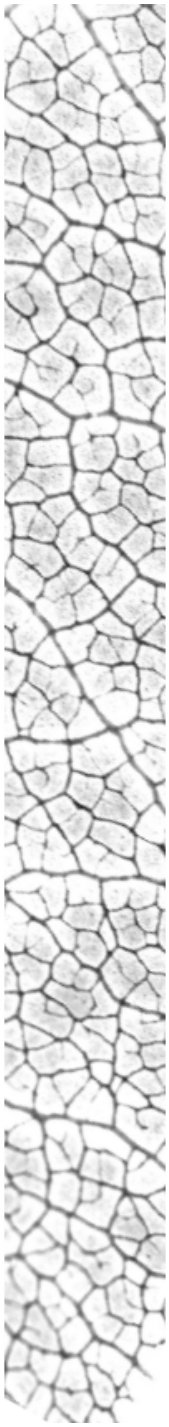

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The role of genetic material and yeast in reducing the effect of T2 toxin on some physiological parameters in mice

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Abstract
The results showed a significant increase in active the Aspartate transaminase enzyme when dosage by toxin (122 enzymatic units/L.), compared with control group (102 units / liter). While genetic material and yeast with toxin showed significantly reduced of toxin effectiveness. The results showed increase in activity of Aspartate transaminase enzyme in animal serum when dosage by toxin 8.9 enzymatic unit / L. and 8.5 enzymatic unit / L. for control group. The genetic material and yeast as adsorbents caused a reduction in the effect of trichothecenes on Alanine transaminase activity, thus restoring normal activity. The results also of this experiment showed that the dosage of trichothecenes for laboratory animals led to a significant reduction at the level (0.05) in its active enzyme Alkaline phosphatase activity (35.5 enzyme alone/L.), compared with control group (37.1 U/L.).The results showed that added of genetic material and yeast , caused in a significant decrease in enzyme activity, compared with dosage of toxin alone or control group .The results showed that the reason for the decrease in total protein in the blood may be due to the presence of toxin, that the toxin effects on the processes that lead to the manufacture of proteins in the cell, may affect in the cloning of DNA into mRNA or may effect on some of the substances that play a role in translating mRNA into ribosomes and the factors involved in initiating the process of protein synthesis. The dosage of trichothecene with the genetic material and yeast , has caused a significant increase in the concentration of the total protein in the blood and this is due, as already pointed out to the role of these factors in the toxicity of trichothecene which leads to blocking its effect ,also the result showed that the dosage of trichothecene has significantly increased the concentration of uric acid in blood (5.2 mg / 100 ml) compared with control group 4.3 mg / 100 ml , genetic material and yeast did not significantly reduce the concentration of uric acid. While the results showed that dosage of trichothecenes a significant decrease in blood glucose concentration (172 mg / 100 ml) compared with control group (184 mg / 100 ml), and by used genetic material and yeast caused significant increase in the concentration of blood glucose compared with used of toxin alone. The results showed that the trichothecene caused a significant reduction in the total protein concentration in the blood, where the concentration was 4.7 mg / 100 ml with the presence of toxin compared with control group 5.9 mg / 100 ml.

Keywords: Trichothecenes, Aspartate transaminase, Alanine transaminase, alkaline phosphatase

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INTRODUCTION

Mycotoxins, secondary metabolites of various *Aspergillus* spp, commonly contaminate a wide variety of tropical and subtropical food or feed stuffs (Niyo et al. 1988). Mycotoxins are known to have strong hepatotoxic and carcinogenic effects and are regulated by feed or food law at least more than 100 countries (Kheiry et al. 2013, Sahay 2003). Mycotoxins produced by microorganisms are the most dangerous toxins, which are secondary metabolites produced by more species of fungi, toxigenic fungi do not systematically produce toxins, it are depends largely on environmental conditions (Engler et al. 2000). The level of toxicity is more variable for different animal species there are more than (300) mycotoxins produced by more variety of fungi, such as aflatoxins, ochratoxin, Citrinin, Patulin, and fumonisien toxins (Dursun et al. 2015, Omurtag and Yazicioglu 2001).

