

# Food Poisoning in Monsoon-Management of Individual cases, Outbreaks & Prevention

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## Abstract

The arrival of the monsoon season is welcomed worldwide, more so by most Indians, as it signifies a respite from the sweltering heat and unbearable humidity. The monsoon brings significant rainfall and higher humidity levels, coupled with Low functional efficiency of municipalities and other civic organization adds to water flooding, stagnation and creating perfect conditions for mosquito breeding. The deadly combination of heightened humidity & fluctuating temperatures creates an ideal environment for fungi, bacteria, & virus to thrive and strike people is food poisoning. At times, people eat adulterated or cold contaminated or stale food that cause infection leading to food poisoning. The season of the rains comes with its own set of drawbacks for maintaining human and cattle health. The incidence of Monsoon maladies like Common Cold, Fever, Viral Influenza, Malaria, Dengue, Typhoid, Hepatitis A, Leptospirosis, Diarrhoea, Dysentery, Chikungunya, Skin problems & Food Poisoning increase.

Public health professional's observations and the Food Safety and Standards Authority of India (FSSAI), findings infer that food poisoning from E. coli, Salmonella and other contaminants are very common during rainy season. Contaminated food is one of the causes of food poisoning, diarrhoea, dysentery and cholera cases. While outbreaks are managed by public health systems, mild food poisoning land in OPD of Primary Care Practitioners. The problem is so widespread that every primary care physician must be equipped to manage food poisoning cases in their setting and educate their clientele families for basic preventive measures. Every developing country PCPs need similar skills.

Minimizing this suffering requires extra efforts in kitchen hygiene, fresh raw items purchasing, storage, food preparation, serving and hand washing practices. All the stakeholders- individuals, families and community serving, civic organization and health system must keep infections at bay by learning & practicing how to prevent them.

**Materials and Methods:** This article is based on a recent anecdote case managed by the author and the food poisoning outbreaks reports in print media and National Integrated disease surveillance's weekly outbreaks reporting platform, supported by appropriate literature search on diagnosing and managing individual cases and outbreaks. Authors experience of managing individual mild cases and managing outbreaks for over 50 years as a public health professional are the backbone of this article.

**Outcome:** Most recent case recovered fully in 48 hours with minimal intervention and most outbreaks are well managed by the public health system in the community and hospital set ups.

**Keywords:** food poisoning; infective fp; non-bacterial type fp; history of ingestion of common food

## Introduction

The arrival of the monsoon season is welcomed by most Indians, as it signifies a respite from the sweltering heat and unbearable humidity. However, the season of the rains comes with its own set of drawbacks. The monsoon season brings significant rainfall and higher humidity levels, Low functional efficiency of Municipalities and other civic organization adds to water flooding, stagnation and creating perfect conditions for mosquito breeding. At times, people eat adulterated and stale food that cause infection in our stomach. [1]

The incidence of Monsoon maladies like Common Cold, Fever, Viral Influenza, Malaria, Dengue, Typhoid, Hepatitis A, Leptospirosis, Diarrhoea,

Dysentery, Chikungunya, Skin problems & Food Poisoning increase. Whether it is a slight drizzle or a heavy downpour, monsoon brings along with it a refreshing change in weather. However, the risk of getting foodborne illnesses also spikes drastically in the rainy season. The deadly combination of heightened humidity & fluctuating temperatures creates an ideal environment for fungi, bacteria, & virus to thrive and strike people is food poisoning [1,2].

Food poisoning is a kind of food-borne illness or sickness people catch after consuming some contaminated food. The root cause is the germs or harmful bacteria in the food or beverage. It is usually not a serious condition and can get better within a few days, with or even without treatment, by exercising

precaution. Some of the common symptoms of food poisoning include- • Upset stomach, • Vomiting, • Nausea, • Diarrhoea, • Pain in the stomach and cramps, • Diarrhoea with blood in the stool, • Fever and • Headache

Key common characteristics of the food poisoning are- i) a history of the ingestion of the common food ii) Attack of the many persons at the same time. Basically, there are two clinical types of the food poisoning a) the commonest type in India is a) Infective type of food poisoning is caused by the ingestion of the food contaminated by Living bacteria or their toxins or sometimes both. b) Non-bacterial type of the food poisoning caused by Arsenic, Cadmium, Mercury, fertilizers, pesticides and certain plants & sea foods [2, 3,9].

In India from Public health professional's observations of practices and the Food Safety and Standards Authority of India (FSSAI), findings infer that food poisoning from E. coli, Salmonella and other contaminants are very common during rainy season. Contaminated food is one of the causes of food poisoning, diarrhoea, dysentery and cholera cases. Minimizing this suffering requires extra efforts in kitchen hygiene, fresh raw items purchasing, storage, food preparation, serving and hand washing practices. All the stakeholders- individuals, families and community serving, civic organization and health system must keep infections at bay by learning & practicing how to prevent them. The problem is so widespread that every primary care physician must be equipped to manage food poisoning cases in smaller setting and educate their clientele families for basic preventive measures [3,5,9].

