

**Research Article**

## **EFFECTS OF ZINGIBER OFFICINALE CONSUMPTION ON RENAL FUNCTION IN QUAIL**

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### **ABSTRACT**

Ginger (*Zingiber officinale*) is a plant of the Zingiberaceae family. Studies have shown that ginger extract has anti-oxidant, anti-inflammatory, anti-bacterial, anti-fungal, anti-microbial effect as well as immune system stimulant effects. Since ginger has different digesting effects and nutritional values, the effect of ginger powder feeding on some serum factors associated with renal function was evaluated in this study in order to determine the nutritional and medicinal effects of the plant.

30 male quail were divided randomly in six groups with 5 quail in any of which as follows: the control group or group A (fed without powdered ginger), treatment group B (fed with ginger powder 0.5 kg per ton of diet), treatment group C (fed with ginger powder at a dose of 1 kg per ton of diet), treatment group D (fed with ginger powder at a dose of 1.5 kg per ton of diet), and treatment group E (fed with ginger powder at a dose of 2 kg per ton diet), treatment group F (2.5 kg per ton of diet).

The birds were fed with the specified diets for one month then blood samples were taken at the end of the period to measure serum factors of total protein, albumin, uric acid, calcium, phosphorus. The obtained results were statistically analyzed using unilateral ANOVA and Tukey tests

No significant difference was observed about examined factors in this study so it can be concluded that the use of ginger powder in poultry nutrition, especially quail, at doses of 0.5 to 2.5 kg per ton of diet has no adverse effect on renal function.

**Keywords:** *Ginger, Quail, Renal Function*

### **INTRODUCTION**

Ginger is a plant of the Zingiberaceae family which is common in many parts of the world as well as a part of nutrition program. The rhizome of ginger has a spicy taste which is used for food dedicating (Arkan *et al.*, 2012; Herawatiand, 2011). In traditional medicine ginger was used to absorb moisture of around the head, throat and stomach. Also, it was used in edible to remove blurred vision caused by moisture (Akoachere *et al.*, 2002; Malekizadeh *et al.*, 2012). Recent studies have determined that ginger has variety pharmacological properties for the active ingredients, which include zingerone, shogaols and gingerols that are responsible for its strong aroma. Ginger is a plant that contains the most antioxidants (Al-Homidan, 2005; Arkan *et al.*, 2012). Based on conducted researches ginger extract has anti-inflammatory (Herawatiand, 2011; Akoachere *et al.*, 2002), antimicrobial (Malekizadeh *et al.*, 2012), antifungal (Moorthy *et al.*, 2009; Onu, 2010) properties, also lowering blood cholesterol, stimulus of brain blood circulation and food digestion (Rukhani *et al.*, 2012; Saeid *et al.*, 2010). In vitro studies have shown that ginger has protective effect against NO (nitrite proxy) and their oxidation products (Zhang *et al.*, 2009; Tekeli *et al.*, 2011; Zhao *et al.*, 2011). Since Ginger helps digest by increasing secretion of saliva and digestive enzymes to and absorb food and causes to increase the growth indices, it is considered by poultry breeders.

In many countries, including Iran, poultry and pet birds is common, but in recent years quail breeding has been common in Iran. Quail has been considered by commercial poultry breeding centers due to rapid

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growth, high egg production, early maturity, less space needed for breeding, resistance to various diseases and also the short period of incubation, so; quail was selected for this study.

The kidneys play an essential role in filtration, metabolism and excretion of metabolic products and chemicals or their metabolically active forms may be transferred from the plasma and condensed more than that found in other tissues. Therefore, in this study, serum uric acid, total protein, albumin, calcium and phosphorus were measured as the most important indicators to evaluate renal function.

## MATERIALS AND METHODS

The research method was experimental and interventional in one control and five treatment groups. The population of this project were 30 Japanese male quail chicks which were divided randomly in six groups with 5 quail in any of which as follows: the control group or group A (fed without powdered ginger) , treatment group B (fed with ginger powder 0.5 kg per ton of diet), treatment group C (fed with ginger powder at a dose of 1 kg per ton of diet), treatment group D (fed with ginger powder at a dose of 1.5 kg per ton of diet), and treatment group E (fed with ginger powder at a dose of 2 kg per tone diet), treatment group F (2.5 kg per ton of diet).

All groups have the same basal diet and were kept in cages for one month breeding period. At the end of the period blood sampling took place from the wing vein using an insulin syringe. After the preparation of serum, the samples were frozen at- 20 ° c until the time of experiment.

In this study, biuret, bromocresol green, PTA, ammonium molybdate, and photometric methods were used respectively to determine the serum total protein, albumin, uric acid, phosphorus, and calcium. Non-parametric mann-Whitney U test was used for statistical data analysis.

