

Effect of Garlic Juice on Liver Function in Layers Chicken

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Abstract: This investigation was designed to determine the effect of garlic juice on liver function of layers for 15 days. Blood samples were collected from 10 animals via jugular vein before garlic juice administration to check (total bilirubin, total protein, total cholesterol, glucose, GOT and GPT enzymes because it act as liver function parameters). Animals received garlic juice in dose (0.02ml/day) for 15 days and blood samples were collected to check same parameters which mentioned above and comprised with before administration. This study revealed significant decrease in total bilirubin and total protein on the other hand significant increase in glucose, cholesterol and GOT beside un significant increase in GPT as compare to before administration. These results can be interpreted that garlic juice lead to increase liver excretory through decrease its serum concentration in addition increase egg quality through decrease serum total protein and increase serum total cholesterol (i.e egg contain less cholesterol and high protein). On the other hand garlic juice lead to mild liver destruction through increase in GPT enzyme due to excessive biochemical process like lipolysis, gluconeogenesis and glycogenolysis which revealed by increase in glucose and cholesterol concentration.

Keywords: garlic juice, liver function, layer chicken

1. Introduction

One of the most active research areas in recent years has focused on finding new feed additives that improving performance on animal either carcass and egg quality(1). variety of herbal supplement including garlic have been widely used to maintain and improve health of human (2). it has long been considered that garlic has several beneficial effect for human and animal exhibiting antimicrobial, antioxidant, antiviral ,antifungal, anti parasitical and has positive effect on immune and digestive system(3). previous researches suggested that those functions are mainly attributed to the bioactive compound such as allin, diallylsulphate and allicin. However, research about effect of garlic juice on liver performance in layer chicken are insufficient with quit discrepancy ,therefore the objective of this study was to evaluate the effect of garlic juice on liver performance and to investigated that the outcome of this study will be used to make decision as to whether or not garlic can be used in layer chicken.

Garlic (*Allium sativum*) *Common Names:* Stinking Rose, Poor Man's Treacle

Plant Parts: bulb

Active Compounds: Garlic contains more than 200 chemical compounds. Some of its more important ones include: volatile oil with sulphur-containing compounds: (allicin, alliin, and ajoene), and enzymes: (allinase, peroxidase and myrosinase).

Allicin is what gives garlic its antibiotic properties and is responsible for its strong odor. Ajoene contributes to the anticoagulant action of garlic. Garlic also contains citral, geraniol, linalool, Aphellandrene and B phellandrene. The allyl contained in garlic is also found in several members of the onion family and is considered a very valuable therapeutic compound.(4).

Pharmacology: The allicins contained in garlic have a fibrinolytic activity which reduces platelet aggregation by inhibiting prostaglandin E2. *Allivium sativum* has also exerted some effect on glucose tolerance for both hypo- and hyperglycemia by reducing insulin requirements to control blood sugar. The compounds contained in garlic have also demonstrated their ability to lower total serum cholesterol and triglyceride levels while elevating HDL levels. LDL synthesis is suppressed by garlic. Garlic allicins have also acted as a larvacide and bacteriostat, active against gram-positive or gram-negative microorganisms. In addition, the compounds can destroy certain fungi such as *Candida albicans*. Several other microbes are effected by garlic, including some viruses. Most researchers agree that the sulfur contain compounds of garlic, especially allicin, alliin, cy-croalliin, and diallyldisulphide are the most biochemically active. In addition, certain unidentified substances of garlic will probably emerge as other therapeutic agents.(5).

(*Note:* Before a bulb of garlic is crushed or chopped, it contains relatively few medically active compounds. Once it is cut, however, chemical reactions take place which create dozens of new compounds.)

Vitamin and Mineral Content: B-vitamins especially B-1, vitamin C, vitamin A, flavonoids, ascorbic acid, phosphorous, potassium, sulphur, selenium, calcium, magnesium, germanium, sodium, iron, manganese and trace iodine. Seventeen amino acids are found in garlic, including eight essential ones.(5)

Character: antibiotic, antihistamine, anticoagulant, expectorant, antibacterial, antiparasitic, alterative, diaphoretic, diuretic ,expectorant, stimulant, antispasmodic, promotes sweating, lowers blood sugar and blood cholesterol levels, lowers blood pressure.(4,5)

Body Systems Targeted: respiratory, cardiovascular, digestive, and nervous systems.

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Garlic is a hardy, perennial bulb which is native to the Mediterranean regions of Africa and Europe. Along with onions, leeks, chives and shallots, garlic is a member of the lily family. The botanical name for garlic, *Allium sativum* may have been derived from the celtic word *all* which refers to "pungent." The edible portion of the garlic plant grows underground and consists of a cloved bulb. Hippocrates believed that garlic could treat uterine cancer and Native Americans used it for stomach cancer. During the Bubonic Plague years in Europe, garlic was used to boost immunity against the infectious organism responsible for so many deaths.

