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INFECTION OF ANIMALS TRANSMITTED TO MAN THROUGH MILK AND STRATEGIES FOR PREVENTION AND CONTROL: A REVIEW

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Abstract: The importance of milk in our diet is well established as it is considered the best, ideal and complete food for all age groups. However, milk can also serve as a potential vehicle for transmission of some diseases under certain circumstances. Moreover, by virtue of possessing almost all the essential nutritional factors, milk can also serve as an excellent source and protective medium for certain microorganisms, which may include potential pathogens capable of causing various health problems to the consumers.

Keywords: Milk, Pathogens, Public health.



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INTRODUCTION

The diseases in principle concerned in milk hygiene are TB, Brucellosis, Streptococcal infection, Staphylococcal enterotoxin poisoning, Salmonellosis and Q-fever. Diseases of lesser importance include cow pox and vaccinia, pseudo cowpox (Milker's Nodule) which are usually transmitted to milkers through contact during the act of milking rather than through ingestion of milk. FMD, Anthrax and Leptospirosis have also been transmitted on rare occasions. The tick borne Encephalitis virus may also be transmitted through milk but further is required, although it is theoretically possible that the polio virus infection and other enteroviruses to be transmitted through milk. However, milk borne hepatitis has been recorded in several times (occasions). The organism that causes all the diseases as mentioned above will be inactivated except the spores of *Bacillus anthracis* by adequate pasteurization or heating.¹

Tuberculosis: Human beings are universally susceptible to infection with the bovine tubercle bacillus. Bovine TB is particularly common in children. It is the most common pathogen present in raw milk. The milk from single infected cow might contaminate the entire milk supply through mixing. The bovine tubercle bacillus is chiefly responsible for the non-pulmonary type infection in man. Children become infected

most commonly in the alimentary tract, cervical lymph glands, bones and skin. Organisms enter milk directly from udder or from dung. Pasteurization kills the pathogen. Tuberculosis has been recognized as one of the most important infectious diseases in the world because of its high global impact and its chronic debilitating characters particularly in the poor sections of the society. Milk borne tuberculosis is directly or indirectly related to the consumption of raw milk from infected dairy herd. Tuberculosis of milk producing animals has two significant features:²

i) Cattle and goats infected with any of the three types of tubercle bacilli i.e. *Mycobacterium tuberculosis*, *M. bovis* and *M. avium* viz. human, bovine and avian types which excrete the organism in the milk even though their udder may be distinctly normal. For this reason, any animal that is known or suspected to be infected with tubercle bacilli or that reacts to the tuberculin test that should be considered as a potential actual excreter of the organism regardless of the presence or absence of signs of udder abnormalities.

ii) The human or bovine strains of the tubercle bacilli may be transmitted between animals and men who are in direct contact with them not only through the

ingestion of infected materials but also through the respiratory tract.

Prevention and control: All cattle should be subjected to Tuberculin test to find out positive or infected cases. Tuberculosis cases should be eliminated. Proper pasteurization or heat treatment of milk and milk products should be practiced. The attendants who are positive for tuberculin test should be prohibited from handling the cattle or milk. Overcrowding in the farms should be avoided. Animal house or living conditions of persons or attendants should be improved with proper ventilation. Proper disinfection of udder clothings, utensils for milk collection should be disinfected properly. Handlers should be subjected to 'Mantoux test' to find out whether that particular person is affected with tuberculosis.

Brucellosis: Infection is primarily acquired from infected animals. The species involved are *Brucella melitensis*, *Brucella abortus*, and *Brucella suis*. Man is infected directly by contact with the diseased animal or their tissue or discharges or through consumption of raw milk and milk derivatives or diseased animal. The organisms get established in the udder and multiply there and are excreted in the milk in large numbers. *Brucella abortus* can also get into the milk from unsanitary barns as the organism survives for long periods under a variety of conditions. The safest

method of disease prevention is to discard the affected animal's milk. Pasteurization is effective in destroying the microorganism.

