

Are Mycotoxins Silent Killers of Humans and Animals?

Mahendra Pal*

Founder of Narayan Consultancy on Veterinary Public Health and Microbiology, 4 Aangan, Jagnath Ganesh Dairy Road, Anand-38800, India

*Corresponding author: Mahendra Pal, Founder of Narayan Consultancy on Veterinary Public Health and Microbiology, 4 Aangan, Jagnath Ganesh Dairy Road, Anand-38800, India, Tel: 091-9426085328; E-mail: palmahendra2@gmail.com

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Editorial

Food, which contains essential nutrients, is vital for survival of all living creature. But it can be contaminated by bacteria, viruses, fungi, chemicals, natural toxicant, and poisonous plants. There are about 200 food borne diseases, which can occur in sporadic and epidemic forms causing serious public health problems in developing as well as in developed nations. These diseases particularly target some vulnerable groups, which include children, elderly, pregnant women and immunosuppressed persons. The food borne illness associated with mycotoxins is known since ancient time. The term mycotoxin is derived from 'myco' meaning fungi and 'toxin' refers to the harmful substance of biological origin. The first documented information on stachybotryotoxicosis in horses in USSR and facial eczema in sheep dates back to 1940 and 1950, respectively. However, the death of 100,000 turkey poult in Great Britain in 1960 due to consumption of peanut meal with toxins of *Aspergillus flavus* gave a new surge to the importance of mycotoxins in human and animal health. This resulted in comprehensive and systematic research in the field of mycotoxins throughout the world.

Currently, over 350 mycotoxins have been identified in nature; however, aflatoxins are the most important and well-known. The mycotoxins are secondary metabolites, which can be produced by many fungi prevalent in our universe but they are mainly produced by three most predominant genera of fungi, such as *Aspergillus*, *Fusarium* and *Penicillium*. Many fungi secrete only mycotoxin while some may produce several toxins. The fungi are ubiquitous in distribution and occur in a wide variety of agriculture commodities, such as barley, bread, corn (maize), cottonseed, cowpea, groundnut, hay, oat, peanut, red clover, rice, rye grass, soya bean, straw, sweet potato, wheat, and others. However, groundnut and groundnut meal have the greatest risk of fungal toxin contamination. The author has isolated toxicogenic strains of *Aspergillus flavus* from many samples of groundnut, rice, maize, bread, milk besides poultry feed. It is pertinent to mention that the presence of mycotoxins in agriculture foods is, indeed, a more challenging issue for human and animal health worldwide. The fungus plays a sleeper role as it remains in resting stage till the favourable environment reaches for toxin production. These are silent killers and their impact on human and animal health is massive. Many species of animals, such as cattle, dog, pig, rabbit, sheep, turkey, chicken and others are affected with mycotoxins.

Mycotoxins are now recognized global health problems and are reported from many countries of the world, such as Australia, Cambodia, Canada, China, Finland, France, Ghana, Hungary, India,

Indonesia, Israel, Japan, Kenya, New Zealand, Nigeria, Romania, South Africa, Sudan, USA, Zimbabwe and elsewhere. Mycotoxins exhibit carcinogenic, teratogenic, mutagenic, hepatotoxic, nephrotoxic and immunosuppressive effects in humans as well as in many species of animals. The effect of mycotoxin depends on the concentration in food, quantity ingested, period of exposure, age and physiological status of the susceptible host. Mycotoxins are important because they affect human health, animal production, and international trade.

The disease produced by ingestion of mycotoxin is called mycotoxicosis (fungal toxicosis, mouldy food poisoning, mould toxicosis), which occurs in sporadic and epidemic form and results in considerable morbidity and mortality. The consumption of mycotoxins can cause acute or chronic diseases in humans as well as animals including birds. There are about 20,000 deaths from liver cancer due to aflatoxin in Indonesia annually. A massive epidemic of hepatitis due to consumption of aflatoxin contaminated maize was responsible for 400 cases in India. In Ghana, aflatoxins were demonstrated in the liver of children with kwashiorkor. Scientists have suggested that aflatoxins may be a possible risk factor in the development of primary liver cancer. In European Union; there are 3.2 million cases and 50,000 hospitalizations due to mycotoxins each year. The cost of mycotoxins in Canada and United States is estimated US Dollar 5 billion every year.

It is believed that mycotoxins in foods are responsible for much higher number of deaths in humans when compared with bacterial foodborne illnesses. It is disheartening to mention that about 25% of world's cereals (food crops) are contaminated by mycotoxins annually. According to recent report of World Food Programme, 815 million people around the world are hungry. If we can save/protect our foods from the menace of mycotoxins by taking appropriate measures, the hunger of poor people of developing nations to some extent can be prevented by meeting the demand for food. The active surveillance of feed grains, use of mould inhibitors, and continuous awareness of agriculture farmers will also be beneficial to reduce the incidence of mycotoxins. The role of natural antioxidants and binders to prevent the injurious effects of mycotoxins should be studied. It is emphasized that good agricultural management should be implemented to combat mycotoxins in feed or food. Sincere attempts should be made to develop a simple, easy and low cost kit, which can be widely used by poor resource countries, to detect the presence of mycotoxins in various foods of plant and animal origin. Further studies seem imperative to elucidate the health effects of mycotoxins in humans and in many species of animals including poultry.