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Table 1. The role of genetic material and yeast in reducing the effect of trichothecenes on the activity of aspartate transaminase, alanine transaminase and alkaline phosphatase

Treatments	Aspartate transaminase Enzyme / L.	Alanine transaminase Enzyme / L.	Alkaline phosphatase Enzyme / L.
Control	102	8.5	37.1
Trichothecenes (100µg/kg)	122	9.3	33.2
Trichothecenes(100µg/kg) + Genome(250µg/kg)	110	9.4	30.7
Trichothecenes(100µg/kg) + Genome(500µg/kg)	106	8.9	34.6
Genome (250µg/kg)	109	8.7	36.8
Genome(500µg/kg)	106	8.7	35.0
***S. cerevisiae* (10mg/kg)**	106	8.5	35.1
Trichothecenes(100µg/kg) + *S. cerevisiae*(10mg/kg)	106	8.4	34.4
LSD(P=0.05)	2.93	0.4	1.1

*Each value represents a rate of three replicates

Some of fungi are called toxigenic, they can synthesis one or more than metabolites which become toxic for human and more animals, when ingested of large quantities, these are called mycotoxins (Avantaggiato et al. 2004). Mycotoxins are contaminate a wide variety of agricultural commodities, including oil seed, fruits, and cereals. T-2 toxin is a trichothecene mycotoxin which produced from Fusarium spp. its secondary metabolites (Scudamore 2005). *Fusarium sporotrichioides*, one of plant pathogens that cause scab in wheat, barley and other plants, which cause damages in cereals by contamination in the field (El-Agroudy et al. 2016, Sklan et al. 2003). Trichothecene mycotoxins are classified into three groups by structural characteristics, T-2 toxin and HT-2 toxin are classified in group A (Bryden 2012).

Trichothecenes act on serotonin mediated neurons and induce anorexia and cause vomiting (Konjevic et al. 2004). In addition which cause inhibit of protein synthesis system by binding with the ribosomal 60S subunit, and effect appears notably in bone marrow, mucosal epithelia of digestive tract, that are regions of active cell division (Sahay 2003). In addition, they induce apoptosis in cells in the immune system, and stimulate in production of inflammatory cytokines (Speijers and Speijers 2004). The current study aimed at detecting the effectiveness of trichothecenes toxin (T2) in some physiological parameters in laboratory animals (Archer 1985). Aimed the study to reveal the role of genetic material and yeast in reducing the effectiveness of trichothecene (Boermans and Leung 2007).

RESULT AND DISCUSSION

The results showed a significant increase (P=0.05) in active the Aspartate transaminase enzyme when dosage by toxin (122 enzymatic units/L.), compared with controle group (102 units / liter), **Table 1**. While genetic material and yeast with toxin showed significantly reduced of toxin effectiveness, but it did the opposite, as it led to an increase in the activity of the enzyme compared control group. The results showed increase in activity of Aspartate transaminase enzyme in animal serum when dosage by toxin 8.9 enzymatic unit / L. and 8.5 enzymatic unit / L. for control group. The genetic material and yeast as adsorbents caused a reduction in the effect of trichothecenes on Alanine transaminase activity, thus restoring normal activity. Pointed (Priska 2004) to a significant increase in the activity of Alanine transaminase and Aspartate transaminase enzymes when fed the meat breeds with an AFB1 contaminated at concentration of 4.7 mg / kg. That the effect of trichothecenes in these enzymes may be caused by damage to the liver to lead to the decomposition of some cells and release the contents in the blood and the center of the presence of these enzymes in liver is naturally to increase the activity of these enzymes in the blood (Vilal et al. 1990). The results also of this experiment showed that the dosage of trichothecenes for laboratory animals led to a significant reduction at the level (0.05) in its active enzyme Alkaline phosphatase activity (35.5 enzyme alone/L.), compared with control group (37.1 U/L.) (**Table 1**), this is agreed with reached finding (Engler et al. 2000), of dosage the rabbits with trichothecenes at concentration of 0.5 mg/kg for 21-day period led to a decrease in Alkaline phosphatase activity. The results showed that added of genetic material and yeast, caused in a significant decrease at (P=0.05) in enzyme activity, compared with dosage of toxin alone or control group.

