

Contaminated Milk

Introduction:-

There are several infectious diseases associated with microbe-contaminated milk and milk products. The good news is that most of these microbes are killed by pasteurization, and so in reality, infections due to milk and cheese are pretty rare -- but still possible.

The pathogenic organisms may be derived chiefly from:

1. Dairy animals.
2. Human handlers.
3. Environment.

(1) The health of dairy animals is a very important consideration because a number of diseases of cattle including Brucellosis, Q fever, Salmonellosis, Staphylococcal and Streptococcal infections and Foot and Mouth Disease (FMD) virus may be transmitted to man through the consumption of milk. The organisms of most of these diseases may be transmitted to milk either directly from the udder or indirectly through the infected body discharges.

(2) The persons may transmit disease like typhoid fever, scarlet fever, diphtheria, septic sore throat, and infantile diarrhea by contaminated hands or by coughing and sneezing.

(3) Dairy and farm environment may also introduce a variety of pathogens into milk and milk products at different stages of production and processing. Some common air-borne pathogens include Group A streptococci, *Corynebacterium diphtheriae*, *Mycobacterium tuberculosis*, *Coxiella burnetti* and some viruses of respiratory origin. Water, fodder and unhygienic conditions at farm and plant level may also contribute pathogens to milk. Prevention of milk-borne diseases is one of the most important problems of public health.

Classification:-

- Milk-borne diseases of contemporary importance: salmonellosis, campylobacteriosis, staphylococcal food poisoning, brucellosis and

yersiniosis. Milk-borne diseases of historical interest: typhoid fever, streptococcal infections, diphtheria, tuberculosis, shigellosis and milk sickness

- Diseases rarely reported as being milk-borne: botulism, enteritis caused by *Escherichia coli*, *Pseudomonas aeruginosa* or *Clostridium perfringens*, listeriosis, *Bacillus cereus* gastroenteritis, Haverhill fever, Q fever, hepatitis A, poliomyelitis, toxoplasmosis, histamine intoxication and hypertension, and arsenic poisoning.

1. Cholera (*Vibrio cholerae*):-

Outbreaks of this disease due to infected milk have been reported in various parts of the world. The infection of milk maybe through carriers or through infected water used for adulteration. Human carriers have been proved to be very potent source of infection of the milk. The causative microorganism *Vibrio cholerae* apparently is easily destroyed by acid development in milk and cream. Prevention consists of periodic medical inspection of all persons connected with farm operations and pasteurization of milk, as the organism is destroyed at 55°C.

2. Typhoid or Enteric Fever:-

It is caused by *Salmonella typhi*. Milk forms the chief source of infection, which occurs through infected persons (active cases) and carriers are potent sources. Use of contaminated water for washing the utensils is another source. Infection through flies is possible. Water obtained from trusted sources largely eliminates the chances of typhoid organisms entering into milk through water. Pasteurization of milk invariably kills the bacteria.

3. Paratyphoid:-

The etiological agent is *Salmonella paratyphi* and spread of this disease through milk and dairy products show similar features as typhoid and the sources of infection are the same as in typhoid. The paratyphoid bacilli are destroyed when the milk is heated to a temperature of 59°C for 10 minutes.

4. *Diphtheria*:-

Causes by *Corynebacterium diphtheriae*. Milk borne epidemics have been reported from lesions on the teats from which the organisms were isolated. However, the primary sources of the organism have been traced to either the milk man or some farm worker. The organism produces an extracellular toxin in the respiratory tract of man, which sometimes causes death. The animals got infected secondarily, and the human carrier is an important factor. Prevention consists of rigid medical inspection of all dairy workers and pasteurization of milk makes it safer for human consumption.

5. *Streptococcal infections*:-

Streptococcal infections like septic sore throat, scarlet fever and food poisoning have been traced to the consumption of contaminated milk and dairy products. Few strains of group D streptococci and enterococci have been found to produce toxic metabolites in milk.