This article is based on a recent anecdote case managed by the author and the food poisoning outbreaks reports in print media and National Integrated disease surveillance's weekly outbreaks reporting platform, supported by appropriate literature search.

## Case Reports

### Food poisoning case managed by the author:

Vandana a Case of food poisoning after eating Pasta: On Thursday in first week of July 2024 evening Vandana aged around 56 yrs. A resident in out apartment complex came to me with the complaints of tummy ache, gaseous distension and loose motions on Wednesday, but on the day only abdominal discomfort. History revealed that she and her DIL had consumed Pasta from outside home. Though both

had some discomfort, she only she vomited and continues to have the discomfort. On examination except for little tenderness in left iliac fossa and upper 1/3 of the abdomen, with gaseous distension on percussion, no other signs were there. Informing her this was just a mild food poisoning and nothing needs to be done and asking her to consume 100 ml of curds every 3 hours, I advised her to see me next if the problem continues. She was fine as reported in Friday morning walking.

### Recent Food Poisoning Outbreaks reported in Media [5]:

1. **Mid-meal led Food Poisoning:** Over 130 students hospitalized after suspected food poisoning in Wayanad, Kerala, on 27 July 2024, out of >1000 children who had lunch from the school on Friday showed the symptoms. Though all of them recovered over 48 hours, such episodes raise concern over Kitchen and food hygiene.
2. On 20 July 2024 print media reported Bollywood actress Janhvi Kapoor was discharged from a Corporate Hospital in Mumbai after treatment for severe food poisoning. She had shown symptoms of food poisoning on 17 July and became severe needing hospitalization, bringing this health issue into the spotlight. The message here is any socio-economic group can get affected, despite consuming food either from street vendors or 5-7-star hotels in the Monsoon season.
3. **Apartment Complex Food Poisoning:** Over 300 in apartment complex in Kerala sought treatment for food poisoning in the last couple of days as on 5 June 24, prompting municipal health authorities to inspect the water sources used by the residents of the flats.
4. At least 10 students staying at the Bangalore University's hostel run by the Backward Classes Welfare Department on the Jnana Bharati campus were hospitalised allegedly due to food poisoning late evening on Monday June 03, 2024
5. **Food sharing, in Fairs & Festivals-a common source of FP in India:** At least 46 people fell ill, reporting uneasiness and diarrhoea following a suspected case of food poisoning in Hoolikatti village of Belagavi district, Karnataka's on 22 May 2024. All of them had consumed prasadam at the Bhireswar and Karemma temple's annual Fair. They all complained of stomach pain, vomiting and diarrhoea. At least 8 needed hospitalizations. All recovered after minor treatment in 24 hours.

6. **Cricket Spectators in M. Chinnaswamy Stadium Bengaluru IPL 2024 T20 FP Episode:** A case was lodged against the KSCA management for allegedly serving stale food to the audience during the Indian Premier League (IPL) 2024 T20 cricket match between Royal Challengers Bengaluru and Delhi Capitals at the M Chinnaswamy Stadium in Bengaluru on May 12. A 23-year-old cricket enthusiast at the stadium lodged a complaint saying he experienced stomach pain and collapsed while seated. Some more experienced minor tummies upset. First aid was administered to him in an ambulance outside with the assistance of stadium staff. It was confirmed as food poisoning and the Caterer Penalized.
7. **Wedding Lunch leading to Food Poisoning:** More than 150 hospitalized after consuming food, ice cream at a wedding, in Channapatana Town Ramanagaram district on Sunday 05 May 2024.
8. **Indian Railways Catering Food Poisoning:** Two College friends travelled recently by train (traveling from Hubli to Bangalore), both ate packed vegetarian fried rice within railway coach. One had food poisoning and the other did not. The one who suffered was an out of state student and the one who did not suffer was localite and might developed immunity because he is Karnataka based. After reaching Bengaluru he got treated with Doxycycline and an anti-spasmodic in form of injection. Food poisoning is minimum in restaurants and Dhaba's where it cooked under your sight and packed afresh. Railway station food also.
9. **Mushroom Poisoning in India:** The 22nd week (May 27-2 June) Assam has reported 14 cases in 3 villages (8,5,1) of 2024 following consumption of Wild Mushroom. They were taken to community health centre where intravenous (IV) fluids and anti-emetics were given, and diarrhoea and vomiting settled after 24-36 h and they remained asymptomatic for 8-10 hrs. This was followed by progressive altered sensorium and behaviour and irritability among one of them for which he was referred to district hospital, where found to have transaminitis >10 times elevated and jaundice. Provisional diagnosis of toxic hepatitis secondary to poisonous wild mushrooms was made. He died on day 3 of the admission [4].