This indicate that these factors possess inhibitory effect of toxin on the Alkaline phosphatase enzyme, it may be due to the association of toxin with genetic material or with yeast walls. Trichothecene caused of effectively reduced the Alkaline phosphatase with presence of toxin may be due to the presence of effective groups in the toxin possess a link to the effective location of the enzyme caused thereby reducing or discouraging its effectiveness (Yoshizawa 1991).

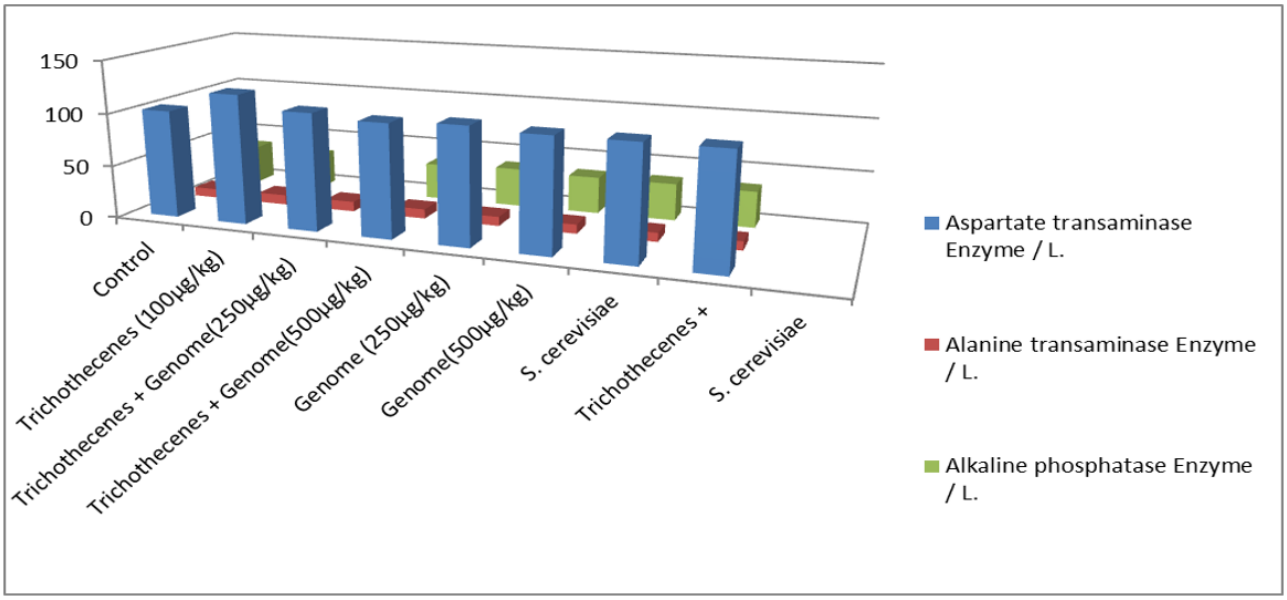

Fig. 1. The role of genetic material and yeast in reducing the effect of trichothecenes on the activity of Aspartate transaminase, Alanine transaminase and Alkaline phosphatase

