

Effects of acetaminophen as a toxic drug on the liver function in poultry

Abstract

Context: The most prevalent diseases in country poultry industry that will infect broiler chickens epidemic; be disrupts the liver function. The liver is an important diagnostic organ in broilers is raised and on the other hand, Because of speed up the metabolism in broiler chickens in order to increase production and efficiency, Hepatic Cytochrome p-450 system, acetaminophen is metabolizes to the one potentially toxic metabolite called N-acetyl- Parabanzoquin-imin (NAPQI) By Conjugation with glutathione, mercaptorick acid be converted that the acid is soluble in water and is excreted through the kidneys and is largely harmless. But in high doses, with high production of toxic metabolites, Glutathione reserves available the finished and therefore, Context, provided for necrosis, and the continuation of this process Can be seen Laboratory evidence of liver cell necrosis (Increased levels of serum transaminases) and liver dysfunction. The liver is an important center involved in the metabolism, and the important medium of the gastrointestinal tract and the blood has a special importance and any Liver damage in broiler chickens in the first step, on the nutrition and consequently will affect on the efficiency of chickens.

Methods: 40 chicks were randomly were divided to two treatments and 20 replications for each treatment. Treatments included: control group, and poisoned group. And at the end of the period of investigation, enzymes that the liver function indicators (AST, ALT, ALP) were determined and examined.

Acetaminophen medication manufactured by the pharmaceutical Aria (Tehran, Iran) with a dose 650 mg per kg of live weight of chickens were used for 7 days.

Results: With a high level of assurance can be said that the use of acetaminophen drug at a dose was used thereby increasing is All three indexes liver enzymes (AST, ALT and ALP), because the differences mentioned significant at less than 0/01.

Conclusion: Drug acetaminophen at doses of 650mg per kg body weight of broiler chickens for one week, it can establish liver toxicity and in research as an inducer drug of poisoning In order to research on other diseases that impair the function of the liver Such as cites disease, can be used.

Keywords: liver function enzymes, broiler chickens, acetaminophen, poisoned

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Introduction

The most prevalent diseases in country poultry industry that will infect broiler chickens epidemic; be disrupts the liver function. The liver is an important diagnostic organ in broilers is raised and on the other hand, Because of speed up the metabolism in broiler chickens in order to increase production and efficiency, The liver is an important center involved in the metabolism, and the important medium of the gastrointestinal tract and the blood has a special importance, And any Liver damage in broiler chickens in the first step, On the nutrition and consequently will affect on the efficiency of chickens.¹

And on the other hand, commonly used antibiotics in farms, like other drugs cause unpleasant side effects, and in the high doses, the body of poultry, a chronic toxic reaction, created, as it is called Aplastic Anemia, and to cause severe liver toxicity with the some drugs, such as neomycin and gentamicin, cause of sudden death in poultry.² As well as antibiotics available in veterinary pharmacies that are part of the of the amino glycosides family; with the creation of apoptosis or programmed cell death and most importantly, the creation of free radicals in tissues such as the liver and kidneys have a negative impact And the impact of self-poisoning some drugs used in the poultry industry, such as gentamicin has been proven.³

Hepatic Cytochrome p-450 system, acetaminophen is metabolizes to the one potentially toxic metabolite called N-acetyl- Parabanzoquin-imin (NAPQI) By Conjugation with glutathione, mercaptorick acid be converted that the acid is soluble in water and is excreted through the kidneys and is largely harmless. But in high doses, with high production of toxic metabolites, Glutathione reserves available the finished and therefore, Context, provided for necrosis, and the continuation of this process Can be seen Laboratory evidence of liver cell necrosis (Increased levels of serum transaminases) and liver dysfunction.

One of the most important tests to evaluate liver function is indicators enzymes of liver function.⁴ Increased levels of AST in serum, indicates liver damage and also ALT, which catalyzes the conversion alanine to private and glutamate, is more specific For liver and more appropriate parameters for detecting liver damage, and the other side, Serum ALP is associated with liver cell function.