### **GOI-NHM IDSP Reporting on Food Poisoning outbreaks:**

There were 9 outbreaks reported in the 22nd week of 2024 (27 May-2 June) and 13 outbreaks in 21 Week (20-26 May 2024) across the country, almost all major states reporting outbreaks. The number of cases ranged from 13-104 (Haveri, 106, and Bengaluru-Rural 98 Karnataka, East Bardhman, West Bengal-86, Daus, Rajasthan-80, and rest were in the range of 13-28cases). Mushroom food poisoning was reported in 22nd week, Nagaon (C-8, D-0), Golaghat (C-5, D-0) and Charaideo (C-1, D-1), Assam, who succumbed to the illness. Darrang in Assam reported 136 cases in the same week of which only one person died [4].

A few earlier weeks reports indicate 2-5 outbreak weekly till 12<sup>th</sup> week, that increased to 6-8 till 17 week and later it has been over 10 outbreaks in 202-24. 20-9, 19-10, [4]

Alert id-8160, 96 students fell sick after consuming milk in ashram school in Aurangabad, Maharashtra

Alert id-8105, 171 children fell ill in Bagaha after eating mid-day meal in P. Champaran, Bihar

Alert id-8104, Half dozen children fell ill after eating castor seeds, 2 critical in Katni, MP

Alert id-8102, Students suffer food poisoning after dinner at girls' hostel in Koraput, Odisha

Alert id-8099, 30 school students in hospital due to food poisoning in Thrissur, Kerala

Alert id-8096, 109 schoolchildren sick after eating pulao, Gulab jamuns in Thane, Maharashtra

A quick analysis of the trends up to 21 week each year Annual reported Food poisoning outbreaks also show an increasing trend over the years, to be 2020-60, 2021-8, 2022-70, 2023-90, 2024-80 till the end of 21 week. This data set indicates that Food poisoning is common with exacerbation in Monsoon months. The people affected are across all Socio-economic classes. Community feeding in schools, fairs & Festivals, marriages and street vendors are the key sources of infection spread [4].

### **Discussion**

In India, foodborne illnesses are a significant public health concern due to issues like improper food handling, inadequate sanitation, and lack of access to safe drinking water in some areas. It's estimated that millions of cases of foodborne illnesses occur in India each year, making it a relatively common health issue in the country. Outbreaks and number of cases in each outbreak vary depending on factors such as food safety practices, hygiene standards, and access to clean water [3,6].



**Causes of Food Poisoning in India:** The main causes of food poisoning in India are i) stale / contaminated or expired raw foods like grains, vegetables, meat and fruits ii) Eating raw food like vegetables and Fruits iii) Alcohol or Hooch (illegally made chemical intoxicants iv) Improper food storage conditions v) Unwashed Hands and Utensils vi) Contaminated

water. In terms causative organisms the most prevalent cause of food poisoning is Entamoeba, followed by campylobacter bacteria, salmonella bacteria, E Coli bacteria, and norovirus [3,6].

Key common characteristics of the food poisoning are- i) a history of the ingestion of the common food ii) Attack of the many persons at the same time.

**Table 1:** Clinical classification & Symptoms of the Food Poisoning

Nature of FP> Sl. NOs	Mild Food Poisoning	Severe Food Poisoning
1.	Nausea	High fever (temperature over 101.5°F)
2.	Vomiting	Severe abdominal pain
3.	Abdominal pain	Blood in stool or vomit
4.	Diarrhea	Rapid heartbeat
5.	Headache	Rapid breathing or difficulty breathing
6.	Low-grade fever	Confusion or difficulty thinking clearly
7.	Fatigue	Blurred vision or double vision
8.	Muscle aches	Muscle weakness or paralysis
9.	Loss of appetite	Severe Dehydration
10.	Mild dehydration (thirst, dry mouth)	
<b>Course:</b>	Symptoms usually begin within a few hours to a day or two after eating a food & last for a few days to a week. Most people recover without specific treatment. Staying hydrated & plenty of rest are management approaches	The symptoms can be life-threatening and require immediate medical attention. They can indicate a more serious infection or complication, such as sepsis or organ failure. Any of the above symptoms after eating contaminated food, demand seeking medical care right away.

**Academic Classification or Types of Food poisoning & Symptoms in India:** Basically, there are two clinical types of the food poisoning a) Bacterial type of food poisoning caused by the ingestion of the food

contaminated by Living bacteria or their toxins or sometimes both. b) Non-bacterial type of the food poisoning caused by the chemicals such as Arsenic, Cadmium, Mercury, certain plants & sea foods, fertilizers, pesticides.

