

## Research article

## Aflatoxins B1 and M1 residues in chicken's livers in Al Diwaniyah city

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(Received 16/8/2017, Accepted 23/12/2017)

### Abstract

*In this study, (60) samples of local and imported chicken liver were collected with (30) samples of each type from markets of Al Diwaniyah city. High Performance Liquid Chromatography (HPLC) technique used to detect the amount and type of aflatoxin residues. The results of the local chicken liver test showed that B1 and M1 residues was observed in (17) samples of (30) samples tested (56.7%) and (13) (43.3%). Total of the two toxins was between (1.9 - 72.2) ppb at the rate of (21.15) ppb, and (5) samples (29.41%) of the local chicken liver is not suitable for human consumption to overcome the toxins in the aflatoxins where the limits allowed in human food. The results of the imported chicken liver examination showed that (15) samples of B1 and M1 were infected (30) samples (50%). The range of toxin amount of the total of the two types of toxins ranged between (0.5 - 52.2) ppb at rate (16.71) ppb, and the amount of toxins in (5) samples of the allowed limits, and the local chicken liver more contain the foals of aflatoxins chicken liver, but there were no significant differences between the two types.*

**Keywords:** Aflatoxin B1, Aflatoxin M1, HPLC, Chicken's liver, Residues

### Introduction

Mycotoxins are toxic secondary metabolites produced by some fungi that grow on food and feed (1). The most important of these toxins is Aflatoxins, Ochratoxins, Trichothecene and Zeralenone (2). But ,aflatoxins which produce by *Aspergillus flavus*, *Aspergillus parasiticus*, and some other are among the most important of these toxins, and most dangerous for their serious pathogenic effects and economic losses caused by the destruction of polluted crops (3). Most animal species are exposed to the poisoning of aflatoxins, especially poultry, sheep and cows, causing severe pathogenic effects due to immunosuppression, as well as their effect on vital organs, especially the liver of the animal, affecting the production capacity of these animals, causing significant economic losses (4). A human is exposed to aflatoxins

by eating animal meat such as liver, muscle or food products such as milk and eggs for animals that have eaten aflatoxins in their diets (residues) (5). Acute aflatoxicosis is rarely exposed to acute toxicity due to its ability to distinguish rotten foods and avoid ingestion, but the greatest risk is the accumulation of these toxins in the human body and thus the pathogenic effects of mutagenesis and carcinogenesis as well as immunosuppression, making it susceptible to other pathogens (6). Therefore, the purpose of this study was to determine residues of these toxins in the liver of broiler in the markets of Diwaniyah city and comparing the levels with the permissible limits.

### Materials and Methods

#### Ethical approval

The Animal Ethical Committee of Veterinary Medicine College, University of Al-Qadisiyah, Iraq, has approved the present study under permission No: 437

#### Samples collection:

Samples were collected from the local markets of Al Diwanayah city from December 2008 to July 2009 where (60) samples were collected from the livers, (30) of which were local samples and (30) samples were imported.

#### Determination of aflatoxins B1 and M1:

The qualitative and quantitative determination of the aflatoxin residues was obtained using the HPLC and following the

### Results

#### Aflatoxins residues in livers:

The results of the examination of (30) samples of local chicken liver showed contamination of (17) samples with different concentrations of B1 and M1, the percentage of contamination was (56.7%) as shown in Figure (1). There were (13) samples (43.3%) free of aflatoxins. The contamination ranged from (1.9) to (72.2) ppb and (21.15) ppb as in Table (1). AF M1 was higher than AFB1. The M1 was present in all positive samples and ranged from (1.7) to (43.7) ppb at mean (13.63) ppb. The results of the statistical analysis showed that there was no significant difference between the two B1 and M1.

method by (7). The Shimadzu Lc- 2010AHT uses a C18 Luna 5u separation column with a separation dimension of (4.60 × 250) and packed with diameter (5) microns at 40° C and a wash solution of acetonitrile + water at a flow velocity of 0.5 mL/ min using Uv detector and wavelengths of 360° and 450 nm. Compared with standard solutions supplied by Sigma Aldrich, on the results.

#### Statistical analysis:

The results of the current study were analyzed using (8) using T-test and Chi-square. The analysis was used to determine the effect of chicken type and avalanche on the level of contamination.

Local samples of. As shown in Table (2). Levels of toxins distribution show that (12) samples (70.59%) were contained in aflatoxins with concentrations below (20) ppb, which is the permissible limit of aflatoxin. Two samples (11.76%) in the range (21-40), one sample (5.88%) within the range (41-60) ppb and two samples (11.76%) exceeded the level of (60) ppb. The results of the examination of (30) of imported chicken liver showed that there was a contamination of the B1 and M1 in (15) samples (50%). Residues ranged from (0.5 to 52.2) ppb, with a mean of (16.71) ppb as shown in Table (3).

