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Research Article

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The effects of milk thistle's extract on blood lipids in broilers under heat stress

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ABSTRACT

Current study was carried out to investigate the effects of adding milk thistle's extract to diet on blood lipids of broilers under heat stress. 350 one day old broilers from Ross-308 race were divided randomly into five groups and were studied in a completely randomized design with five replications and 14 broilers in each replication. Treatments were control, 5, 10, 15, and 20 ml/lit of aquatic extract in drinking water. To enforce the heat stress, temperature increased to 35-37 $^{\circ}C$ eight hours a day. At 22 and 42 days two broilers were selected from each replication randomly and blood lipids were measured. According to results, the extract reduced LDL at day 22 but didn't affect cholesterol, triglyceride and HDL. At day 42, triglycerides of 5, 10 and 20 ml groups were increased significantly in proportion to control group. LDL was also increased significantly in 5 and 20 ml groups but cholesterol and HDL were not affected. In general, using milk thistle can affect blood lipids and adjust some blood lipid parameters under heat stress dose dependently.

Keywords: milk thistle extract, heat stress, liver enzymes, blood lipids, broilers

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INTRODUCTION

Plants have been really important for maintaining health and improving the quality of human life. This is mainly because of their extracts and active compounds which are known as natural, harmless compounds by people [1]. Many researches have reported benefits of some plant species and their extracts in reducing blood cholesterol, increasing palatability and strengthening the immune system [2]. The growth of the poultry industry by increasing the genetic potential of broilers has led to birds' susceptibility to breeding condition. Since most of Iran regions are dry and warm, heat stress in salons especially in summer is inevitable. Heat stress changes hormone system and causes reduction in body resistance against pathogens [3].

Hen and turkey don't have sweating glands. Lungs and air sacs act as the evaporative cooling [4]. In the time of heat stress, birds use respiratory cooler system and by irregular increasing of temperature, food consumption is reduced to decrease the temperature load of metabolism [3]. Fatality and undesired performance of heat stress is very expensive for all poultry industry parts. By starting panting, physiological changes and decreasing food efficiency, fertility, production and shell quality will be started. Stress, especially heat stress which affects metabolism of energy and minerals and interfere immune system cause reduction in immunity responses of broilers against some stressful factors (and pathogens) such as alkalosis [5].

Nowadays, consumers are more aware of harmful effects of residual antibiotics in foods and tend to use healthy meat free of antibiotics. Poultry breeders tend also to use herbal extracts in order to attract consumers. Herbal extract are originated from leaves, roots, tubers, or fruits of medicinal or spice plants. Broilers diet has various components including additives which are really effective in spite of their low amounts [6]. Heat stress causes increase in

cholesterol of plasma, increased excretion of minerals, and reduced stability of calcium, iron, potassium, sodium and zinc [7].

Milk thistle (*Silybum marianum*) has been used for 2000 years as medication of many diseases especially liver diseases. Main active compounds of milk thistle are silibinin (silybin), sily Christine, and silydianin which are generally known as silymarin [8]. Silymarin is active in reducing total cholesterol and high densities of HDL and LDL. Biliary cholesterol and phospholipids are also reduced by silymarin. In view of the effects of milk thistle extract on blood lipids this study was carried out to investigate the effects of milk thistle extract on liver enzymes and blood lipids of broilers under heat stress [7]. Medicinal effects of milk thistle seeds are because of properties such as anti-oxidants and liver protection. The effects of silymarin in stimulating second phase of mice detoxification have been reported in various researches. This medication in 100-200 mg/kg dose increased the activity of glutathione transferase in liver, lung, intestine and skin cells for three days [9].

Current study was carried out to investigate the effects of milk thistle's extract on blood lipids of broilers including cholesterol, triglycerides, HDL and LDL under heat stress.

EXPERIMENTAL SECTION

The study was carried out in a commercial poultry unit in summer 2014. Salon was washed with high-pressure water was disinfected with formalin gas. 25 cumulative cages (1.2 $_{\times}$1 m) were used in this study. Chickens were weighed and divided in various weight ranges. After that, 350 one day old broilers were divided into 25 groups (14 members in each group) and every five cages were considered for each treatment. Samples had free access to food and water during the study. 24 hours lighting system was used. Temperature was 32-34 $^{\circ}C$ at first (entrance of broilers) which was increased to 35-37 $^{\circ}C$ for enforcing the heat stress. To prevent adaptation, temperature was about 32-34 $^{\circ}C$ at nights.

