Tomato Fever: An Emerging Viral Infection In India

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Abstract:

This article tries to highlight the most recent information on the "tomato flu" outbreak in India. The "new" virus known as tomato flu, which has been identified in India, is a version of the previously widespread hand, foot, and mouth disease (HFMD). A new disease recently sprung out in some regions of India. The illness had a rash that was primarily seen in children under the age of nine and was extremely contagious. It was called "tomato flu" because the rash was excruciatingly painful and the blisters were the size of tiny tomatoes. On the virology, replication, epidemiology, and clinical characteristics of this disease, a thorough literature study was conducted. The present outbreak was contrasted with earlier diseases that shared similarities with it. Children who were impacted displayed a significant rash on their hands, feet, mouths, and other body parts. They experienced a fever, a sore throat, and blisters on their tongue, gums, and cheeks after developing myalgia and a febrile sickness. None of the afflicted children experienced problems that would have resulted in death. The focus of the therapy was primarily symptomatic, supportive care along with seclusion and upholding hygiene standards. The RNA virus Coxsackievirus A16, a member of the Picornaviridae family, was shown to be the cause. We come to the conclusion that a novel form of Coxsackievirus A16 may be to blame for the current pandemic of this disease in India.

Keywords: *Blisters; CA-16, Coxsackievirus A16; CA-16, HFMD; Clinical features; Coxsackievirus A16; HFMD; Rash; 'Tomato flu'.*

Introduction:

An unknown viral organism that causes the infectious sickness known as tomato flu was discovered for the first time in Kerala, India, in May 2022. The primary symptom of the sickness, tomato-shaped blisters all over the body, led to the nickname "Tomato Flu." The illness first appears as a tiny, red blister that later grows to mimic the shape of a tomato, giving rise to the names "Tomato flu" and "Tomato fever." Children under the age of five are the main victims. The low frequency of tomato flu in adults may be due to strong protection to the virus[1].However, people who interact with children may function as viral carriers and spread the disease. According to Dr. Amar S Fettle, an epidemiologist and the state nodal officer for Kerala, tomato flu is categorised as a "Hand, Foot, and Mouth disease" (HFMD), a common viral illness[2].Viruses from the enterovirus genus, including polioviruses, coxsackieviruses, echoviruses, and other enteroviruses, are responsible for HFMD. The most common cause of HFMD is coxsackie virus A16. Only a moderate version of the illness is caused by coxsackie virus A16 infection in HFMD[3]. Nearly all patients recover in roughly 7 to 10 days without medical intervention. It is sometimes mistaken with the swine, cow, and sheep-specific foot-and-mouth disease, also referred to as hoof-and-mouth disease. But because the two disorders are caused by distinct viruses, they are unconnected. Direct contact with the infectious virus, which is found in the saliva, blister fluid, nose and throat secretions, and faeces of persons who are sick, is the only way for infection to spread from one person to another. People's hands, fomites, and contact with infected surfaces are the most common ways in which the virus is spread. Even though the first week of the illness is usually symptom-free for infected persons, it is the period when they are most infectious. Animals cannot contract or spread HFMD, and children under five are the most vulnerable age group. The majority of patients only exhibit a few clinical traits. Adults and older children are likely immune since enteroviruses are common. The three major ways that enterovirus spreads are by respiratory droplets, coming into touch with blister fluids, and coming into contact with infected faeces[4]. Transmission risk can be decreased by avoiding contact with ill people and upholding personal cleanliness. If adults, especially pregnant women, have never been exposed to these viruses' defending antibodies, they are more vulnerable to infection. The majority of enterovirus infections during pregnancy leave moms with a mild sickness or no symptoms. At this time, there is no conclusive proof that maternal enterovirus infection can result in undesirable pregnancy outcomes such abortion, stillbirth, or congenital defects. Mothers who get the virus right before giving birth, however, could pass it on to the baby. A newborn's risk of infection increases if the mother was suffering from enterovirus illness at the time of delivery. The majority of newborns infected with enteroviruses only experience a mild sickness, but in rare instances, the infection may become serious and spread to the heart or liver, among other crucial organs, and end in death[5]. But scientists are still trying to determine the exact etiological component that is generating this sickness[6].

