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OCCURRENCE OF AFLATOXIN M1 (AFM1) IN MILK AND ITS TOXICITY FOR HUMAN HEALTH

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Abstract:

The aim of this study was to aware the people about the toxicity of Aflatoxin M1 (AFM1), which are upcoming to human body through milk. AFM1 is the secondary metabolite of Aflatoxin B1. AFM1 is carcinogenic as well as hepatotoxic for mammals. Due to hepatic cellular carcinoma globally thousands of people died each year. To protect human being from this horror European Union (EU), United States Food and Drug Administration (FDA) set up maximum residues limits (MRL) for it. The international Agency for Research on Cancer classified it as group 1 carcinogenic agent.

Key words:
Aflatoxin M1, Carcinogenic, Hepatotoxic, Mammals.

Introduction :

Aflatoxin M1 (AFM1) is a mycotoxin and is a major metabolite of Aflatoxin B1 (AFB1)[(1)]. During the process of sterilization, pasteurization and various dairy products preparation the AFM1 is stable[(2)]. AFM1 is produce when animal's feeds on AFB1 contaminated food, the gastrointestinal tract rapidly absorbed it and liver convert it into metabolite AFM1, which appears in the blood of animal within 15 minutes, and then secreted in milk through mammary glands. There is a linear relationship between ingestion of AFB_1 into animal body and release of AFM1 in milk [(1)]. 1-2% of AFB1 is converting in animal body and secreting in milk in the form of AFM1. The AFM1 secretion varies from animal to animal, milking to milking and day to day. When the AFB1 enter to animal body, within 12-24 hours AFM1 appears in milk and within few days reaches to a maximum intensity. When the ingestion of AFB1 is ended, after 72 hours the presence of AFM1 reduces to invisible limits. It has been find out that up to 6 % of AFB1 are secreting in milk in the form of AFM [(1)]. It has been demonstrated that actually the contagion of milk and milk yield due to AFB1 depend on country side, natural features and season. The contamination due to AFM1 also depends on the cold and worm condition of season. Greens are consumed more at the end of summer so it cause a decrease of AFM1 level in animal body because grazing land, wild plants, coarse feeds are mostly found in summer and spring than in winter [(3)].

Methodology

The purpose of this review article is to aware the people about the toxicity of milk, due to contamination with Aflatoxin M1 (AFM1). In the preparation of this article total of 25 published literatures

were reviewed from international journals, national journals and books. Out of the total 7 of them were unrelated and were excluded. The remaining literatures were reviewed scientifically and analyzed.

Global burden of Aflatoxin M1

AFM_1 is considered to be carcinogenic and hepatotoxic for humans and various other species [4]. There is estimation that due to contaminated foods, throughout the world in progressing countries, more than 500 million people has risk of chronic exposure to Aflatoxins [5]. Due to Aflatoxins the hepatocellular carcinoma is the primary disease (liver cancer, or HCC). According to WHO, globally hepatocellular carcinoma is the leading cause of cancer death[6]. Due to hepatocellular carcinoma each year 550,000–600,000 new cases occur, out of which in Sub Saharan Africa and East Asia eighty three percent of deaths occur[7].

Maximem Residues limits (MRL) for Aflatoxin M1

It is considered that milk and its derivatives are consumed daily and, moreover, that they are of primary importance in the diet of children, most countries have set up maximum admissible levels of AFB1 in feed [8], and for AFM1 in milk, which vary from the 0.05 µg/kg established by the European Union (EU), to the 0.5 µg/kg established by United States Food and Drug Administration (FDA)[9]. Based on acceptable level, the intake of AFM1 from milk has been computed between 0.0001µg/ to 0.012µg/ per day per person in Africa and Far East respectively. (Middle East: 0.0007 µg/person per day, Latin America: 0.0035 µg/person per day, and Europe: 0.0068 µg/person per day)[10].

International Agency for Research on cancer (IARC) and Aflatoxin M1

The international Agency for Research on Cancer checked the carcinogenicity and hepatotoxicity of AFB1 and obviously confirmed it as group 2B carcinogenic agent (11). In the beginning the IARC classify AFM1 as group 2B carcinogenic agent but after that its toxicity were checked which were lower than AFB1 [12]. Due to these investigation IARC consider AFM1 as group 1 human carcinogen instead of group 2B carcinogen (11).

Conclusions

Milk is the main source of nutrition for human being especially for children, but they are contaminating due to different reasons especially through Aflatoxin M1. It is carcinogenic and hepatotoxic for humans and other mammals. It is also the leading cause of death. So European Union (EU) and United States Food and Drug Administration (FDA) set up maximum residues limits (MRL) for it. The international Agency for Research on Cancer classified it as group 1 human carcinogen.

Competing interest

The author declares that they have no competing interest.

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