Prevention and control: Segregation of infected herd should be done to avoid cross infection of milk of the healthy herds. The healthy animal should be isolated and slaughtered. The herd should be properly vaccinated with calf-hood vaccination by using Brucella cotton strain-19 vaccine. Vaccine should be administered to calves below 6 months of age. Adequate heat treatment and pasteurization of milk and milk products should be done. The persons engaged in dairy farms should be tested against Brucellosis.

Anthrax: Anthrax disease has been reported in people following consumption of infected milk. *Bacillus anthracis* may be excreted in milk shortly before death of the animal. Samples of milk drawn from cows that died of Anthrax may show numerous anthrax bacilli. However, the organisms may gain entry into milk from environment which is often contaminated with the bacilli or its spores.

Prevention and control: Milk from disease animals should not be used. Proper sanitation of the dairy herds, proper vaccination to the animal of dairy herds by Anthrax spore vaccine (1 ml dose) should be implemented. The discharges of the infected materials should be promptly and properly disposed off.

Q fever: It is caused by *Coxiella burnetii* and is a rickettsial disease. The organism is known to be excreted in the milk of cattle, sheep and goats. Raw milk is commonly implicated as a vehicle for the transmission of the disease. A number of reports indicating the high incidence of disease in raw milk as well as pasteurized milk have been recorded from different countries. *C. burnetii* is more resistant to heat and it can resist at certain pasteurization temperature i.e. Vat pasteurization temperature especially when air space heaters are not used, it may escape destruction at low temperature accepted for pasteurization i.e. 61.5°C for 30 min, thus leading to potential hazard. Treatment at 63°C for 30 min or 75°C for 15 sec have been recommended for the inactivation of organisms in milk as *C. burnetii* is comparatively resistant to heat than *M. tuberculosis*. Higher temperature is recommended for milk and milk products where butter fat content is greater than that of milk.

Prevention and control: (i) Adequate heating of milk and cream, (ii) Calving and lambing sheds should be away from the milking shed and dairy farms, (iii) Heat treated milk should be kept away from dust and discharges, (iv) Control on the import of domestic animals and (v) Recontamination of heat treated milk with dust and discharges should be prevented and avoided.

Cow pox: Cow Pox is transmissible from infected cows to the human beings, especially to the young one. In the case of adults, the attack will be usually mild but in children, it results in fever and malaise. The contamination of milk is through the lesions on the udder. Pasteurization is effective in destroying the virus.¹

Prevention and control: The veterinary advice on herd treatment should be short and the milk should be pasteurized properly. The milk of cows showing active lesions in the udder in the form of pustules or serous scabs on the udders should not be used. The principle sources of infection for milkers are handling the teats of such infected animals.

Foot and Mouth disease: This virus produces gastro-intestinal disturbances on consumption of milk and dairy products like cream, butter and cheese prepared from milk of infected animals. Children are more susceptible. The virus is present in the fluid of the vesicles and from these vesicles; they gain entry into the saliva, feces, urine and milk. Lesions also occur in the udder, milk ducts and secreting portions of the udder is also involved. Pasteurization is a simple method to destroy the FMD virus.

Staphylococcal enterotoxin intoxication: Multiplication of certain strains of Staphylococcus in milk leads to enterotoxin formation in milk. This toxin is particularly produced by enterotoxic strains of

Staphylococcus spp. These strains show the usual characteristics of pathogenic staphylococci and are coagulase positive in nature. Enterotoxin contamination of raw milk is usually derived from sick animals, usually who suffer from mastitis. It can be from food handlers or milk handlers who carry the bacterial population on their skin in hand and forearms in conditions such as pyodermitis and furunculosis. Staphylococcus enterotoxin which generally remains preformed in milk is thermostable in nature and can resist boiling.²

Prevention and control: (i) Rapid refrigeration of food or milk or milk products, (ii) Control of human carriers at critical points in milk processing plants and (iii) maintenance of hygienic standards in milk processing plants during transport and up till distribution to consumers.

SUMMARY

A variety of pathogenic organisms may gain access into milk and milk products from different sources and cause different types of milk-borne intoxications in susceptible human beings. Milk and milk products may carry organisms as such or their toxic metabolites. Ingestion of preformed toxins in milk and milk food products produces poisoning syndromes in the consumers. So, adequate preventive and control measures should be implemented for production of hygienic and edible dairy products.

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