Food microbiology (FST 606)

**FOOD MICROBIOLOGY AND PUBLIC HEALTH**

By Dr Farzana siddique

FOOD POISONING

FOOD – POISONING

Food – poisoning is an acute gastro-enteritis caused by the ingestion of the food or drink contaminated with either living bacteria or their toxins or inorganic chemical substances and poison delivered from the plant and animals

CHARACTERISTICS

There is history of the ingestion of the common foods Attack of the many persons at the same time Similarity of the sign and symptoms in the majority of the cases

TYPES OF THE FOOD POISONING

Non – bacterial type of the food poisoning Bacterial Type of the food poisoning

NON – BACTERIAL TYPE OF THEFOOD POISONING

It is caused by the chemicals such as Arsenic Certain plants & sea foods The contamination of the food by the chemicals such as Fertilizer Pesticides Cadmium Mercury

BACTERIAL TYPE OF THE FOOD –POISONING

It is caused by the ingestion of the food contaminated by the living bacteria or their toxins The conventional classification of the bacterial food poisoning in to the toxic and infective type is becoming increasingly blurred, with the knowledge that in some types both multiplication and toxins production involve

SALMONELLA – FOOD POISONING

Common form of the food poisoning There is increasing incidences of this type of the food poisoning because of - An increase in communal feeding - An increase in international trade in humane food - A higher incidences of the salmonellosis in farm animals - Wide – spread use of the house – hold detergents interfering with the sewage treatment - Wide distribution of the prepared food

CAUSATIVE AGENTS

The species most often incriminated in humane outbreaks are S – typhimurium S – cholera –suis S – enteritidis

SOURCE

Salmonellosis is primarily a disease of the animals Man get infection from the farm animal & poultry through Contaminated Meat Milk & Milk Products Sausages Custards Eggs & Eggs Products Rat & mice are another source, they are often heavily infected and contaminate the foodstuffs by their urine & faces

INCUBATION PERIOD

The incubation period is 12 – 24 hours commonly

MECHANISM OF THE FOODPOISONING

The causative agents on ingestion multiply in intestine and give rise acute “enteritis & colitis” The onset is generally sudden with Chills Fever Nausea Vomiting Profuse Watery Diarrhea (Last 2 – 3 days) Convalescent carrier state may lasting for the several weeks The mortality rate is 1%

STAPHYLOCOCCAL FOODPOISONING

It is also as common as salmonella food poisoning

AGENTS

Enterotoxins of the certain strain of the coagulase positive staphylococcus aureus At least five different enterotoxins have been identified Toxins can be formed at optimum temperature of the 35oC to 37oC These toxins are relatively heat stable and resist a boiling of 30 minuets or more

SOURCES

Staphylococci are ubiquitous in nature Found on the Skin Nose Throat They are common agents of the boil and pyogenic infection in man and animals Cow suffering from the mastitis have been responsible for the outbreaks of the food poisoning involving the milk and milk products

INCUBATION PERIOD

Incubation Period is between the 1 – 6 hours The incubation period is short because of the performed toxins

MECHANISM OF THE FOODPOISONING

Food poisoning resulting from the ingestion of the performed toxins in the food In food bacteria have grown (Intradietic toxins) Toxin remain in the food after the organism have been died because the toxin is heat resistant Action Of The Toxins: The toxin act directly on the intestine and CNS

SIGN & SYMPTOMS

The illness become manifested by the sudden onset of the vomiting Diarrhea Abdominal Cramps In severe cases blood & mucus may appear Unlike salmonella food poisoning the staphylococci food poisoning rarely cause the fever Death is uncommon

BOTULISM FOOD POISONING

Botulism derived its name from Latin word (Sausage = Botulus) It is most serious type of the food poisoning It occurs rarely It kills about two – third of the victims

CAUSATIVE AGENTS

Exotoxin of the clostridium botulinum generally type A, B or E

SOURCE

The bacteria is widely distributed in soil, dust and intestinal tract of the animals The organism enter in to the food in the form of the spore Food Responsible For The Botulism: These are preserved home food such as Home – canned vegetables Smoked or pickled fish Home made cheese Other mow – acid foods

INCUBATION PERIOD

The incubation period is between the 12 – 36 hours Because the organism enter in to the food in spore form