The liver as largest glands of the gastrointestinal tract receives efferent Blood of intestine. And therefore: All material is absorbed in the intestines of toxins and exogenous entered the liver. Poultry liver is as a detoxifier member, that, a significant portion of its detoxification activities is relevant to neutralize the toxins produced by harmful microbes.⁵

The goal of this study was to investigate the effect of acetaminophen on poultry liver function due to toxic doses of acetaminophen.

Method

We are in the main hall of 10,000 breeding chickens kept for one day and randomly (male and female) and 40 chickens choose to do the rest of the steps we've taken to the cage.

Acetaminophen medication manufactured by the pharmaceutical Aria (Tehran, Iran) with a dose 650 mg per kg of live weight of chickens were used for 7 days (on the basis of other studies).⁶

Blood parameters

Almost 6 ml of blood from each chicken and in a simple test tube was poured and the tube with cover was closed. Test tubes were labeled with the extract name and number chicken. Test tubes in a container with a temperature of about 2-4° C storage and transferred to the laboratory and then for 10 minutes at a speed of 3000 rpm was used in centrifuges to separate serum. After separation of the serum, each of the serum samples were transferred to a special test tubes and serum samples isolated were stored in the freezer at 20 degrees Celsius below zero until the measured blood parameters and the parameters of blood serum was measured Pars Azmoun kits by using the spectrophotometer Model RA1000.

Evaluation of liver function

Important for the homeostasis of the liver is one of the major clinical diagnoses. One of the most important tests to liver function is evaluation of liver enzymes.

When hepatocytes die by necrotic response to inflammation or infection, Enzymes are released such as alanine amino transferase (ALT) and aspartate amino transferase (AST). These enzymes can be measured easily and increase their serum shows the liver damage.

Enzymes alanine amino transferase (ALT)

This enzyme called glutamate pyruvate transaminase (GPT) was known, naturally found in blood and spinal fluid but there is no in the urine. Level of ALT enzymes in the cytoplasm of hepatocytes was greater than the extracellular fluid and liver damage may leave the cell and serum concentrations increase it.¹

The enzyme aspartate aminotransferase (AST):

This enzyme also was called serum glutamic oxaloacetic transaminase. Serum AST levels may be increased in liver disease all animal species. This enzyme may be increased in acute hepatitis and chronic liver disease and as well as in heart disease and loss of muscle movement also increased.¹

The enzyme alkaline phosphatase (ALP):

This enzyme is the Serum enzymes that rise in liver and bone disease. Serum alkaline phosphatase levels are naturally in young people is higher the elderly. In adults, the alkaline phosphatase is mainly comes from liver. Whereas, in the growing children, the source most important is the bone cells and also Increasing the amount of this enzyme in the Hepatobiliary tract disease, the development of liver lesions, Lesions resulting from bone osteoblasts, at the time of process of bone repair, Lesions of the gastrointestinal tract such as malabsorption, Necrosis of the lungs and kidneys, and even the splenic infarction and hyperthyroidism.¹

Materials and methods

Independent variable with two levels of medicinal supplements (healthy controls and poisoned) and the dependent variable is the blood parameters (AST, ALT, ALP) and at a continuous scale was measured.

In this study, the experimental and control groups were equivalent at random. The experimental group was influenced by Acetaminophen and the control group was kept away from the effect of this drug. And at the end, the difference between blood parameters tested at the groups (Table 1).

Table 1 Partitioning

The Group	The Group Name	The Number of chicks	Dosage of Acetaminophen
1	The Control Group	20	0
2	Poisoning Group	20	650mg/kg

Table 2 Mean value and standard deviation of both groups (healthy and poisoned)

Variable	Poisoned group		Control Group	
	Standard deviation	Average	Standard deviation	Average
AST	28/07	295/8	38/83	244/4
ALT	Apr-41	31/1	6-Mar	24
ALP	1009/18	5203	516/21	3104/5

Statistical analysis of data

This study, the experimental (intervention) and to the implementation of the factorial design was used and data were analyzed by ANOVA. One-way analysis of variance (ANOVA) was used in some cases to an independent variable and the dependent variable there is little class.

Thus, to assess the mean difference of two or more groups of ANOVA used.

The two groups (control group without medication and group that were under medication) were compared with the results below.