Recently, medical research has focused on garlic's potential value in treating cardiovascular disorders and as an anti-cancer agent. This renewed interest in garlic has contributed to the development of the "Designer Foods Program" which is sponsored by the National Cancer Institute.³ This agency investigates foods that may be effective cancer preventatives. Garlic is one of those foods which may have profound cancer prevention potential.⁽⁶⁾

Liver: The liver is in the upper right part of the abdomen. The functions of the liver include: storing glycogen (fuel for the body) which is made from sugars; helping to process fats and proteins from digested food; making proteins that are essential for blood to clot (clotting factors); processing many medicines which you may take; helping to remove poisons and toxins from the body (7). The liver also makes bile. This is a greenish-yellow fluid that contains bile acids, bile pigments and waste products such as bilirubin. Liver cells pass bile into bile ducts inside the liver. The bile flows down these ducts into larger and larger ducts, eventually leading to the common bile duct. The gallbladder is like a 'cul-de-sac' reservoir of bile which comes off the common bile duct. After you eat, the gallbladder squeezes bile back into the common bile duct and down into the duodenum (the first part of the gut after the stomach). Bile in the gut helps to digest fats.⁽⁷⁾

2. Materials and Methods

Animals: a total number of 10 layer chicken were used in this investigation, they were fed ordinary pellet diet, the animals were housed in 4×3m² at college of veterinary medicine at temperature 23-25C° for 15 days, the light dark cycle were (12:12) hr and had free access to food and water . Prior the arrival of chicken the house was disinfected and chicken were weighted on arrival to obtain their initial weight 1400-1600gm for determination of dose.

Preparation of garlic juice: the bulb of garlic were cleaned and homogenized by blender, the juice 12ml from 500gram of garlic and the dosage calculated according to human dose.

Experimental design: ten layer chicken received (0.02ml/day) of garlic juice for 15 days orally by usage gavage needle.

Blood sampling were obtained via jugular vein puncture from each layer chicken before treatment and at day 15 of treatment by disposable syringe and put in without anti coagulant tubes. Samples were centrifuged at 3000rpm for

15 min and serum sample were stored in -20 C°, each supernatant serum was used for some biochemical liver function tests such as total bilirubin, total protein, total cholesterol, glucose , GOT and GPT enzyme.

All these estimations were carried out to before treatment samples and day 15 of treatment by using spectrophotometer and diagnostic kits.

Statistical analysis of data performed on T-test and regard as significant at level P<0.05(8).

3. Results and Discussion

Table: The effect of garlic juice on liver function in layer chicken.

Liver function tests	Pre treatment	Post treatment
Total bilirubin	5.467± 1.717 A	3.811±0.949 B
Total protein	7.01±1.052 A	1.05±0.173 B
Total cholesterol	64.1±7.5 B	78.0±4.8 A
Glucose	57.8±2.011 B	70.08±8.4 A
GOT	35.35±4.04 B	42.79±7.36 A
GPT	0.498±0.1 b	0.602±0.142 a

mean±SE

Capital letters denote significant differences p<0.05. Small letters denote non significant differences p>0.05. Statistical analysis T test

Values of total bilirubin, total protein, total cholesterol, glucose GOT and GPT are illustrated in table. Serum total bilirubin and total protein showed significant decrease while total cholesterol, glucose, GOT revealed significant increased as compared to pretreatment beside non significant increase GPT as compare to pretreatment.

The functional status of several organ, notably the liver can be evaluated by application of laboratory test to detect the presence of disease (9). in spite of complexities of liver function test utilize of select procedure may yield information that is of value clinically when a pathological condition affect the liver or biliry tract is present or suspected (9). All liver function test may be classified according to the type of hepatic function. Liver function test may categorized as follow;

1. Test depend primary on hepatic secretion and excretion, this experiment reveled significant decrease in serum total bilirubin: which is formerly referred to as hematoidin is yellow break dawn product of normal heme catabolism which formed in hemoglobin this may be interrupted that garlic juice lead to increase excretion of bilirubin with feces or with egg (10).

2. Liver function test based on specific biochemical function: the table also demonstrate decrease of total protein. The plasma protein occupy a central and dominant position in metabolize of protein because of their intimate relation to metabolism in the liver as well as their interaction with other tissue like female reproductive system of chicken (11) which they can derive essential amino acids from blood to be incorporated into process egg protein biosynthesis(12), so the reduction of plasma protein may be attributed largely to

that garlic can increase the ability of oviduct to supply itself by the essential element (probably by enhancing the transport mechanism from blood to egg that increase egg protein constituents).

Total cholesterol: this experiment result increase in serum total cholesterol at day 15 of treatment as compare to pretreatment. Cholesterol is different from triglycerides in its structure is sterol nucleus (degradation of fatty acid other than fatty acids) (13). Cholesterol is present in all tissue cells and the plasma membrane for their fluidity so the increase in its concentration may be result from that garlic decrease absorption of cholesterol from gastrointestinal tract and oviduct (mean egg contain little cholesterol) or due to the lipolysis effect of garlic on lipid tissues (14).

Glucose: in this investigation the glucose concentration increased significantly as compared to pre treatment. This result may be refer to that garlic may increase liver gluconeogenesis and glycogenolysis (15).

3. Liver enzyme activity:GOT or ALT the data pertaining to enzyme liver enzyme activity of treated animals as compared to pretreatment are depicted in table. Glutamic oxaloacetate transaminase this enzyme associated with cell necrosis of many different tissue in the body.pathosis involving either skeletal muscle or cardiac muscle and hepatic cell lead to escape large quantity of this enzyme into blood (16).

GPT or AST: Glutamic pyruvic transaminase: are of value in detected the extensive of liver disease as the enzyme is present in large quantity in the liver. (16) it is increased in serum when cellular degenerate or destructed occur in this organ, the elevated level of these enzyme may be due to that garlic lead to excessive liver biochemical activity like lipolysis, gluconeogenesis and glycogenolysis (17).

4. Conclusions

- 1) Garlic juice increase liver excretory function through decrease serum bilirubin concentration.
- 2) Garlic juice increase egg quality through increase and decrease in serum concentration of cholesterol and total protein respectively.
- 3) Garlic juice increase glucose concentration due to increase gluconeogenesis and glycogenolysis.
- 4) Increase in liver enzyme due to excessive liver biochemical function.

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