Abbas *et al*. *J Pure Appl Microbiol,* **12**(**4**), 1825-1828 Dec. 2018
http://dx.doi.org/10.22207/JPAM.12.4.16

Print ISSN: 0973-7510; Online ISSN: 2581-690X

REVIEW ARTICLE

Induce Cancer by Ochratoxin A

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Abstract

Mycotoxins are microbial agents which cause food or feed-borne intoxications. Mycotoxins are undesirable compounds often found in cereal grains and forages. Ochratoxin A (OTA) is mycotoxin creates by more than a few type of *Aspergillus* in addition to *Penicillium* and can cause benign and/or malignant tumors. Due to that, this study was planned to induce cancer in mice mammary gland by (OTA). Twenty mice were caged to tow experimental groups and treated (10ppb OTA) for 6 months. The results showed that the mammary gland gross appearance gave enlargement with irregular shape while the histopathological changes showed pleomorphic hyperchromatic malignant cells indication for malignant adenocarcinoma of mammary gland. These results clearly indicated that OTA has carcinogenic compound that cause cancer in mammary gland of mice.

Keywords: Mycotoxins, Ochratoxin A, Carcinogenic effects, Fungal contamination.

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(Received: 13 July 2018; accepted: 30 September 2018)

Citation: Oday S. Abbas, Dalia A. Abdul-Shaheed and Rand M. Anwer, Induce cancer by Ochratoxin A, *J Pure Appl Microbiol.,* 2018; **12**(4):1825-1828. http://dx.doi.org/10.22207/JPAM.12.4.16

INTRODUCTION

One of the most contaminants to the natural food is Mycotoxins it is basically formed by moulds of *Aspergillus* genetics in addition to *Fusarium* spp as weel as *Penicillium.*

The toxicity effect of Mycotoxins on health of animals and human beings is rising and growing up and that's incourage the countries to legislate laws to terminate their existence in food through a very strict control specially Aflatoxins (AFs), Mycotoxins are Ochratoxin A (OTA), Patulin and Fusarium toxins[1]. Fungi produce this biochemical for a wide array of reasons, many of which remain unknown[2]. Mycotoxins production tends to increase when fungal growth rates slow down and as fungi move toward dormancy; in such instances, mycotoxins production appears to be a defensive reaction[3].

Ochratoxin formed from Mycotoxin in addition to produced by quite a few types of *Penicillium* and *Aspergillus*. Among different types of Ochratoxin, Ochratoxin A is most important, the other being the methyl and ethyl ester of OTA, which is also known as Ochratoxin C and Ochratoxin B[4]. Numerous evidences proposed to facilitate OTA can cause cancer (carcinogenic) to animals and human beings. Initially OTA cause a nephropathy which can cause death due to its effect on kidneys frailer and diseases, the diseases is called (BEN) Balkan Endemic nephropathy. Subsequently, OTA is consider to be toxic to immune and the genetics to many genus.

Petkova-Bocharova and his coworker (1998) mentioned that in 1993 the cancer research agency (IARC) finished that OTA can cause cancer to human brings (Type 2B) in addition to placenta which damage the DNA as well as the tissues and eventually case fatal and death[5]. Also The National Toxicology Program (NTP)[6] have recognized 42 chemicals that considered to be the main reason to tumors in mammary gland tumors to animals. The Environmental Risk Factors and the Cornell Program on Breast Cancer and upon a revision and research on those chemical was ended that the contact to those chemicals have a great effect on human health and safety[7].

The question addressed in this study is: what is their carcinogenicity risk of OTA assessments *in Vivo?*

MATERIALS AND METHODS

This research is a joint research by the College of Veterinary Medicine / University of Baghdad and the Iraqi Center for Cancer and Medical Genetic Research. All chemicals and Standards of OTA were purchased from Sigma.

Animals and experimental design

Twenty female albino BALB/C mice were used in this study, aged 3-4 weeks and weight (15 ± 20) g. supplied by the animal house. They were housed and maintained in a conventional animal facility, with controlled conditions of temperature (18 ± 6ºC) with lighting program of 12 Light and 12 Dark hours. The animals were fed on special formula feed pellets and given tap water.

