

## Assessment of Clinical and Necropsy Manifestation, Losses and Some Biochemical Factors in Broiler Breeder with Gout Syndrome

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**Abstract:** Gout is a common metabolic disorder that results in abnormal accumulation of urates in domestic birds. The aim of present study was to assessment of clinical and necropsy manifestation, losses and some biochemical factors in broiler breeder with gout syndrome. In present study, two affected and non-affected broiler breeder farms to gout syndrome were selected. The losses rate by focus on necropsy signs were recorded also blood sampling to determination of biochemical factors such as uric acid, creatinine, albumin, total protein, calcium, phosphorus and sodium and potassium was done. Also, the percentage of egg production during a period of 25-64 weeks in both farms were recorded and compared. Blood samples were obtained from wing vein separation of their serum by centrifuging in 3000 rpm for 15 min then the samples freezed in -19°C. Data examined and analyzed by SPSS Statistical Software, Version 17 with t-test in significant level of  $\alpha = 0.05$  and confidence level of 95%. Data showed that there is a significant differences between measured parameters in two farms  $p < 0.001$ .

**Key words:** Clinical and necropsy manifestation, losses, biochemical factors, broiler breeder, gout syndrome, Iran

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### INTRODUCTION

Gout is a common metabolic disorder that results in abnormal accumulation of urates in domestic birds (Damodarn *et al.*, 1978). It occurs as two distinct forms, namely visceral and articular gout. Visceral gout has been reported in various caged and aviary birds from different parts of the world. It is among the most commonly diagnosed causes of mortality in poultry (Brown, 1996; Riddell, 1987). Typical clinicopathology of visceral gout is hyperuricaemia. Early attempts to determine the cause of visceral gout were focused on conditions in the layer house. However, field reports have made it apparent that immature birds also experience outbreaks of visceral gout. Many factors, such as exposure of birds to nephrotrophic strains of infectious bronchitis virus, influenza virus, cryptosporidium, high crude protein diets, diets containing oosporem, Vitamin A deficiency, water deprivation or metabolic alkalosis induced by elevated dietary sodium plus potassium over chloride ratios have been reported to be associated with visceral gout (Siller, 1981; Chong and Apostolv, 1982; Slemmons *et al.*, 1990; Trampel *et al.*, 2000; Hocking, 1989; Hocking and Bernard, 1997; Pegram and Wyatt, 1981; Sharma and Kaushid, 1986; Mubarak and Sharkawy, 1999).

Visceral gout in birds is an economically important disease in China. Case histories of affected bird flock

often but not always showed that excessive calcium and protein had been fed and that visceral gout could be induced by feeding growers on a commercial layer ration containing 36-38 g Ca kg<sup>-1</sup> compared with the normal range of 8-10 g Ca kg<sup>-1</sup>. An experiment in adult feed-restricted broiler breeder males showed that plasma uric acid concentration increased linearly above 106 g Crude Protein (CP) kg<sup>-1</sup> and gout was observed in birds fed on 400 g CP kg<sup>-1</sup> (Hocking, 1989). The concentrations of CP in grower diets are in the range 160-180 g CP kg<sup>-1</sup>, according to National Research Council recommendations. To date, little experimental research has been conducted on the relationship between the disease and independent and combined dietary calcium and protein concentrations and earlier investigations of gout have little clinicopathological evaluation. The aim of present study was to assessment of clinical and necropsy manifestation, losses and some biochemical factors in broiler breeder with gout syndrome.

### MATERIALS AND METHODS

In present study, two affected and non-affected broiler breeder farms to gout syndrome were selected. The management and cultural condition was identical in both farms and the just variation was gout syndrome. It must be noted that each farm had eight salon of 5000

broiler breeder, Ross race. The losses rate by focus on necropsy signs were recorded also, blood sampling to determination of biochemical factors such as uric acid, creatinine, albumin, total protein, calcium, phosphorus and sodium and potassium was done. Also, the percentage of egg production during a period of 25-64 weeks in both farms were recorded and compared. Blood samples were obtained from wing vein separation of their serum by centrifuging in 3000 rpm for 15 min then the samples frozen in  $-19^{\circ}\text{C}$ . The relevant experiments then conducted for evaluating of uric acid, urea, total protein, albumin, creatinine, calcium, phosphorus, magnesium, alkaline phosphatase; Ziestchem Co., (Iran) kits were used in all cases. Darman Kave Co., (Iran) kits were used in order to evaluating the rate of serum calcium and creatinine. The Spectrophotometer Model Biowave made by UK was utilized for all samples. Consequently, raw data examined and analyzed by SPSS Statistical Software, Version 17 with t-test in significant level of  $\alpha = 0.05$  and confidence level of 95%.