**Table 2:** Aetiology specific Food Poisoning in India

Pathogen	Symptoms	Incubation Period	Foods Responsible	Means of Transmission
Staphylococcus aureus	Nausea, vomiting, diarrhea	1-6 hours	By infected individuals	Contaminated food or water, person-to-person
Campylobacter	Diarrhea (often bloody), fever, abdominal cramps	2-5 days	Undercooked chicken, unpasteurized milk, contaminated water	Contaminated food or water, cross-contamination
Salmonella	Diarrhea, fever, abdominal cramps	12-72 hours	Poultry, eggs, raw meat, fruits, vegetables	Contaminated food or water, cross-contamination
Listeria	Fever, muscle aches, nausea, diarrhea	1-70 days	Unpasteurized dairy products, deli meats, hot dogs	Contaminated food or water, cross-contamination
Clostridium perfringens	Diarrhea, abdominal cramps	6-24 hours	Meat, particularly beef, and poultry	Contaminated food or water
Escherichia coli (E.Coli)	Diarrhea (often bloody), abdominal Pain, Vomiting	2-5 days	Beef, Produce grown in contaminated soil	Contaminated food or water, person-to-person
Giardia	Diarrhea, gas, stomach cramps, bloating	1-2 weeks	Raw, undercooked food	Contaminated water, raw or undercooked foods
Cryptosporidium	Diarrhea, stomach cramps, dehydration	2-10 days	Contaminated water, raw or undercooked foods	Contaminated food or water, person-to-person
Norovirus	Nausea, vomiting, diarrhea, stomach cramps	12-48 hours	Shellfish, salads, contaminated water	Contaminated food or water, person-to-person, aerosolized vomit
Hepatitis A	Nausea, vomiting, diarrhea, abdominal pain, fever	15-50 days	Shellfish, produce, contaminated water	Contaminated food or water, person-to-person
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Hepatitis A	Nausea, vomiting, diarrhea, abdominal pain, fever	15-50 days	Shellfish, produce, contaminated water	Contaminated food or water, person-to-person

## Bacterial Food Poisoning:

**Salmonella food poisoning:** In the recent years there is increasing incidences of this type of the food poisoning because of i) An increase in communal feeding ii) An increase in international trade in humane food iii) A higher incidences of the salmonellosis in farm animals iv) Wide distribution of the prepared food in schools, marriages, fairs and festivals. The causative organisms often incriminated in humane outbreaks are *S. typhimurium*, *S. cholerae suis*, *S. enteritidis*. The source of Salmonellosis is primarily a disease of the animals. Man get infection from the farm animal & poultry through-

1. Contaminated Meat
2. Milk & Milk Products
3. Sausages
4. Custards
5. Eggs & Eggs Products
6. Rat & mice heavily infected and contaminate the

foodstuffs by their urine & faces. The outbreak manifests within 12 - 24 hours as the incubation period is short.

The patho-physiology of the causative agents is on ingestion they multiply in the intestine and give rise acute "enteritis & colitis" Therefore, the onset is sudden with-a. Chills /Fever b. Nausea/Vomiting c. Profuse Watery Diarrhoea. The condition is self-limiting, but carrier state may last for several weeks. In India case fatality rate reported is less than 1%.

**Staphylococcal food poisoning:** In India it is as common as salmonella food poisoning. The causative agent- *Staphylococcus aureus* is a Gram positive anaerobic Coccal bacteria appears in clusters and produce toxin. Currently there are at least five different enterotoxins have been Identified. Toxins

are formed at optimum temperature of 35 C to 37<sup>o</sup> C and are relatively heat stable and resist a boiling of 30 minutes or more.

Staphylococci are ubiquitous in nature and are found on the Skin, Nose, Throat, boils and pyogenic infection in man and animals. Cows & Buffaloes suffering from the mastitis have been responsible for the outbreaks of the food poisoning involving the milk and milk products. The infection has very short incubation period of 1-6 hrs, because of preformed toxins. Mechanism of action of the food poisoning involves the ingestion of the preformed toxins in the food (Intra-dietetic toxins). Toxins remain in the food after the organism have been destroyed by heating which act directly on the intestine and Central Nervous System.

The common symptoms include- i) Sudden onset of vomiting, Diarrhoea & Abdominal Cramps ii) In severe cases blood & mucus may appear. ii) the staphylococci food poisoning rarely causes fever and death is very rare. Diagnosis is usually with history and clinical symptoms and management involves rehydration, anti-emetics and antibiotics. In outbreaks a stool culture is used to detect the presence of disease-causing bacteria.