Treatments were:
1- Control group: corn-soybean based diet
2- Base diet plus aquatic extract in 5 ml/lit dose
3- Base diet plus aquatic extract in 10 ml/lit dose
4- Base diet plus aquatic extract in 15 ml/lit dose
5- Base diet plus aquatic extract in 20 ml/lit dose

Two broilers were selected at 22nd day and blood was taken from wing vein. Serum was separated using centrifuge machine and cholesterol, triglycerides, LDL and HDL were measured in laboratory.

At 42nd day also, blood samples were taken from the same broilers and blood lipids were measured.

Obtained data were analyzed using SAS program in a completely randomized design with five replications and 14 broilers in each replication.

RESULTS AND DISCUSSION

- Blood lipids at 22nd day

Among blood lipids (cholesterol, triglyceride, LDL, and HDL) only LDL of 10 and 15 ml/lit groups showed significant reduction in proportion to control group (Fig.1).

Triglyceride was increased non-significantly in 15 ml/ lit group.

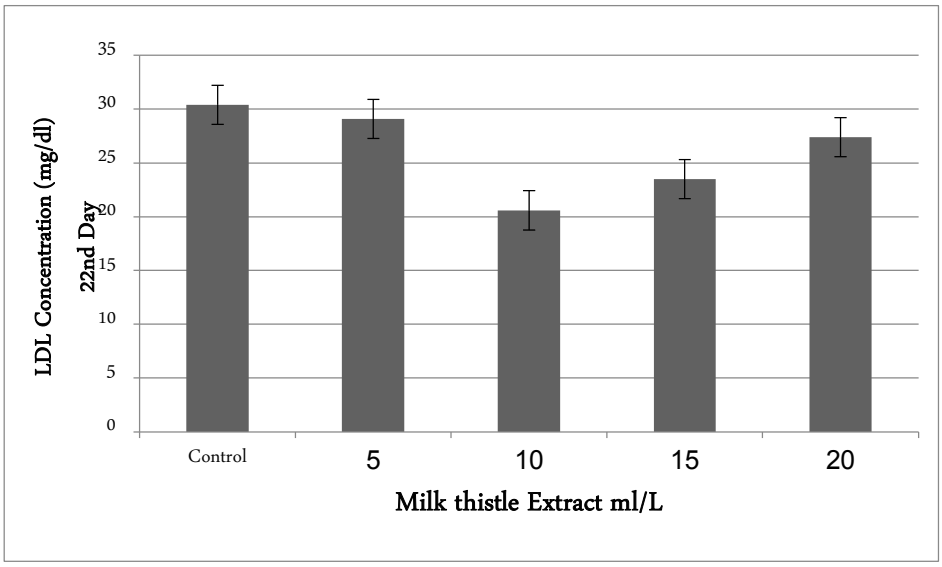

Figure1. Mean comparison of LDL concentration at 22nd day

- Blood lipids at 42nd day

At 42nd day, triglyceride was significantly affected by treatments. Triglyceride amount of 5 and 20 ml/lit groups were significantly more than control group (Fig.2).

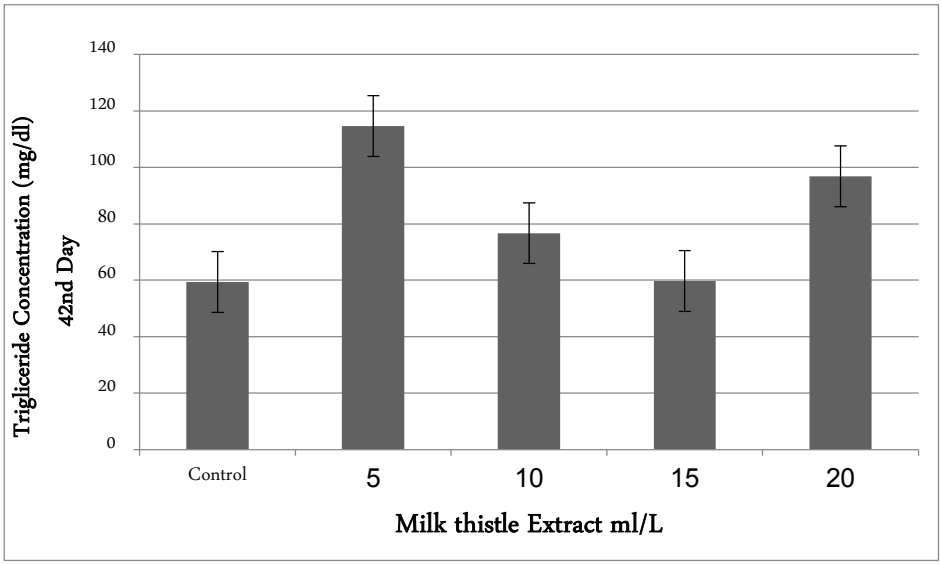

Figure 2. Mean comparison of triglyceride concentration at 42nd day

LDL amount was also significantly higher in these groups in proportion to control group (Fig.3).