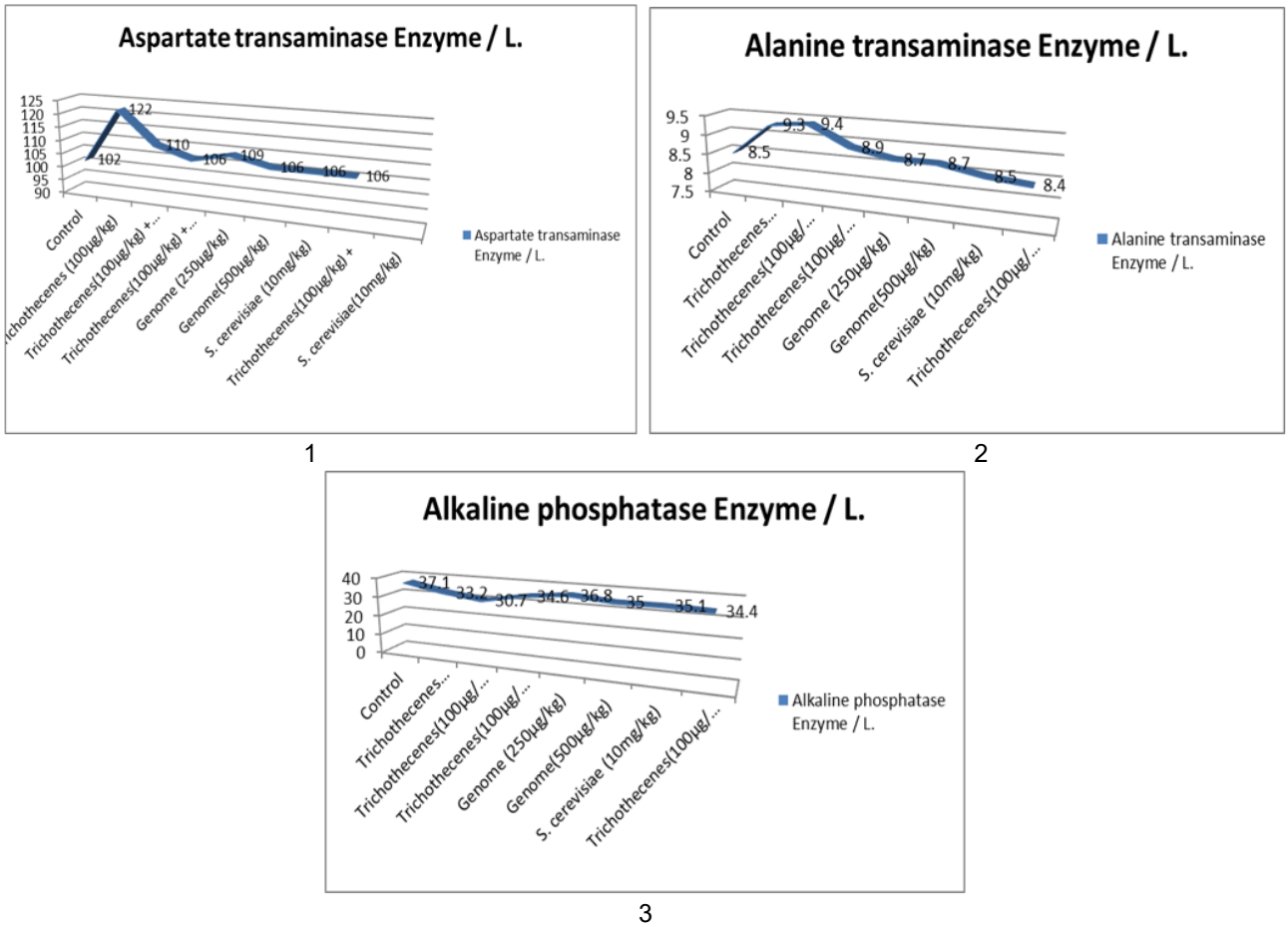

Fig. 2. The role of genetic material and yeast in reducing trichothecenes on the parameters (1,2,3)

Table 2. The role of genetic material and yeast in reducing the effect of trichothecenes on the activity of Total protein, Urecic acid, Glucose and Cholesterol

Treatments	Total protein mg / 100 ml	Urecic acid mg/ 100 ml	Glucose mg /100 ml	Cholesterol mg / 100 ml
Control	5.9	4.3	184	197
Trichothecenes (100µg/kg)	4.7	5.2	172	205
Trichothecenes(100µg/kg) + Genome(250µg/kg)	5	5	189	211
Trichothecenes(100µg/kg) + Genome(500µg/kg)	5.3	4.9	195	200
Genome (250µg/kg)	5.6	4.5	180	202
Genome(500µg/kg)	5.4	4.6	187	209
***S. cerevisiae* (10mg/kg)**	5.7	4.4	181	201
Trichothecenes(100µg/kg) + *S. cerevisiae*(10mg/kg)	5.3	4.8	182	202
LSD(P=0.05)	0.6	0.5	2.8	2.5