History:

Coxsackievirus A16 (CVA16) and human enterovirus 71 (HEV71), as well as rarely Coxsackievirus A4-A7, A9, A10, B1-B3, and B5, are responsible for the hand, foot, and mouth disease (HFMD), which was first noted in New Zealand in 1957. Erythematous papulo vesicular eruptions across the hands, feet, perioral region, knees, and buttocks, as well as intraorally, are the hallmarks of this condition, which primarily affects youngsters. It has long been recognised that HFMD runs a self-limiting course. For the first several decades, only minor outbreaks have been documented in the United States, Europe, Australia, Japan, and Brazil. However, as shown in several Southeast Asian nations since 1997, the illness has noticeably altered its behavior. Before that time, there had hardly ever been a substantial increase in incidence, severity, complications, or even fatal results. The non-polio enterovirus HEV71, which has been virtually eradicated, may now pose the biggest potential to induce serious neurological problems. This makes it even more clear that finding a viable treatment or vaccination is still a long shot. Since 2004, there have been reports of disease activity in several parts of India. Even while the epidemic is less severe, its continued expansion to encompass bigger portions of the nation may be a sign that India is more susceptible to deadly outbreaks in the future. A lack of knowledge among healthcare professionals might be quite important. At the same time as we are dealing with the probable emergence of a fourth wave of COVID-19, a new virus known as tomato flu, or tomato fever, has appeared in India in the state of Kerala in children under the age of five[7]. Watchful management is chosen to prevent further outbreaks of the unusual viral infection, which is in an endemic form and is not believed to be life-threatening, as a result of the horrifying COVID-19 pandemic. The first incidence of tomato flu was reported in the Kollam district of Kerala on May 6, 2022; as of July 26, 2022, the local government hospitals have recorded the infection in more than 82 children under the age of five[8]. The other areas in Kerala affected include Anchal, Aryankavu, and Neduvathur. The neighbouring states of Karnataka and Tamil Nadu were made aware of this widespread viral illness. 26 children in the state of Odisha, ranging in age from 1 to 9 years, were found to have the ailment, according to the Regional Medical Research Centre in Bhubaneswar. No other regions of India have yet experienced the impacts of the virus, with the exception of Kerala, Tamil Nadu, and Odisha. The Kerala Health Department is taking efforts to track the virus's progress and prevent it from reaching other parts of India.

Epidemiology:

The illness epidemic began in Kerala's Kollam district, where as of May 13, 2022, 82 cases of tomato flu have been documented; further cases are anticipated. The first incidence of tomato flu, which was recorded on May 6, 2022, was a four-year-old from the village of Aryankavu, which is close to the border between Kerala and Tamil Nadu[9]. Since then, 26 cases in Orissa have tested positive for the illness Hand, Foot, and Mouth, which is thought to be tomato flu[10].

Causes & Etiology

Investigations are still ongoing to determine the infection's specific source. Scientists are currently investigating the bacterium that causes tomato flu. Since it is a disease that spreads through touch, medical specialists advise taking preventative steps. The "tomato flu" is brought on by the Coxsackie virus A 16. It belongs to the family of enteroviruses. Hand, foot, and mouth disease (HFMD) is a common febrile rash disorder caused by enteroviruses (EV) Coxsackie A16 (CA16), EV A71, Coxsackie A6, Coxsackie B, and Echo viruses, according to Dr. Suresh Kumar Panuganti, a paediatrician at Yashoda Hospitals in Hyderabad[11].

Clinical Features:

The symptoms of the tomato flu virus are similar to those of COVID-19 in that both are initially characterised by fever, tiredness, and bodyaches, and some COVID-19 patients also report skin rashes, although the two viruses are unrelated. Children's tomato flu may not truly be a viral disease, but rather a dengue or chikungunya fever consequence. The virus may possibly be a new strain of the virus that causes the common infection known as hand, foot, and mouth disease, which primarily affects youngsters and others with weakened immune systems. Immune-competent people have also been seen to have the disease in several case studies. There is no specific treatment to treat tomato flu because it is a self-limiting illness. The following are the typical presenting signs that have been determined thus far.:

• Large, spherical, reddish blisters on multiple parts of the body
• High-grade fever
• Dehydration
• Skin rash and skin irritation
• Myalgia
• Swollen and painful joints
• Other uncommon symptoms are:
- Nausea and vomiting,
- Running nose,
- Sneezing,
- Frequent coughs,
- Patches and discoloration on various body parts including hands, buttocks and knees,
- Abdominal pain and cramps,
- Feeling of tiredness,
- Fatigue.

Tomato flu does not cause any serious illness.Complications are rare with the disease[12].