**Botulism:** Botulism is most serious type but occurs rarely with high case fatality rates of 50-60%. The causative Toxin is Botulinum toxin (BTX) is a neurotoxic protein, produced by the bacterium *Clostridium botulinum*. Botulinum toxin is classified into 8 neurotoxins A, B, C, D, E, F, G and H which are antigenically and serologically distinct but structurally similar. Only exotoxins of the *clostridium botulinum* type A, B or E cause toxicity in man whereas Cl. Botulinum C and D cause toxicity in animals. The bacteria distributed in soil, dust & intestinal tract of the animals, enters the food as spores. Food Responsible for the Botulism include canned vegetables, Smoked or pickled fish. Homemade cheese and other low-acid foods. The Incubation period is 12 - 36 hours as under suitable anaerobic condition the toxins will be performed into the foods, which act on the parasympathetic nervous system. Its action on the GI - Tract is very slight. Botulinum toxin is one of the most powerful known toxins as, just about one microgram of it is lethal to humans when inhaled. It acts by blocking nerve function through inhibition of the excitatory neurotransmitter acetyl choline's release from the pre-synaptic membrane of neuromuscular junctions in the CNS. Common signs & symptoms exhibited are Dysphagia, Diplopia, Ptosis, Dysarthria, Blurring of

the vision muscle weakness & even quadriplegia. Fever is generally absent, and Consciousness is generally retained, but the condition is generally fatal. Death occurs in 4 - 8 days due to respiratory or cardiac failure. The good characteristics of the Botulism toxin is they are thermo-labile and if the foods contaminated with the botulism toxins are heated for 100 C for a few minutes are safe for consumption. Treatment includes i) Heptavalent antitoxins given to all individuals partaking the food as quickly as possible. The dose varies from the 50,000 - 100,000 unit IV. The antitoxin is of no value if the toxin is already fixed to the nervous tissues. ii) Guanidine hydrochloride given orally in doses of the 15 - 40 mg/kg of the body weight have been shown to reverse the neuromuscular block of the botulism. Prevention is possible with active immunization with botulism toxoid to high-risk persons. A recommended prevention measure for infant botulism is to avoid giving honey to infants less than 12 months of age, as botulinum spores are often present in Honey. In older children and adults, the normal intestinal bacteria suppress development of *C. botulinum*. Commercially canned goods are do undergo a "botulinum cook" in a pressure cooker at 121 °C (250 °F) for 3 minutes.

**Cl - Perfringens poisoning:** It is less common type of the food poisoning, with rapid recovery and no death. The organism is an Anaerobic Gm + spore, forms heat resistant spores when deposited on food. They Survive normal cooking/heating temperature (100 °C) and germinate during preparation between 12°C - 60°C. Proliferate very rapidly between 30°C - 50°C. Once ingested, forms several toxins in the intestine. Most of the outbreaks in India have been associated with the ingestion of the Meat, meal dishes and poultry, and the symptoms start 6-24 hours after ingestion. The usual story is that food was stored and cooked 24 hour or more before the consumption and allowed to cool at room temperature and then heated immediately prior to serving. The incubation Period is between the 6 - 24 hours, with peak time between the 10 - 14 hours. As the spores can survive the cooking, if the cooked meat and poultry are not cooled enough, they will germinate. The organism multiply between the 30o C - 50°C and produce Alpha, & Theta - toxins.

The most common symptoms are- Diarrhoea, Abdominal Cramps, Little or no fever 8 - 24 hours after the consumption of the food. Nausea & vomiting are rare. Illness is usually of the short

duration (1 day or less), Recovery is rapid, and no death have been reported.

**Cereus food poisoning:** *Bacillus - cereus* is an aerobic, spore bearing, motile gram-positive rod. It is ubiquitous in soil and in raw, dried and possessed foods. The spore can survive cooking and germinate and multiply rapidly when the food is held at favourable temperature. • *B - cereus* has been recognized as a cause of the food poisoning with increasing in frequency in recent years. *B Cereus* produce two distinct enterotoxins -1) Emetic Form of the food poisoning 2) Diarrheal Form of the Food Poisoning. Diagnosis can be confirmed by the isolation of the organism. Treatment is symptomatic.

**Amoebiasis outbreak of Odisha:** In 2016, an outbreak of amoebiasis occurred in the tribal-dominated district of Nabarangpur of Odisha. The outbreak was caused by the consumption of contaminated water and food and led to the hospitalization of hundreds of people, with some fatalities reported. The incident highlighted the urgent need for better water and food safety regulations, particularly in rural areas where access to clean water and safe food is limited. Amoebiasis is a parasitic infection caused by the protozoan parasite *Entamoeba histolytica*. The infection is spread through contaminated food and water and can cause severe diarrhoea, abdominal pain, and other gastrointestinal symptoms. In this outbreak contaminated water was identified as the primary source of the infection. The local authorities were quick to respond to the outbreak, setting up medical camps and providing treatment to those affected. The incidence highlighted the challenges faced by Indian authorities in enforcing environmental and safety regulations [10].