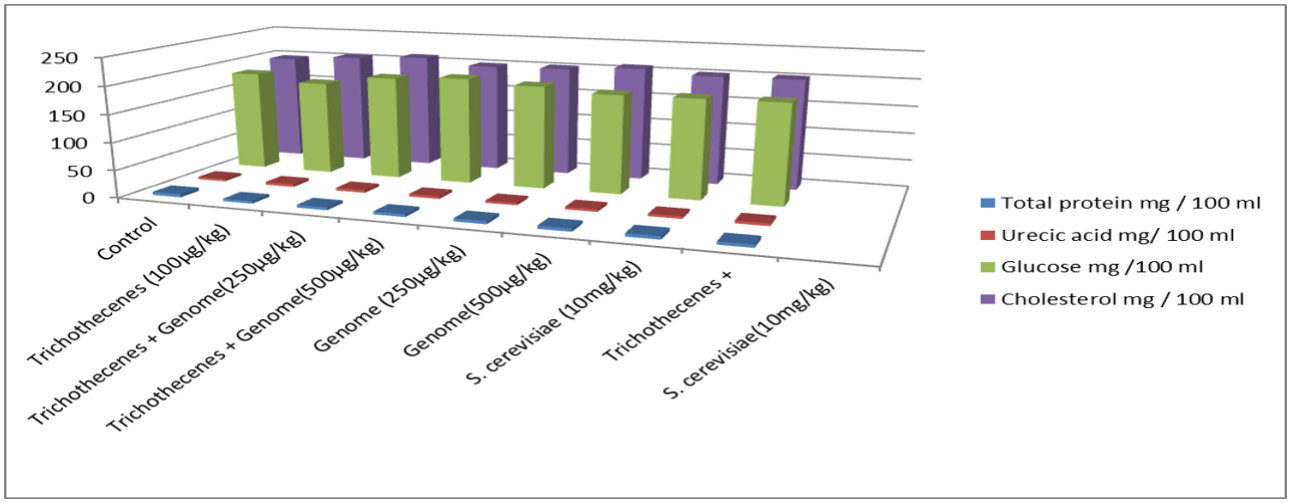

Fig. 3. The role of genetic material and yeast in reducing the effect of trichothecenes on the activity of Total protein, Urecic acid, Glucose and Cholesterol

Effect of Adding Genetic Material and Yeast in Reducing the Effectiveness of Trichothecenes in Some Biochemical Properties of Laboratory Animals

The results showed that the reason for the decrease in total protein in the blood may be due to the presence of toxin, that the toxin effects on the processes that lead to the manufacture of proteins in the cell, may affect in the cloning of DNA into mRNA or may effect on some of the substances that play a role in translating mRNA into ribosomes and the factors involved in initiating the process of protein synthesis (Angela and Wolfgang 2005). In both cases, the protein produced in the cells is reduced and thus reduced in the blood (Hazim and Walli 2015). Pointed out (Bennet and Klich 2003) that the trichothecene has an inhibitory effect on the synthesis of protein and nucleic acids through its association with ribosomal peptidyl transferase (Alvareza et al. 2004). The dosage of trichothecene with the genetic material and yeast, has caused a significant increase in the concentration of the total protein in the blood and this is due, as already pointed out to the role of these factors in the toxicity of trichothecene which leads to blocking its effect (Niyo et al. 1988). Also the result showed that the dosage of trichothecene has significantly increased the concentration of uric acid in blood (5.2 mg / 100 ml) compared with control group 4.3 mg / 100 ml, genetic material and yeast did not significantly reduce the concentration of uric acid (**Table 2**).

While the results showed that dosage of trichothecenes a significant decrease in blood glucose concentration (172 mg / 100 ml) compared with control group (184 mg / 100 ml) , and by used genetic material and yeast caused significant increase in the concentration of blood glucose compared with used of toxin alone. Glucose concentration ranges in animals with dosage of toxin with added of genetic material (189, 195 mg / 100 ml) respectively for two concentrations (250, 500 µg/kg) and yeast (182 mg / 100 ml) respectively. These results are agreed with what pointed (Perkowski and Basinski 2002), of that trichothecene generally lead to reduced blood sugar (Robledo et al. 2002). when give of trichothecene to animals caused an increase in concentration of cholesterol in the blood, but it is not significant if the concentration was 205 mg / 100 ml with toxin compared with control group 197 mg / 100 ml. genetic material and yeast caused in remove reduce effect of toxin and returned to normal. The results showed (**Table 2**) that the trichothecene caused a significant reduction in the total protein concentration in the blood, where the concentration was 4.7 mg / 100 ml with the presence of toxin compared with control group 5.9 mg / 100 ml. The addition of genetic material or *S.*