According to Table 2, at control group that under the influence of medication (acetaminophen), three liver enzyme levels was more than the control group that did not use the drug. Based on the results of the comparison between the averages of which is reflected in Table 3, the differences are significant at less than 0/01. In other words, it can be concluded with high confidence level that the use of fixed-dose drug used acetaminophen poisoning caused as a result of elevated liver enzymes AST, ALT and ALP is have been.⁷⁻⁹

Table 3 t-test in order to evaluate the effect of acetaminophen on elevated liver enzymes

Liver enzymes	t-Test	Degrees of freedom	Mean difference	Degrees of freedom
AST	-0.007653061	18	-12.75	0/003
ALT	-0.004143646	18	-0.857142857	0/002
ALP	-0.008561644	18	-419.6	0/000

Discussion

Given those significant differences in levels of less than 0/01. That is to say with high confidence can be concluded that use of the drug acetaminophen, the dose used to enhance all three enzymes indicator of liver function (AST, ALT and ALP) and because liver enzymes nearly two-fold increase, it can be concluded that at a dose of 650 mg of acetaminophen can cause liver toxicity in broilers (Figure 1-3).

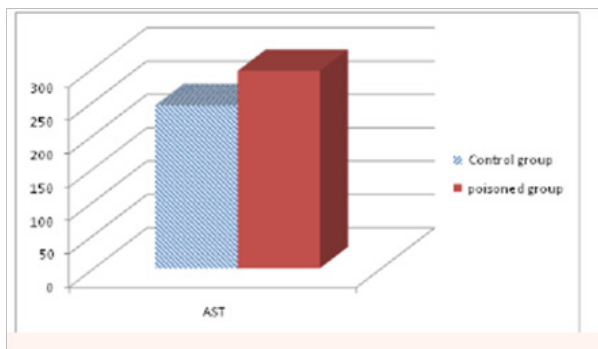


Figure 1 compares the average liver enzyme AST in both control and poisoned.

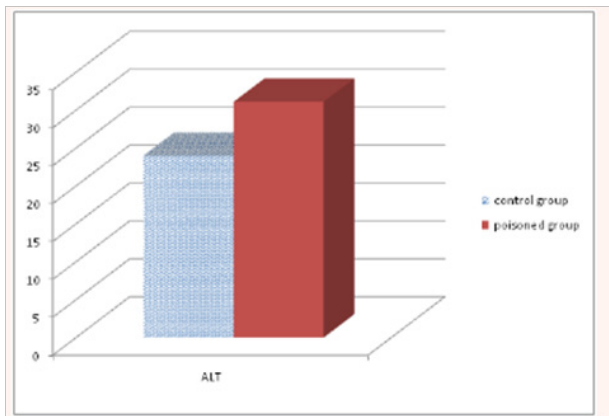


Figure 2 Compares the average liver enzyme ALT in both control and poisoned.

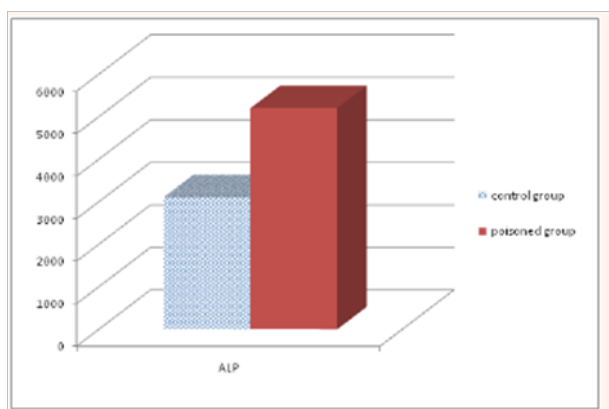


Figure 3 Compares the average liver enzyme ALP in both control and poisoned.

Conclusion

Acetaminophen medication given at a dose of 650mg, an increase in liver enzymes Performance Index (AST, ALT and ALP) and can cause liver toxicity in broilers. And research that needs to toxic materials at the lowest cost and highest efficiency in poultry is to induce toxicity in doses of acetaminophen can be specified in the scheme (650mg per kg) can be used.

Conflicts of Interest

The authors declare no conflict of interest

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