### **Non-infectious Food Poisoning in India**

**Mushroom Poisoning in Assam 2024:** Mushroom is an important constituent of diet in many ethnic tribes who are known to consume nearly 283 species of wild mushrooms out of 2000 species recorded world over. Although they are experts in distinguishing the poisonous from edible mushrooms, yet occasional cases of toxicity are reported due to accidental consumption of poisonous mushrooms. Usually, a family or an individual consumes wild mushrooms harvested from mountains. Subsequently all of them developed pain abdomen, vomiting and bloody diarrhoea 4-6 h after consumption. Patients were managed with IV fluids, antibiotics, anti-emetics and antacids. The man died on day 4 of the illness and in

view of worsening sensorium the remaining three patients were referred to our centre, a tertiary care hospital in North India. All the patients had similar complaints of jaundice and altered sensorium at admission. On Examination all three were afebrile, tachypnoeic (respiratory rate 26-32/min), had tachycardia (respiratory rate 120-160/min) with normal blood pressures at presentation.[4]

**The Vizag Gas Leak of 2020:** It was a major environmental and health crisis that occurred in the city of Visakhapatnam (also known as Vizag) in the state of Andhra Pradesh. The incident involved the release of toxic gas from a chemical plant, which led to the hospitalization of thousands of people and the death of several individuals. The incident took place on 7 May 2020, when a gas leak occurred at the LG Polymers plant located in the outskirts of Vizag. The gas that leaked was styrene, used in the production of polystyrene plastics. As the gas spread across the surrounding areas, thousands of people began to experience symptoms such as nausea, vomiting, and breathing difficulties. Some people were also found unconscious on the streets, and several individuals died [10].

**The Punjab hooch tragedy 2020:** The Punjab hooch tragedy, in August 2020, resulted in the deaths of over a hundred people in several districts of Punjab, India. The tragedy was caused by the consumption of spurious liquor, commonly referred to as "hooch" or "desi Daru," which was manufactured and sold illegally. The hooch was spiked with toxic chemicals, like methanol, known to cause blindness and death [10].

**Pesticide food poisoning Maharashtra in 2017:** The Maharashtra food poisoning incident began to unfold in July 2017 when a family of five from the village of Masalwadi in Yavatmal district fell ill after consuming brinjal and tomatoes curry. The family members were rushed to the hospital, where they succumbed to pesticide poisoning. The tomatoes and brinjals (eggplants), were contaminated with the pesticide Monocrotophos. Monocrotophos is a highly toxic organophosphate insecticide that is commonly used in agriculture, despite its ban in several countries due to its hazardous nature. Pesticides are used to kill insects, but they pose serious health risks to humans if ingested in large amounts. These risks include respiratory distress, seizures, and even death. Thereafter, other cases of illness were reported in the surrounding areas. The state government launched an investigation, which led to the discovery of the

contaminated vegetables and the source of the pesticide [10].

**The Kodaikanal Mercury Poisoning 2015:** This incident of 2015 involved the contamination of a local river and soil with toxic levels of mercury, which was released by a thermometer factory owned by the multinational company Unilever. The incident began in 2001, when the factory was shut down due to economic reasons. The factory had been producing thermometers containing mercury, a toxic heavy metal that can cause serious health problems such as neurological damage, kidney damage, and respiratory failure. However, before shutting down the factory, the factory allegedly dumped tons of glass scrap contaminated with mercury on the factory premises and in a nearby scrapyard. Over the years, the mercury waste was carried by rainwater into the nearby Pambar Shola forest and Kodaikanal Lake, contaminating the soil and water with toxic levels of mercury. The contamination had severe health consequences for the local community, residents who used the lake for fishing and recreational purposes [10].

### **Diagnosing of Food poisoning cases at Primary care settings:**

A diagnosis of food poisoning in a primary care setting is based on a detailed history taking, more details of food and drinks consumed recently, physical exam and a review of reasons that may be causing vomiting, diarrhoea or other symptoms.

A general practitioner i) hear patiently the complaints and ask for details of the symptoms, ii) Food or drinks the patient had consumed in last 72 hours iii) Symptoms in people who ate with the patient, iv) Recent changes in the drugs the patient is taking and vi) Recent travel.

When one person or a family gets food poisoning, it's hard to know what food was contaminated except when street food was consumed. The time from eating contaminated food to the time of sickness can be hours or days does help in corroborating symptoms and suspecting the types of infection depending upon the type of infection. During that time, if patient/s had several more meals, it is difficult to pinpoint to what food made them sick.

The physical examination involves examination checking for signs of dehydration, tenderness in the abdomen, icterus if any etc [3,10].

**Laboratory Tests:** Lab. Tests are rarely needed. A doctor order or conduct various tests to identify the specific pathogen responsible for the illness.

Commonly used Lab. Test to diagnose food poisoning are:

**Stool culture:** This involves collecting a sample of the patient's stool and sending it to a laboratory to identify any bacteria or other pathogens present.

**Blood tests:** Blood tests can help identify certain pathogens, such as Salmonella or E. coli, by detecting antibodies or other markers in the blood.

**Urine tests:** Shigella infection related food poisoning, can be detected through a urine test.

**Imaging tests:** Imaging tests such as X-rays or CT scans are used to look for signs of complications like intestinal obstruction or perforation.

**Diagnostics in Outbreak:** In a large outbreak, following community feeding in marriage, fairs and festivals public health officials will find Collect the samples of food eaten, water, vomitus and stool of active cases and send them to public health Laboratories for identifying the organisms causing the outbreak and source of infection [2,3,10].