MECHANISM OF THE FOODPOISONING

Under the suitable anaerobic condition the toxins will be performed in to the foods It act on the parasympathetic nervous system Its action on the GI – Tract is very slight

SIGN & SYMPTOMS

The prominent Symptoms are Dysphagia Diplopia Ptosis Dysarthria Blurring of the vision Muscle weakness & even quadriplegia Fever is generally absent Consciousness is generally retained The condition is generally fetal Death occurs 4 – 8 days later due to respiratory or cardiac failure

CHARACTERISTICS OF THEBOTULISM TOXINS

Botulism toxin is thermolabile Foods contaminated with the botulism toxins heated for 100oC for a few minuets are safe for the consumption

INFANT – BOTULISM

The botulism occurring in the infants is called infants botulism It is due to the infection of the gut by the Cl – botulinum, with subsequent in vivo production of the toxins

BOTULISM – ANTITOXINS

Antitoxins are of the considerable value in prophylaxis of the botulism When a case of the botulism have occurred, antitoxins should be given to all individuals partaking of the food The dose varies from the 50,000 – 100,000 unit IV The antitoxin is of the no value if the toxin is already fixed to the nervous tissues 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 When combine with good medical and nursing care the drug can be useful adjunct in the treatment of the botulism Active immunization with botulism toxoid is available

CL – PERFRINGENS POISONING

It is less common type of the food poisoning There is rapid recovery no any death due to this type of the poisoning

CAUSATIVE AGENTS

Cl – perfringens (Welchii)

SOURCES

The organism have been found in to the faces of the humane and animals, soil, water and air The majority of the outbreak have been associated with the ingestion of the Meat, meal dishes and poultry The usual story is that food has been stored and cooked 24 – hour or more before the consumption and allow to cool slowly at room temperature and then heated immediately prior to serving

INCUBATION PERIOD

Incubation Period is between the 6 – 24 hours With peak time between the 10 – 14 hours

MECHANISM OF THE FOOD –POISONING

The spores are able to survive the cooking If the cooked meat and poultry are not cooled enough, they will germinate The organism multiply between the 30o C – 50oC and produce a variety of the toxins such as Alpha – toxin, theta – toxins

CLINICAL SYMPTOMS

The most common symptoms are Diarrhea Abdominal Cramps Little or no fever These symptoms occurring 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

PREVENTION

Cooking foods just prior its consumption Store the foods by rapid and adequate cooling

B – 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 favorable temperature B – cereus has been recognized as a cause of the food poisoning with increasing in frequency in recent years

B – CEREUS ENTEROTOXINS

B – cereus produce at least two distinct enterotoxins causing two distinct form of the food poisoning 1) Emetic For of the food poisoning 2) Diarrheal Form Of The Food Poisoning

EMETIC – FORM OF THE FOODPOISONING

This form of the food poisoning have a short incubation period in between 1 – 6 hours It is characterized pre-dominantly by the upper gastro – intestinal tract symptoms

DIARRHEAL – FORM OF THE FOODPOISONING

This form of the food poisoning have longer incubation period of about 12 – 24 hours It is characterized predominantly by the Diarrhea Abdominal pain Nausea with little or no vomiting and no fever The recovery within the 24 – hours is usual The toxins are performed and stable

DIAGNOSIS

Diagnosis can be confirmed by the isolation of the organism of 105 or more B – cereus organism per gram of the epidemiologically incriminated food Treatment: Treatment is symptomatic

DIFFERENTIAL DIAGNOSIS

Cholera Acute bacillary dysentery Arsenic poisoning

INVESTIGATION OF THE FOODPOISONING

1) Secure complete list of the people involved and their history 2) Laboratory Investigation 3) Animal Experiments 4) Blood for the antibodies 5) Environmental Study 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 particular foods

PREVENTION & CONTROL

Food Sanitation: Meat inspection High standard of the personal hygiene among the individuals engaged in handling, preparation and cooking of the food

Food handler suffer from any disease should be excluded from food handling Food handling technique I.e. the time between the food preparation and consumption is short

Sanitation of the all work surface, utensils, equipments, must be insured Food handler should be educated in matter of the clean habits, and

personal hygiene (Frequent and thorough hand washing)

REFRIGERATION

In order to prevention o0f the bacterial food – poisoning the emphasis must be placed on proper temperature control Food should not be left in warm pantries Cook and eat the food same day immediately is golden rule