Figure1:Patients With Typical Lesions On The Hand

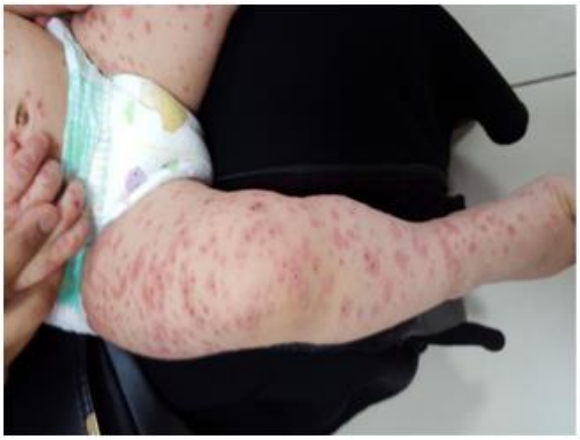
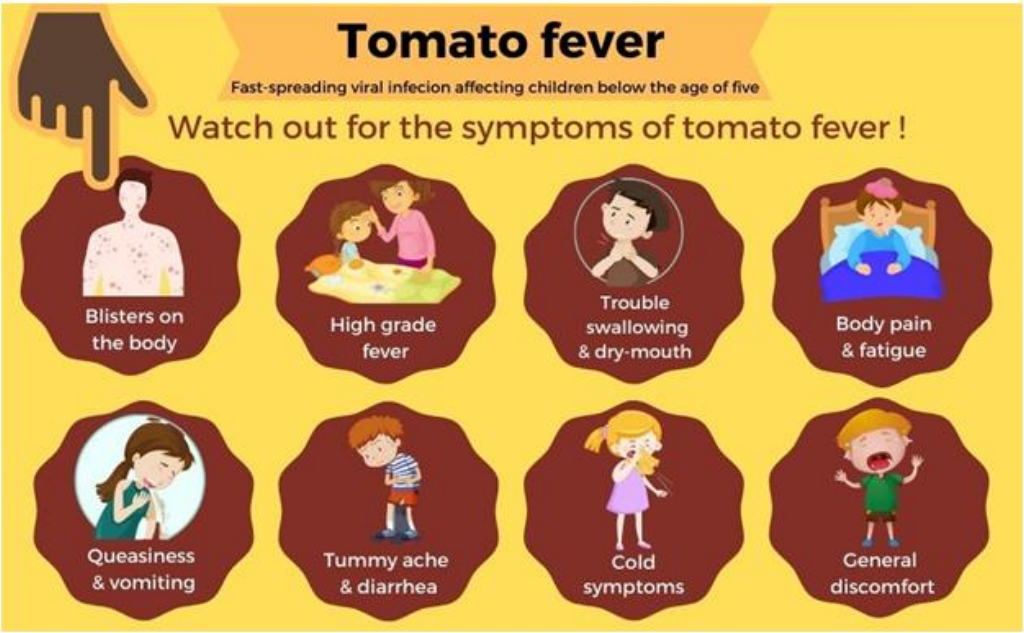


Figure2:Patient With Generalized Lesions On The Leg

Figure3: Patient With Mouth Ulcer



Management of Tomato Flu:

Five to seven days after the onset of symptoms, isolation must be utilised to stop the virus from spreading. The best preventative strategy involves practising excellent hygiene, sanitising the nearby area, and preventing the sick child from exchanging items with other kids who are well[13]. Drug repurposing and vaccination are the most effective and economical ways to protect the general populace from viral infections, especially in children, the elderly, and those with compromised immune systems[14]. There are currently no antiviral drugs or vaccinations that can be used to treat or prevent tomato flu. To better comprehend the morphology of the virus and potential therapeutic options, long-term follow-up is required[15].

Preventive Measures:

For HFMD, neither a pharmaceutical treatment nor a vaccination are currently available. The main goal of prevention and control is to stop the spread of viruses, avoid serious consequences, and avoid fatalities. The WHO's guidelines on HFMD break down the prevention and control measures into the following eight categories: establishing and strengthening surveillance, running educational campaigns on good personal hygiene, helping childcare organisations during outbreaks, improving infection control measures in both healthcare facilities and the community, modernising the equipment for treating severe diseases, and regional preparedness and response information exchange[16]. One of the most efficient strategies to manage and prevent HFMD may be to produce a vaccination or antiviral medications against viruses [17]. Numerous studies on vaccines are now being conducted while taking the effects of HFMD on public health into account. Some of the precautions that should be taken to avoid tomato flu are the ones listed below: [18-19]

1. Persons who are affected must be kept apart for at least 5 to 7 days due to the disease's quick transmission from one person to another.
2. Patients should be warned not to scratch the skin blisters since tomato flu is a very infectious condition. It frequently affects youngsters, therefore it's crucial to keep them from scratching the contagious blisters.
3. Avoid making close physical contact with anyone who are ill. Children who have a fever or rash should be discouraged from being touched or hugged by other kids.
4. Adequate defences against the illness include good hygiene and appropriate sanitation. The impact of these activities on children should be considered.
5. The patients' personal items, such as their clothing and any utensils or other items they use, should be thoroughly and often sanitised.
6. Keep the kids well hydrated.
7. To maintain a strong immune system, a well-balanced diet should be routinely followed.
8. If any family members start to exhibit symptoms, they should be separated right once and should see a doctor.