### **Management of Food Poisoning**

**Individual Cases:** Symptomatic treatment with rehydration (oral or IV depending upon the severity) as priority, anti-emetics, antibiotic only if bacterial infection is suspected.

#### **Home Management**

Most Indian patients would seek care at Primary care physicians after trying Lifestyle and home remedies: For most people, symptoms improve without treatment within 48 hours. They would have tried to keep themselves more comfortable and prevent dehydration by:

- i) Langanam Param Aushadham: Most people stop consuming food hoping the stomach to settle.
- ii) Would have Eaten light food after their stomach was settled felt hungry again.
- iii) Replace body fluids by consuming water, Coffee, Tea, Butter milk, sports drinks, juice with added water. Some consume oral rehydration fluids like Electral FDC, Pedialyte, Prolyte, etc.
- iv) Avoid certain foods and substances like dairy products, caffeine, alcohol, nicotine, and fatty or highly seasoned foods.
- v) Rest to recover from illness and dehydration.

#### **Management by PCP**

PCP considers the home therapy provided and then treats depending upon the severity of symptoms and suspected cause of the illness. The treatment approaches followed in general order of priority are:



**Fluid replacement:** The key manifestations of Vomiting and Diarrhoea create an imbalance in Fluids and electrolytes, of human body, maintaining of which is very important to balance of fluids in our body. Electrolytes include minerals such as sodium, potassium and calcium. If the dehydration is severe, it may require hospitalization and fluids and electrolytes delivered intravenously under observation. Most food poisoning cases can be managed by oral rehydration solution and other home available or made fluids.

**Anti-emetics:** Antiemetic medications, such as Metoclopramide injections or promethazine, Ondansetron Oral Disintegrating Tablets IP, Metopar Tablet,

Ondansetron Injection 2 MG, 4 mg/ 2ml, Aprepitant Capsules Emend, may be used to manage nausea and vomiting associated with bacterial food poisoning. The mechanism of action is to block serotonin from interacting with the 5-HT<sub>3</sub> receptor. Of these, ondansetron and granisetron are the most frequently used.

**Probiotics:** Most Indian practitioners recommend probiotics to restore the natural balance of bacteria in the gut, which are disrupted by bacterial food poisoning. Homemade curds and butter milk are easily available and are good supplements. Some doctors prefer prescribing commercial probiotics such as yogurt, kefir, and kimchi to replenish beneficial gut bacteria.

**Rest:** Resting is essential during the recovery period from bacterial food poisoning. It helps to reduce the severity of symptoms and allow the body to focus on healing.

**Antibiotics:** Most food poisoning cases do not need antibiotics, however, in some cases, particularly if the infection is severe antibiotics may be prescribed to treat bacterial food poisoning, or if the person is immunocompromised, or the bacteria is particularly virulent. Antibiotics can help to reduce the duration and severity of symptoms and prevent complications. Some commonly used antibiotics for bacterial food poisoning are ciprofloxacin, azithromycin, doxycycline, and amoxicillin. Pregnant women need to prescribe antibiotics amoxicillin/ampicillin intravenous & gentamicin, or oral amoxicillin/ampicillin for less serious cases only.

**Antiparasitic:** Parasitic infections like Giardiasis, Amoebiasis cases are prescribed antiparasitic medicines.

## Management of Food Poisoning Outbreaks

Food poisoning is the second most common cause of outbreaks of highly infectious diseases, in India. Therefore, all health insurances cover outpatient consultations and even diagnostic tests during your regular check-ups since 2017.

The investigation of the food poisoning involves 1) Securing complete list of the people involved and their history 2) Laboratory Investigation 3) Blood for the antibodies 4) Environmental Study 5) Animal Experiments 6) Analysis of the data according to descriptive method of time, place and person 7) A case control study may be undertaken to establish the epidemiologic association between illness and the intake of the foods.

Indian Public Health approach remains providing the treatment on the site by mobilizing staff and requisite equipment's and drugs. Caps are set up in schools or Panchayat offices and any other big halls, provision for OPD and supervised Intravenous rehydration for need patients is made. The nearest PHC doctor/s and staff is mobilized supplemented from neighbouring PHCs if required. Complicated cases are referred to the nearest Medical College or district hospitals. Most cases recover, with rare fatality. Some of the case may end up in complications. Most common complications of food poisoning we come across are: Kidney Failure: Food poisoning due to E. coli and Salmonella, can cause kidney failure in some people who are brought late due to toxins produced by the bacteria entering the bloodstream and damage the kidneys. Symptoms of kidney failure include decreased urine output, swelling in the legs or feet, and fatigue.

Neurological Complications: Certain types of food poisoning do cause neurological complications, such as meningitis or encephalitis, when bacteria or viruses enter the brain and cause inflammation. Symptoms of neurological complications can include headaches, fever, and changes in mental status.