- A. *Streptococcus pyogenes*: This bacterium causes scarlet fever, septic sore throat, tonsillitis and septicemia in humans.
- B. *Streptococcus agalactiae*: It is the causative agent for mastitis in animals.
- C. Group D streptococci: It is one of the pathogen behind incidence of food poisoning in the human beings. Scarlet fever is primarily a disease of man, but cows may be secondarily infected from human sources and pass on the disease through milk to man. Large number of streptococci shed from udder of single cow infected with this organism may contaminate a large bulk of milk. Pasteurization of milk is the only safeguard against these bacteria.

Control by:-

1. Adequate heat treatment of milk and its products.
2. Holding of milk at low temperature during storage.
3. Rejection of milk from animals suffering from mastitis.
4. Regular check on the health of the dairy workers.
5. Fecal contamination of milk and its products should be avoided.

6. *Shigellosis*:-

Shigellosis is one of the common food borne infections caused by *Shigella dysenteriae*. Milk borne outbreaks have been frequently recorded and unpasteurized milk appears to be commonly implicated in such outbreaks. *Shigella* multiplies readily in milk at a temperature of 15°C or above. Milk may become infected by contamination with infected materials like utensils, water, flies, etc. Milk handlers may be carriers of infectious agents and also cause contamination.

Control by:-

Rigid sanitary discipline should be enforced among dairy workers particularly in pasteurization plants and retail shops dispensing milk in bulk. All the sanitary attendants looking after patients should be prohibited from contact with milk or utensils. Fly population should be controlled adequately during milk production and distribution.

7. *Listeriosis*:-

Listeriosis is a food-borne illness caused by *Listeria monocytogenes*, is capable of growing over a wide range of temperatures from 1 to 45°C. The pathogenicity is due to the production of extracellular haemolysin (alpha, beta) by this organism. Infected animals are the main sources of these organisms. Handlers carrying the disease, unhygienic practices during production and processing, faecal contamination of milk and water, contaminated refrigerators, dish and clothes may also introduce the organisms into milk. This organism appears to survive heat treatments like pasteurization.

Control by:-

1. Strict hygienic practices should be followed during production and processing.
2. Prevention of source of infection.
3. Proper heat treatment of milk.

8. *Bacillus cereus*:

poisoning *Bacillus cereus* is one of the causative organisms for mastitis. The herd raw milk sometimes gets *B. cereus* from mastitic animals. The raw milk also gets

spores from animal's teats and skin, milking machine and other source such as cans. Soil may introduce *B. cereus* directly or indirectly into milk and milk products.

Control by:-

Prompt cooling of milk, product during storage. General hygienic conditions should be maintained during production of milk and marketing of dairy products.

9. Aflatoxicosis:-

Aflatoxicosis is common type of fungal intoxication caused by the common moulds *Aspergillus flavus*, *A. flavus* can produce aflatoxin B1, B2 and G1, G2 types in milk and milk products. Aerial contamination is one of the most important sources of mould spores. Soil and contaminated food may also introduce spores in milk and milk products. Poor storage conditions.

Control by:-

1. Prevent fungal contamination of milk and milk products as well as feed by taking appropriate precautions.
2. Prevent fungal growth of the animal feeds by storing the products under proper conditions and by use of fungi static agents.
3. Detoxification of aflatoxins by physical and chemical agents.

How to Prevent Milk-borne Infectious Diseases?

- Don't drink raw milk.
- Keep dairy products refrigerated within the expiration date marked on the package.
- Be careful when you travel to developing nations, follow the recommended sanitary precautions for the country you are in and do not eat raw dairy products.

There are four techniques are employed for the specific control of milk-borne diseases. These are:

- (1) The inspection of cattle and elimination of infected animals.
- (2) Routine medical examination of all milk handlers and dairy personnel.
- (3) The killing of disease agents by the process of pasteurization.

- (4) Proper temperature control of milk during storage. This technique serves as a method of lengthening the lag phase of the growth curve of microorganisms.