Throughout the experiments, each ten mice were housed in a plastic cage containing hard-wood chip as bedding. The bedding was changed weekly to ensure a clean environment. Twenty females were separated into 2 groups each group has 10 females. One group was considered as control and it was not treated while the second was exposed to Ochratoxin A (10 ppb) by drinking water for 6 months[6].

Histological examination

Tissue processing (mammary gland) and staining depending on[8].

RESULTS

Grossly of Mammary gland

The disgusting outward shows a noticeable difference and shape size.

Histopathology

The experiments were achieved on mice and figure 1 below shows the mammary gland of mice that was exposed to Ochratoxin, the figure indicate clearly the effect of hateful cell as well as the pleomorphic hyper chromatic which indicates the adenocarcinoma.

DISCUSSION

The study indicate that Ochratoxin A is dangerous, and toxic and can ruin food and also can cause worsen the animal as well as human being health.

To have safe of food, it is very important to keep the food away from Ochratoxin A and be aware from being contaminated with it, and that's why it is important to establish a very accurate

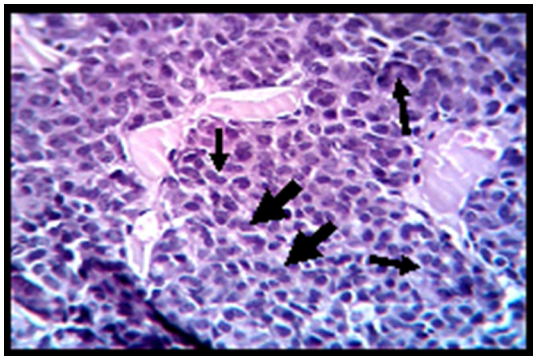

Fig. 1. Indicate clearly the effect of hateful cell as well as the pleomorphic hyper chromatic which indicates the adenocarcinoma (H&E (↑) 200 X)

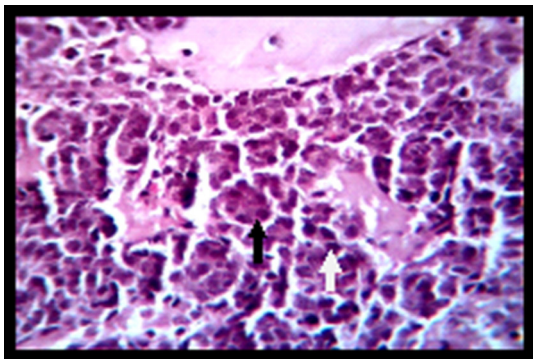

Fig. 2. Mammary gland for mice exposed to Ochratoxin (H&E (↑) 200 X)

system to keep the food away from contamination with it. The most important factors that affect the presence of Ochratoxin A are humidity and the temperature those two things has to be well maintained to prevent the exposure of food to Ochratoxin, that's why the monitoring and good control must achieved to maintain healthy food with no Ochratoxin A[9].

Upon the experimental studies, researches and evidences Ochratoxin A sensibly predictable to cause cancer to animals and human being and this was totally approved in the studies achieved on mice and it was found (when mice exposed to Ochratoxin A), it was found that mice will suffer from renal cell tumors and hepatocellular tumors as well as mammary gland tumor in addition to hyper plastic hepatic nodules and hepatomas[10].

In 2016 Malir and her coworkers observed that OTA can be the main reason to smash up DNA, which may lead to creation of cancer in animals and human as well due to the indirect effect of OTA on some of the body processes due to DNA damage which eventually case damage to the cells[11].

Experiments achieved on ice indicate that when oral tissues exposed Ochratoxin A, this may cause tissues to be damaged which leads to appear tumors in mice[12]. In addition to that cancer tumors may appears in kidney, stomach and mammary-gland tumors of female rats as well as male rats[13,15].

ACKNOWLEDGMENTS

We appreciate the laboratories of the Iraqi Center for Cancer and Medical Genetic Research its valuable cooperation in this research.

CONFLICTS OF INTEREST

Authors declare that there is no conflict of interest.

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