled?

CDC has no specific recommendations regarding the exclusion of children with HFMD from child care programs, schools, or other group settings. Children are often excluded from group settings during the first few days of the illness, which may reduce the spread of infection, but will not completely interrupt it. Exclusion of ill persons may not prevent additional cases since the viruses that cause HFMD can remain in the body for weeks after the patient's symptoms have gone away. This means that the infected person can still pass the infection to other people even though they appear well. Also, some persons who are infected and excreting the virus, including most adults, may have no symptoms. Some benefit may be gained, however, by excluding children who have blisters in their mouths and drool or who have weeping lesions on their hands.

If an outbreak occurs in the child care setting-

- Make sure that all children and adults wash their hands frequently and thoroughly, especially after changing diapers or using the toilet.
- Thoroughly wash and disinfect contaminated items and surfaces, using a diluted solution of chlorine-containing bleach.

Q. 14. Where can we get the diagnosis confirmed?

The diagnosis of HFMD can be confirmed only by laboratory testing. One must send the samples to a virology laboratory for virus isolation and confirmation. In India, the samples collected can be sent to the virology laboratory at: National Institute of Communicable Diseases, Delhi, National Institute of Virology, Pune and Enterovirus Research Centre, Mumbai.

**DISEASE OUTBREAKS REPORTED BY THE STATES THROUGH IDSP FOR THE MONTH OF JULY, 2008
(27th WEEK- 30th WEEK)**

Sr. No	Name of State	Name of District	Disease/ Illness
1	Andhra Pradesh	Ananthapur	Food poisoning
		Hyderabad	Food poisoning
		Khammam	ADD
		Krishna	ADD, Food poisoning
2	Arunachal Pradesh	Kurung Kumey	Measles
3	Assam	Hailakandi	Malaria (2 outbreaks)
4	Chandigarh	Chandigarh	Cholera
5	Delhi	Delhi	Dengue
6	Gujarat	Kachchh	ADD
7	Haryana	Karnal	Measles
		Panchkula	Cholera
8	Karnataka	Bagalkot	Food Poisoning
		Belgaum	Food Poisoning
		Bidar	ADD
		Chamarajnagar	ADD
		Gadag	ADD
		Kolar	Dengue
		Mysore	Chikungunya
		Tumkur	Chikungunya
		Kannur	Chikungunya
9	Kerala	Idukki	Viral Hepatitis
		Khargone	ADD
10	Madhya Pradesh	Ahmednagar	Malaria (2 outbreaks)
11	Maharashtra	Aurangabad	Malaria

Sr. No	Name of State	Name of District	Disease/ Illness
11	Maharashtra	Dhule	Malaria
		Jalgaon	ADD, Dengue
		Kolhapur	ADD
		Nagpur	Viral Encephalitis, ADD
		Nashik	Malaria (3 outbreaks)
		Raigad	ADD
		Ratnagiri	ADD
12	Nagaland	Dimapur	AFP
13	Orissa	Boudh	ADD
		Ganjam	ADD
		Koraput	ADD
		Sambalpur	ADD
14	Rajasthan	Alwar	ADD
15	Tamil Nadu	Tiruchirapally	Viral hepatitis
		Villupuram	ADD
16	Uttarakhand	Almora	Viral hepatitis
		Pauri Garhwal	ADD
		Uttarakashi	ADD
17	Uttar Pradesh	Balrampur	ADD
		Lucknow	Food poisoning
18	West Bengal	Unnao	ADD
		Burdwan	ADD
		Hooghly	Food poisoning, ADD
		Parganas	ADD

Weekly alerts of outbreak reporting for the month of July, 2008 (27th wk.- 30th wk.)		
Week No. (Date)	Total no. of States reported	No. of outbreaks reported
27 (30.6.08-6.7.08)	28	19
28 (7.7.08-13.7.08)	26	17
29 (14.7.08-20.7.08)	21	11
30 (21.7.08-27.7.08)	20	10

Total no. of outbreaks reported in the month of July, 2008	
Disease/ Illness	No. of Outbreaks
Acute Diarrhoeal Disease	25
Acute Flaccid Paralysis	1
Chikungunya	3
Cholera	2
Dengue	3
Food Poisoning	7
Malaria	9
Measles	2
Viral Encephalitis	1
Viral Hepatitis	3

24X7 IDSP CALL CENTER (Toll free no. 1075)

The IDSP call center has been established to collect supplemental information on disease alert from across the country. The National Informatics Centre is maintaining the Call Centre accessible through the toll free number 1075 from all over the country by fixed and mobile phones. We encourage that all Health Care Providers utilize this day and night service to report all events of public health importance including alerts on Epidemic Prone Diseases like Cholera, Measles, Plague, Malaria, Typhoid, Dengue, Chikungunya, Leptospirosis, Viral Hepatitis, Japanese Encephalitis, Meningococcal meningitis and AFP or any unknown syndrome in any family or workplace or locality.

...about CDAlert

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