## RESULTS

**Uric acid:** based on Mann-Whitney test and the comparison of uric acid median between the control group with each of the groups B, C, D, E and F, there was no significant difference ( $P>0.05$ ). (Table 1)

**Table 1: Mean  $\pm$  SE and significant levels of serum Uric Acid per mg/dl**

Sig (P Value)	Mean $\pm$ SE	Group
0.085	8.14 $\pm$ 1.23	A
	8.53 $\pm$ 0.98	B
	9.14 $\pm$ 0.87	C
	9.03 $\pm$ 1.06	D
	8.45 $\pm$ 0.65	E
	9.11 $\pm$ 0.47	F

**Total protein:** based on Mann-Whitney test and the comparison of total median between the control group with each of the groups B, C, D, E and F, there was no significant difference ( $P>0.05$ ). (Table 2)

**Table 2: Mean  $\pm$  SE and significance total protein per g / dl**

Sig (P Value)	Mean $\pm$ SE	Group
0.065	4.21 $\pm$ 0.23	A
	4.02 $\pm$ 0.98	B
	3.85 $\pm$ 0.87	C
	3.93 $\pm$ 0.59	D
	4.14 $\pm$ 0.35	E
	4.09 $\pm$ 0.24	F

**Albumin:** based on Mann-Whitney test and the comparison of albumin median between the control group with each of the groups B, C, D, E and F, there was no significant difference ( $P>0.05$ ). (Table 3)

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**Table 3: Mean  $\pm$  SE and significant levels of serum albumin per g / dl**

Sig (P Value)	Mean $\pm$ SE	Group
0.073	2.16 $\pm$ 0.67	A
	2.25 $\pm$ 0.39	B
	2.56 $\pm$ 0.27	C
	2.32 $\pm$ 0.55	D
	2.53 $\pm$ 0.28	E
	2.39 $\pm$ 0.54	F

**Calcium:** based on Mann-Whitney test and the comparison of calcium median between the control group with each of the groups B, C, D, E and F, there was no significant difference ( $P > 0.05$ ). (Table 4)

**Table 4: Mean  $\pm$  SE and significant levels of serum calcium per mg / dl**

Sig(P Value)	Mean $\pm$ SE	Group
0.066	10.14 $\pm$ 2.17	A
	10.53 $\pm$ 1.98	B
	9.88 $\pm$ 2.87	C
	9.93 $\pm$ 2.73	D
	10.45 $\pm$ 1.65	E
	10.12 $\pm$ 2.47	F

**Phosphorous:** based on Mann-Whitney test and the comparison of phosphorous median between the control group with each of the groups B, C, D, E and F, there was no significant difference ( $P > 0.05$ ). (Table 5)

**Table 5: Mean  $\pm$  SE and significant levels of serum phosphorus per mg / dl**

Sig (P Value)	Mean $\pm$ SE	Group
0.069	3.17 $\pm$ 0.42	A
	3.11 $\pm$ 0.75	B
	3.56 $\pm$ 0.35	C
	3.38 $\pm$ 0.39	D
	3.22 $\pm$ 0.55	E
	3.64 $\pm$ 0.41	F

## DISCUSSION

In poultry, Uric acid is the end product of protein catabolism. Unlike mammals in which the urea excretory system is achieved through renal filtration, uric acid in birds is the result of tubular secretion. In birds, the amount of uric acid excretion is independent of urinary flow rate and the state of dehydration. The amount of uric acid excretion mainly is influenced by the concentration of uric acid in blood plasma and renal blood flow. A normal amount of uric acid in birds is 2 to 15 mg per deciliter. Amounts to more than 20 milligrams per deciliter are considered as hyperuricemia. Increased uric acid in prolonged starvation, gout and kidney disease has been reported. In this study, no significant changes in serum uric acid were observed in any of the treatment groups that correspond with the results of Weidner 2000.

Serum total protein concentration in birds is 3 to 6 grams per deciliter. Hypoproteinemia represents hypoalbuminemia in birds. Hypoproteinemia is observed in liver disease, kidney disease, malnutrition and malabsorption.

There was no significant change when comparing four groups and that was consistent with the results obtained by Onu 2012 but in variance with the results obtained by Al-Homidan 2005 in which a significant reduction in Total protein and albumin of birds fed with 6% ginger in dietary has been reported.

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Serum calcium levels in most birds have been reported 8 to 18 mg per deciliter. Hypocalcemia in poultry is occurred when the serum calcium concentrations decline the lower than 6 mg per deciliter. This study did not demonstrate significant differences in the study groups.

Serum phosphate levels in most birds is 2 to 6 mg. Increased phosphorus levels in poultry have been reported due to kidney disease. Renal failure in birds is often associated with hyperphosphatemia. In the cases of digestive diseases and malabsorption the blood phosphorus level is reduced. In this study, no significant differences in phosphorus were observed in any of the groups studied.

Considering no significant Changes of understudied factors, it can be concluded that incorporating ginger powder with mentioned doses in quail dietary, does not have any deleterious effects on renal function.

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