Treatment:

There are no particular antiviral medications available for HFMD at this time. However, a number of potential antiviral medications have been researched, and some of them have shown outstanding clinical outcomes. Acyclovir and oseltamivir are a couple of them. Patients are encouraged to take it easy, consume filtered water, and remain hydrated. Fever and body aches can be treated with ibuprofen or acetaminophen [20]. Resting in bed is advised, and sanitation and appropriate hygiene should be upheld. Children who are affected need to be kept apart for five to seven days[21].

Coxsackievirus A16:

The family Picornaviridae contains the single-stranded, polyadenylated RNA virus known as CV-A16. It is vulnerable to variant generation because the enzyme required for single-stranded RNA replication is incapable of proofreading, which raises the mutation rate. The most recent HFMD epidemic in India has been linked to CV-A16, which may be a brand-new strain. Skeletal muscle, lung, and brain tissues are all tautologous to CV-A16. Nasal mucosa, lung, and brain tissues all contained high concentrations of interleukins and interferongamma. Nasal mucosa, lung, and brain tissues all contained significant amounts of interleukins and interferongamma. This explains the pathophysiology of CV-respiratory A16's illness and maybe its CNS pathology [27]. CV-A16 and EV-71 are the two main agents that cause HFMD. The majority of HFMD cases are caused by enterovirus-A species, such as CV-A16, EV-A71, CV-A6, and CV-A10. Coxsackievirus-B2, Coxsackievirus-B3, and Coxsackievirus-B5 are other causes of HFMD. Typically, a CV-A16 infection results in a self-limiting, non-life threatening condition. However, it has a tendency to be lethal, particularly in kids and people with impaired immune systems. In a small number of instances in China in 2010, CV-A16 was shown to induce

brainstem encephalitis and acute flaccid paralysis. Additionally, CV-A16 infection has been linked to tragic mortality in several regions of the world[22]. Therefore, in the event of an outbreak, it is crucial to educate the general population about the symptoms of neurologic dysfunction. Oseltamivir and Acyclovir have demonstrated potential advantages in the treatment of HFMD. Ibuprofen or acetaminophen are two common symptomatic treatments for HFMD, though. However, preventative measures like handwashing have demonstrated to reduce the prevalence of HFMD [23]. There are no approved vaccinations against CV-A16 infection.

Steps taken by the government:

The neighbouring state of Tamil Nadu has stepped up border monitoring in reaction to the discovery of instances of tomato flu in Kerala. In order to treat the affected people, the Keralan government launched initiatives in every Anganwadi and medical facility. In Coimbatore, 17 Anganwadi centres are screening for diseases, and it's been claimed that 24 mobile teams with medical specialists have been sent out. For the purpose of keeping an eye out for anyone exhibiting symptoms of fever and rashes, three teams made up of tax inspectors, health inspectors, and police have been sent out in shifts[24]. The surrounding areas are closely monitored because the majority of the illnesses originate in Kerala. The 19 outpatient departments of all the hospitals in the neighbouring states are urged to report any patients exhibiting tomato flu symptoms.

Conclusion and perspective:

Even though the poliovirus has been successfully eradicated from almost all of the world's nations, non-polio enterovirus illnesses like HFMD continue to pose a threat to the public's health. Serious consequences and a greater risk of morbidity have been linked to HFMD. Because of the participation of novel enterovirus serotypes, this illness, which was formerly primarily limited to the Asia-Pacific area, is now widespread globally. In light of the serious complications linked to EV-A71, new EV-A71 vaccines should be utilised and assessed (effect on the decrease in severe cases), and a potential "replacement" by other enteroviruses (producing severe HFMD) should be watched over a few years. The eventual answer should centre on a multivalent HFMD vaccination that is made to target the main viruses implicated, given the evolving epidemiology of the disease. The production and distribution of a multivalent HFMD vaccination face several obstacles that must be addressed, but there is optimism. To do this, governments and global health organisations should work together with the vaccine manufacturers. In order to provide for ongoing updates about such a multivalent vaccine, epidemiological surveillance of HFMD viruses must also be improved.

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