**RESULTS AND DISCUSSION**

Data related to measurement of blood parameters with losses and product rates are shown in Table 1. After necropsy and approving of gout syndrome researchers aimed to capture images from losses to clarify the clinical signs. Some of these images are shown in Fig. 1-4.

Like any other living creatures in birds the kidneys health is necessary for fulfilling physiologic tasks of the body. Any factor which causes kidney's damage, leads to differences in kidneys' physiologic tasks and eventually causes some disorders in total physiology of the body. One the most important factors is gout syndrome

(Suryashe and Deshmukh, 1997). What is important about incidence of gout syndrome is the percentage of dietary calcium which its standard rate for broiler chicks is 1% (Leeson and Summers, 2008).



Fig. 1: Urate deposition on the surface of the liver in broiler breeder farm with gout syndrome



Fig. 2: Urate deposition on the surface of the kidneys in broiler breeder farm with gout syndrome

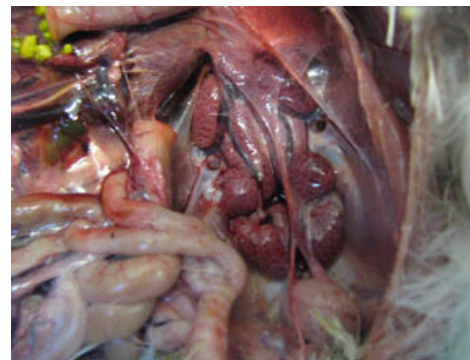


Fig. 3: Urate deposition on the surface of the kidneys, inflammation and the modification of kidneys in broiler breeder farm with gout syndrome

Table 1: Statistical analysis of data obtained from two farms

| Parameter measured | Group             | Mean±SE                         | SD    | p-value |
|--------------------|-------------------|---------------------------------|-------|---------|
| Creatinine         | Affected farm     | 1.06±0.02 mg dL <sup>-1</sup>   | 0.23  | 0.001   |
|                    | Non-affected farm | 0.41±0.01 mg dL <sup>-1</sup>   | 0.14  |         |
| Albumin            | Affected farm     | 2.68±0.01 g dL <sup>-1</sup>    | 0.12  | 0.001   |
|                    | Non-affected farm | 2.83±0.01 g dL <sup>-1</sup>    | 0.12  |         |
| Total protein      | Affected farm     | 4.33±0.08 g dL <sup>-1</sup>    | 0.78  | 0.001   |
|                    | Non-affected farm | 5.36±0.07 g dL <sup>-1</sup>    | 0.65  |         |
| Calcium            | Affected farm     | 10.09±0.25 mg dL <sup>-1</sup>  | 2.32  | 0.001   |
|                    | Non-affected farm | 8.70±0.12 mg dL <sup>-1</sup>   | 1.19  |         |
| Phosphorus         | Affected farm     | 3.58±0.04 mg dL <sup>-1</sup>   | 0.41  | 0.001   |
|                    | Non-affected farm | 3.88±0.02 mg dL <sup>-1</sup>   | 0.26  |         |
| Sodium             | Affected farm     | 140.47±0.77 mEq L <sup>-1</sup> | 6.93  | 0.001   |
|                    | Non-affected farm | 153.14±0.59 mEq L <sup>-1</sup> | 5.51  |         |
| Potassium          | Affected farm     | 10.67±0.16 mEq L <sup>-1</sup>  | 1.44  | 0.001   |
|                    | Non-affected farm | 8.11±0.05 mEq L <sup>-1</sup>   | 0.48  |         |
| Uric acid          | Affected farm     | 8.35±0.28 mg dL <sup>-1</sup>   | 2.51  | 0.001   |
|                    | Non-affected farm | 5.40±0.14 mg dL <sup>-1</sup>   | 1.36  |         |
| Product rate       | Affected farm     | 64.89±2.55 (%)                  | 16.14 | 0.569   |
|                    | Non-affected farm | 66.80±2.15 (%)                  | 13.64 |         |
| Losses rate        | Affected farm     | 15.53±0.37 (%)                  | 0.92  | 0.001   |
|                    | Standard range    | 8 (%)                           | -     |         |

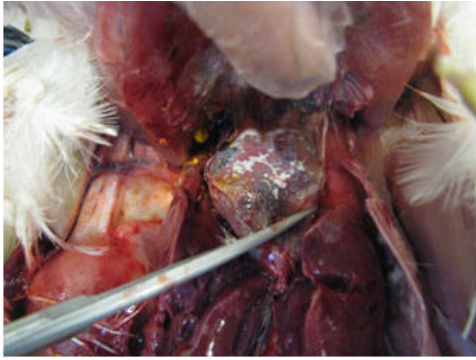


Fig. 4: Urate deposition on the surface of the heart in broiler breeder farm with gout syndrome

In the current study, complications resulted of double rate of calcium in broiler chicks' dietary was investigated. Kidneys' uric acid clearance is used as an important index in functional evaluations of kidneys. Therefore, the rate of uric acid in blood sample is one of the indices for health of kidney. Kimuara *et al.* (1991) reported the normal rate of uric acid  $5.8 \text{ mg dL}^{-1}$  which confirms the findings in non-affected group. Hence, in control group which were fed with standard rate of dietary calcium (1%), uric acid rate of blood sample varied between  $4\text{-}8 \text{ mg dL}^{-1}$ .