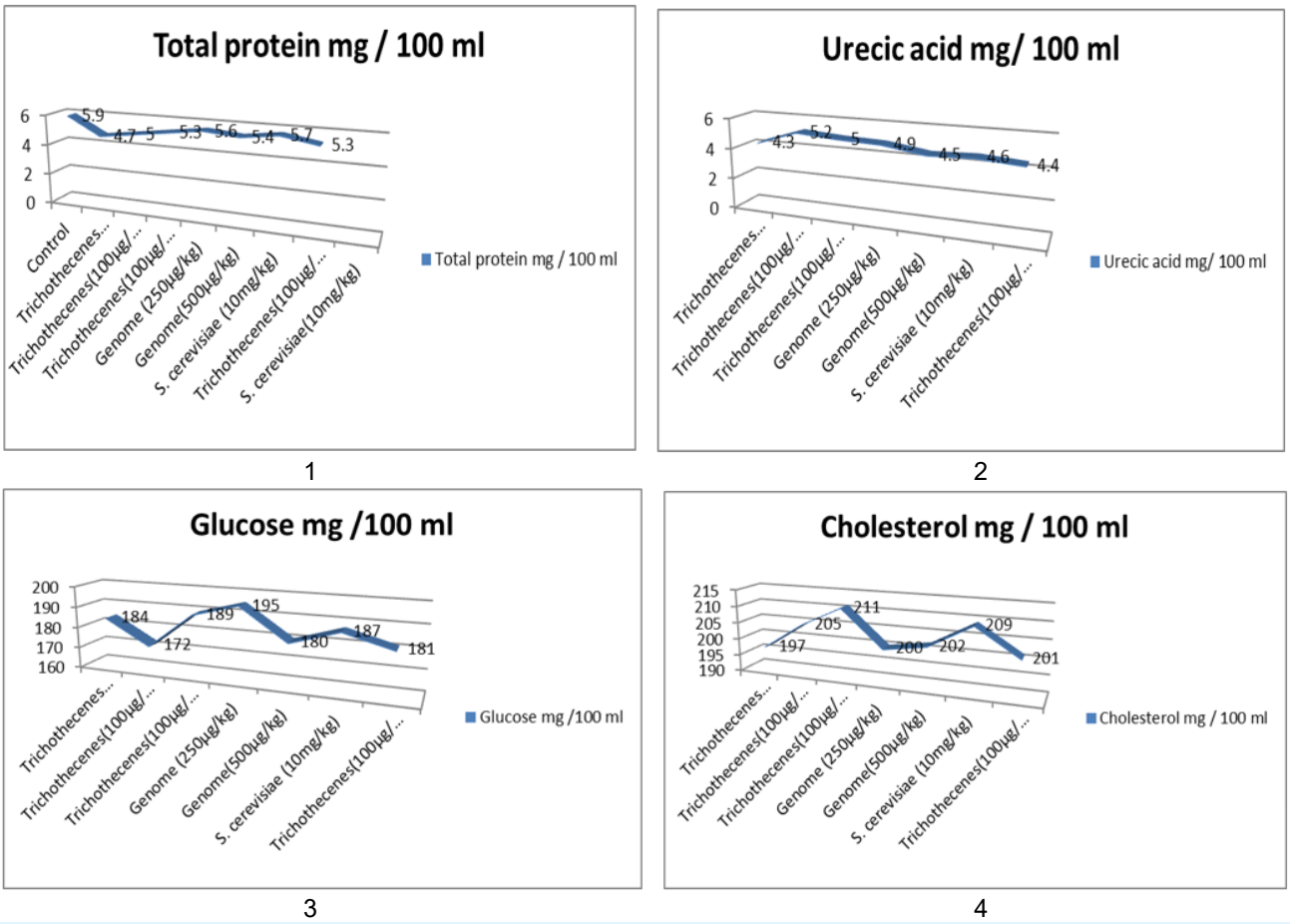

Fig. 4. The role of genetic material and yeast in reducing trichothecenes on the parameters (1, 2, 3, 4)

cerevisiae with trichothecene each one individually, cause in a significant increase in concentration of total protein in the blood **Table 2**, compared with control group 5.9 mg/100ml.