Septicaemia (Bloodstream Infections): Some types of food poisoning led to bloodstream infections, which can be life-threatening, when bacteria or viruses enter the bloodstream and spread throughout the body. Symptoms of bloodstream infections include fever, chills, and low blood pressure.

Reiter's Syndrome: Reiter's syndrome is a rare complication of food poisoning by Salmonella, Shigella, or Yersinia bacteria. It can cause joint pain, eye irritation, and painful urination.

Haemolytic Uremic Syndrome: Haemolytic uremic syndrome (HUS) is a serious complication of food poisoning caused by E. coli bacteria. It can cause

damage to red blood cells and the kidneys, leading to anaemia, low platelet count, and kidney failure

**The Mid-Day Meal Tragedies** is widespread public outrage and condemnation of the government's handling of the program. It is usually a result of the lack of oversight and regulation of the program, and the failure of the government to ensure that the food served to children was safe and of good quality. These also highlight the problem of corruption and mismanagement in the government, which had led to the diversion of funds and resources meant for the mid-day meal program.

**Ten golden rules – of World Health Organisation (WHO)**

1. Cook raw food thoroughly.
2. Eat cooked food immediately
3. Prepare food for only one meal
4. Avoid contact between raw foods and cooked foods

5. Choose foods processed for safety.
6. Wash hands repeatedly
7. Keep all food preparation premises meticulously clean
8. Use safe water
9. Be cautious with foods purchased outside, Breast-feed infants and young children.

### **Prevention of food poisoning in monsoon**

**Prioritise food hygiene:** Maintaining hygiene is extremely important in preventing foodborne illnesses. All must make it a point to wash their hands well-using soap and water before they touch or consume any food. Maintaining hygiene in the kitchen as well as where the food is cooked. Keep all the kitchen surfaces, chopping boards, and utensils clean regularly to avoid cross-contamination. Use separate cutting boards for vegetables & raw meats to mitigate the risk of contamination even more.



Figure 1

### **Always try to eat the food that is served hot (as most germs do not survive)**

**Opt for fresh ingredients:** Always handpick fresh, high-quality ingredients whenever one can. Refrain from purchasing pre-cut fruits and vegetables from street vendors as they are likely to be contaminated. While buying meat, fish and poultry, make sure they are fresh and well-kept at the right temperature. Also, while buying packed foods, always check for expiration dates or breach in packing and any signs of spoilage.

**Cook your ingredients well:** When cooking food at the right temperature, it ensures that the harmful bacteria and viruses get killed. Only consume well-cooked meat, poultry, and seafood items, & avoid consuming raw or undercooked foods including salads. Maintain the prepared food temperatures above 74°C, if need be, use a food thermometer to verify the internal temperature of cooked foods, ensuring that they are at a safe level. For instance, the ideal internal temperature for poultry is 165 degrees F (74 degrees Celsius) and for vegetables 50°C.



Figure 2



Figure 3

**Store your food properly:** Food, if not stored properly, has a higher chance of getting contaminated in monsoon. Refrigerate perishable food items as quickly as possible and try not to leave cooked food outside at room temperature for long. You can also use airtight containers to store leftover food in the refrigerator. Also, make sure your refrigerator is set at the right temperature to prevent bacterial growth.

**Keep yourself hydrated with safe drinking water:** Water gets contaminated easily during monsoon and that becomes a major reason for foodborne illnesses. Make it a point to only drink filtered water or boiled water. Do not use ice cubes from unreliable sources and give homemade ice using purified water preference. Also, avoid buying beverages from street vendors, for their water quality might be questionable.

**Say no to street food:** Urbanites these days are always tempted to eat street food, but it is best to stay away from it in the monsoon season. Most street vendors fail to maintain consistent hygiene standards, if you feel like eating street food, go for vendors that have visibly cleaner stalls. Go for freshly cooked, hot items and avoid consuming raw foods from the street.

**Dairy products are a concern:** Dairy foods are most prone to spoilage during monsoon. Make sure that your milk and milk-based items are pasteurized and stored at right temperature. Any dairy product that has been left out at room temperature for long should be avoided. Check for expiration dates and proper sealing while buying dairy items.

**Thoroughly wash the fruits and vegetables:** Whatever raw food you purchase from outside, wash it well under running water before consumption. Even if the groceries from the best vendors, might carry harmful pesticides and bacteria during monsoon. Leafy greens can be soaked in a solution of water and vinegar to get rid of any residual contaminants. Peeling fruits can also curb the risk of ingesting toxic substances from the skin.

**Handle your food safely:** Always try & learn safe food handling techniques like serving food in clean utensils and plates, not to use the same utensils for raw & cooked items. Whenever in doubt of the safety of any food, it is better to discard than risk getting a foodborne illness.

**Stay up to date about food recalls:** Keep a close tab on the food safety alerts issued by FSSAI and local

health authorities, which will rescue from consuming contaminated products.

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