Patel *et al.* (2007) fed the broilers with 1.7% calcium dietary; they observed also triple of normal rate in uric acid on day 15 and the plaster colored urates deposition in viscera. Their findings conform to our findings except the mortality that began in the study on day 35. Ansar *et al.* (2004) in a study fed the broiler chicks with high calcium (2 and 3%) and phosphorous (0.5%) dietary. The chicks fed by high calcium dietary revealed increase of serum calcium concentration, decrease of serum phosphorous concentration, increase of FCR and ureter dilation caused by urates accumulation. Their findings conform to the findings.

The rate of serum calcium in most of birds is  $8\text{-}18 \text{ mg dL}^{-1}$  (Chandra *et al.*, 1984) and in the study, this rate in control group was maximum  $8.70 \pm 0.12 \text{ mg dL}^{-1}$  and maximum  $10.09 \pm 0.25 \text{ mg dL}^{-1}$  in affected group that is significant, statistically ( $p < 0.001$ ). The increase of serum calcium in treatment group is related to increase in dietary calcium. The increase of serum calcium and its decrease in the study confirms the findings of Ansar *et al.* (2004), Ismail (1989) and Wideman *et al.* (1989).

Normal rate of serum phosphorous is  $2\text{-}4/5 \text{ mg dL}^{-1}$  (Kimuara *et al.*, 1991). In the study also the rate of serum phosphorous in control group was  $3.88 \pm 0.02 \text{ mg dL}^{-1}$  on 42nd day and in affected group was  $3.58 \pm 0.04 \text{ mg dL}^{-1}$  on 42nd day that the decrease of phosphorous is significant statistically. Ansar *et al.* (2004), Chang and Fun (1992)

and Ougra (1981) observed the decrease of serum phosphorous with increasing of dietary calcium in broilers that conforms to the findings. In present study, serum creatinine in affected group was  $1.06 \pm 0.02 \text{ mg dL}^{-1}$ ; however, its rate in control group was  $0.41 \pm 0.01 \text{ mg dL}^{-1}$ . This increase is significant in affected group, statistically ( $p < 0.001$ ). The increase of creatinine level in treatment group because of the increase in dietary calcium conforms to Ansar *et al.* (2004), Wideman (1987) and Wideman *et al.* (1989).

In the study, there was no significant difference about serum magnesium concentration between two groups ( $p < 0.05$ ) that conforms to findings of Chandra *et al.* (1984). The rate of alkaline phosphatase has been increased in treatment group significantly in the current study ( $p < 0.05$ ). About the relationship between renal insufficiency and the rate of alkaline phosphatase in birds, any data was not obtained from other researchers. The increase of serum urea in treatment group compared with control group was significant statistically ( $p < 0.05$ ) however, there is no report herein from other researcher.

The normal rate of total protein in poultry blood samples has been reported  $3\text{-}5 \text{ g dL}^{-1}$  (Dein, 1986). In the study the increase of total protein and albumin in treatment group compared with control group was observed that was significant statistically ( $p < 0.001$ ) and conforms to the findings of Beckman (1995). In the study, the FCR was 2 in control and 2.15 in treatment group which shows the increase of feeding in treatment group; these results conforms to findings of Ansar *et al.* (2004).

The rate of mortality resulting from gout syndrome in treatment group was 2% more than control group; its rate calculated from 35th to 42nd days. The rate of lameness and paralytic disability was 1 and 4.5% in control and treatment group, respectively however there has been no report from other researchers. Researchers began to necropsy by starting of clinical signs on 35th day and observed urates depositions around heart and necrosis in renal tissue which conforms to findings of Randall (1991) and Siller (1981).

## CONCLUSION

The results of this study showed that 2% calcium in broilers' dietary increase the rate of serum uric acid, urea, total protein, albumin, creatinine, calcium and alkaline phosphatase that have significant difference compared with control group. The rate of phosphorous also in treatment group decreased significantly compared with control group. There was no significant difference between two groups about the rate of magnesium. Then, it can concluded that the physiologic process of kidneys encountered some disorders and consequently resulted

in urates depositions on serous surfaces of viscera especially kidneys which are the symptoms of gout syndrome that makes vast mortality in herd. This phenomenon is very important economically so much attention must give in setting the broilers' dietary especially the rate of dietary calcium for preventing of gout syndrome incidence and its consequences.

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