It is noted that the dosage of trichothecene has caused a reduction in the concentration of glucose and total protein in the blood , and that the low concentration of glucose in the blood may be due to the fact that the toxin has caused an increase in physiological stress and metabolic processes of the body and these processes need to energy and the fact that sugar is the best and easiest compound to release energy was consumed by the animal for this purpose and thus reduced blood concentration (Schollenberger et al. 2002). It has been pointed out to the fact that fungal toxins generally cause a reduction in the amount of sugar in the blood (Smith et al. 1994).The results of this study were agreed with the results of other study to other researchers in efficiency of yeast in reducing the effectiveness of toxin (WHO 1991). While the use of genetic material was for the first time, which supports the conclusion that these supplements should be added to animal food to prevent the hazard of toxins.

MATERIAL AND METHODS

Experiment Animals

The experiment was conducted in the building of the Environment Unit, University of AL-Qadisiayah. Swiss laboratory mice were obtained from the Institute of Fertility and Infertility / Medicine City about one month ago, weighing between 20-30 g. The animals divided to eight groups. The dose of trichothecenes, *genome and Saccharomyces cerevisiae* have been given per 24 hours for a month, after the end of experimental duration and after 2 days of test end, it had killed all the rats by drawing blood from stab the heart (Schollenberger et al. 2002).

Group Animals

Group 1: includes 5 mice as control group.

Group 2: includes 5 mice given solvent of DMSO.

Group 3: includes 5 mice for dose 100 µg / kg from trichothecenes.

Group 4: includes 5 mice for dose 100 µg / kg from trichothecenes and 500 µg / kg from genome.

Group 5: includes 5 mice for dose 100 µg / kg from trichothecenes and 250 µg / kg from genome.

Group 6: includes 5 mice for dose 500 µg / kg from genome.

Group 7: includes 5 mice for dose 250 µg/kg from genome.

Group 8: includes 5 mice for dose 100 µg/kg from trichothecenes and 10 mg/kg from *S. cerevisiae*.

Group 9: includes 5 mice for dose 10 mg/kg from *S. cerevisiae*.

Preparation of Trichothecenes Concentration

Trichothecenes concentration was 100 µg/kg, where used dimethel sulfoxide (DMSO) as solvent to trichothecenes.

Preparation of Genome Concentration

Genome concentration were (250,500) µg/kg, where used dimethel sulfoxide (DMSO) as solvent with trichothecenes.

Preparation of *Saccharomyces cerevisiae* Concentration

S. cerevisiae concentration was (10) mg/kg, where used dimethel sulfoxide (DMSO) as solvent with trichothecenes.

Biochemical Examinations

Physiological tests were based on the company's instructions in their implementation (Pioneer kit).

Culture Media Used in this Study

Sabouraud Dextrose Agar (SDA)

Suspend 65 gm of SDA powder in a liter of distilled water and add 1 ml of 0.5% chloramphenical solution to each 100 ml of SDA to prevent bacterial growth. Mix thoroughly and adjust pH at 5.6±0.2 then heat with frequent agitation then sterilize by autoclaving at 121°C under 15 pound/ inch^2 for 15 minutes .After that cooled sterile media to about 50 °C and poured into plates (Hazim and Walli 2015).

Collection of Samples

Fifty samples from animal food (each sample weighed about 100gm) have been collected from Al-Diwania markets.

Fungal Diagnosis

The diagnosis of different fungal growth was carried out according to Schollenberger et al. (2002). The identification of the fungus by taken small piece from the fungal growth that mixed with 1 drop of lactophenol cotton blue stain and covered with cover slip and examined under the microscope by using 40X lens (Robledo et al. 2002).

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