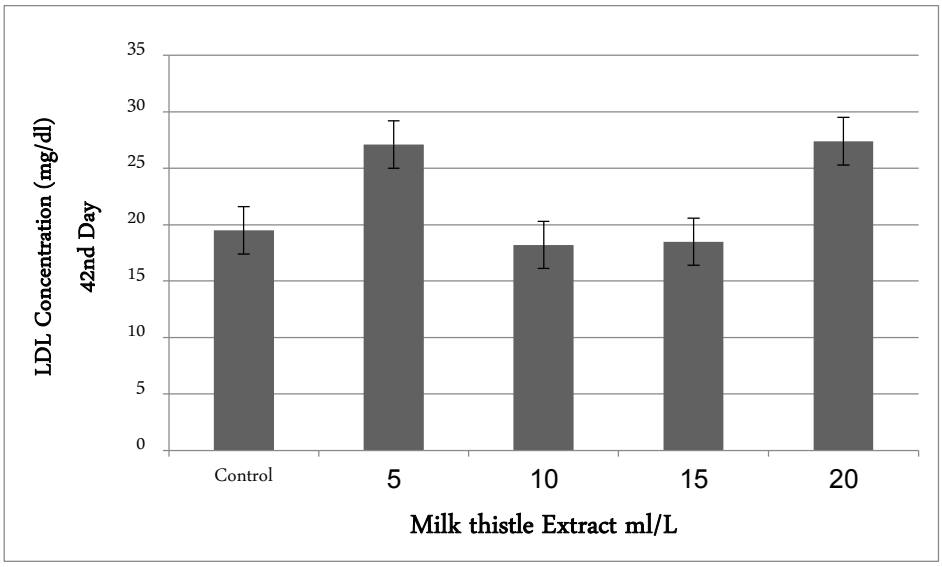

Figure3. Mean comparison of LDL concentration at 42nd day

Researches have shown that milk thistle derivate flavonoids are able to reduce intestine absorption of cholesterol [10]. Studies indicate that the role of secondary metabolites of plants (thymol, carvacrol, and silibinin) in reducing blood lipids is probably because of preventing activity of liver enzymes in cholesterol synthesis and fatty acids. Pure compounds of essential oils and extracts control the activity of 3-hydroxy-3-methylglutaryl coenzyme A (HMG-COA) liver reductase [11], which is a key enzyme in cholesterol synthesis. According to Case et al [12], report in 1995, five percent control of HMG- COA reductase reduced serum cholesterol of poultry to 2%.

Balouchnejad et al. (2008) announced that silymarin reduced the blood glucose by affecting Kinetics of glucose-6-phosphatase and controlling gluconeogenesis [8]. This was observed in broilers non-significantly by adding 200 mg of silymarin. Therefore, using 10 ml/lit of aquatic extract will reduce LDL which must be considered. Balouchnejad et al. showed that long term intraperitoneal injection of silymarin in experimental model of rat's diabetes, plus obvious hypoglycemic effects caused desired useful changes in blood lipids, activity of SOD antioxidant enzyme and MDA level.

Researcher reported that adding 100 mg of silymarin increased blood HDL not significantly and 200 mg dose decreased glucose, cholesterol, triglyceride, LDL and increased HDL, but not significantly [7]. Using milky thistle extract can reduce the heat stress effects on blood LDL at 22nd day dose dependently but didn't affect cholesterol, triglyceride, and HDL. At day 42, triglycerides of 5, 10 and 20 ml groups were increased significantly in proportion to control group. LDL was also increased significantly in 5 and 20 ml groups but cholesterol and HDL were not affected. According to results, milky thistle extract can affect blood lipids and adjust some lipid parameters of blood under heat stress, dose dependently.

CONCLUSION

In general, using milk thistle can affect blood lipids and adjust some blood lipid parameters under heat stress dose dependently.

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