**Table (1) Percentage, extent and rate of contamination of aflatoxin in domestic and imported chicken liver**

Liver type	number of examined samples	positive samples	Contamination %	negative samples	contamination %	contamination range	mean ±standard error
local	30	17	56.7	13	43.3	1.9-72.2	5.3721.15±
imported	30	15	50	15	50	0.5-52.2	4.57±16.71

$$\chi^2 \text{Cal} = 0.268 \quad {}^2 \text{Tab} (0.05, 1) = 3.84$$

**Table (2) Percentage, range and rate of contamination of positive samples contaminated**

Liver type	number of examined samples	Positive samples			contamination range	mean ±standard error
		type of AF	number of samples	%		
Local	30	B1	17	56.7	0.2-21.9	±2.097.51
		M1	17	56.7	1.7-43.7	3.6113.63±
Imported	30	B1	15	50	0.1-18.5	1.655.92 ±
		M1	15	50	0.4-33.7	10.78 ±2.94

$$\chi^2 \text{Cal} = 0.0 \quad {}^2 \text{Tab} (0.05, 1) = 3.84$$

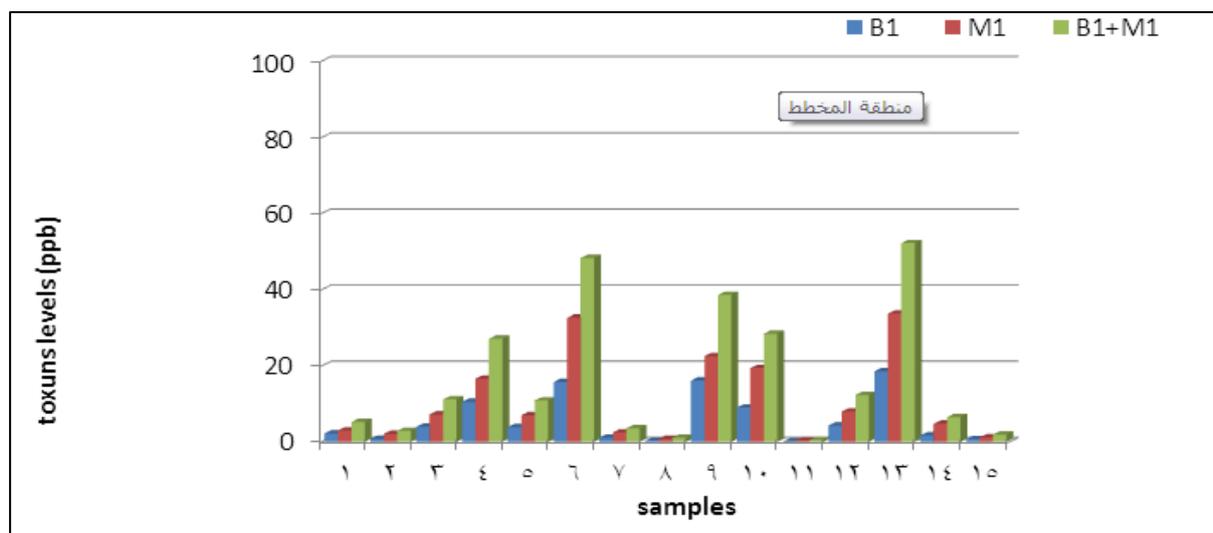


Figure (1) levels of Aflatoxins B1 and M1 and their total in local chicken's liver

## Discussion

The results of the presence of the AF B1 and M1 in local chicken liver showed that more than half of the local samples of the tested liver were contaminated with AF, where (17) samples of (30) samples were tested (56.7%). With a total of B1 and M1 between (1.9-72.2) ppb. The study found that (5) samples (29.41%) of the samples were not suitable for human consumption to exceed the level of toxin which limit by the US Food and Drug Administration (US-FDA), which is (20) ppb. while (12) samples (70.59%) of the samples were suitable for human consumption because their content of the toxins did not exceed the permissible limit, in addition to (13) samples were free from the toxins. The results were less than indicated by (9) in her study in Iraq on the contamination of domestic chicken liver in the name of AF B1 and M1 where the range of contamination ranged from (13.7) to (269.4) ppb and the highest level of the AFB1 was (83.0) ppb and lowest level (2.5) ppb at mean (30.28) ppb while the highest level of AFM1 was (176) ppb and lowest (9.7) ppb at mean (60.11) ppb. Contamination mean was (91.7%) of the total

samples. The results in the current study were lower than those measured by (10). In Iraq, where they pointed out that the rate of the remains of the toxins in the liver AF was (51) ppb. On the other hand, the results were higher than those found in (11) (43%) of the total (100) samples were tested. In addition, the contamination levels of the B1 and M1 were lower than the current study showed. The first type of contamination was between (1.1 -7.1) at rate (4.6) ppb, while the range for the second type ranged from (1.4 - 10.1) ppb at a rate of (6) ppb. The cause of high levels of AFB1 and M1 in the liver is due to the fact that it is a vital organ in the body responsible for detoxification (12). It is also considered on the top of the list of organs in the body that contains high concentration of aflatoxins (13). Contaminated feedstuffs by aflatoxin are major sources for dissemination of these toxins to the liver tissue, especially when fed for a long time on fodder contaminated with high levels of toxins. It was found that when given contaminated feed with (50) ppb and for a long time the highest level of toxins was found in the liver by (1.1) ppb (14).

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