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Serum Activities of Enzymes in Broiler Chickens that Died from Sudden Death Syndrome

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Abstract: In this study, serum Creatine Phospho Kinase (CPK), Lactate Dehydrogenase (LDH) and Glutamic Oxaloacetic Transaminase (GOT) activities were measured in healthy broiler chickens and from broiler chickens that died from Sudden Death Syndrome (SDS) within 20 min after death. Blood sample (3 mL) from healthy broiler chickens of 1, 2, 3, 4, 5, 6 and 7 week of age were obtained by bleeding from the lunar vein. Also, blood samples (3 mL) were obtained by bleeding from the jugular vein during 20 min after broiler chickens died from SDS. Enzyme activities were measured by spectrophotometric methods. Results showed that serum CPK, LDH and GOT activities in broiler chickens died from SDS was increased compared to that in the healthy group. These results suggest that an elevation in serum CPK, LDH and GOT activities occur in association with SDS and may be used as a characteristic sign of birds that are dying of SDS.

Key words: Broiler chicken, sudden death, creatine phosphokinase, lactate dehydrogenase, glutamic oxaloacetic transaminase

INTRODUCTION

As is well known, the characteristics of Sudden death syndrome or flip-over disease is the sudden death of well-nourished broiler after abrupt and brief flapping of their wings^[1,2]. Recent studies have suggested that vitamins^[3], diet rich in fat^[4] and lightning^[5] to influence developing sudden death syndrome, but the resolution of this effects requires further experimentation. Reduction of sudden death syndrome in cattle must be dependent on improved feeding and management practices^[6]. Marked elevations in plasma creatine phosphokinase activity have been reported in several pathological muscle conditions in poultry including growth-associated and stress-induced myopathies^[7]. Recent investigation^[8] indicate that increase serum level of enzyme utilized as indicators for clinical diagnosis of cardiac failure is in association with SDS. It is not easy to diagnose heart failure in birds accurately. An alternative diagnostic approach is to measure biochemical markers, e.g. serum enzymes, which are associated with circulatory disturbance. The goals of the present study were to measure the serum CPK, LDH and GOT activities in healthy broiler chickens and broiler chickens that died from sudden death syndrome.

MATERIALS AND METHODS

A total of 50,000 birds were assigned. Commercial broiler chickens were used for this study. The total study group consisted of 350, aged 1-7 week. The environment

temperature and light was controlled with commercial feed. Birds were provided food and water. The study carried out according to the principles of bird's care. During the rearing period, 187 birds were found dead on their backs. The laboratory data of this group were used as a SDS. The status of SDS was assessed by necropsy as victims of SDS. The bodies were in good condition and had a full digestive tract and an empty of gall bladder. The control group (n= 163) consisted of healthy birds. All control birds survived the study without signs of illness. The laboratory data of this group were used as a control group. Serum samples were collected in the Babol area (Babol, Iran). Collection occurred throughout the 2004-2005. Blood sample (3 mL) from healthy broiler chickens of 1, 2, 3, 4, 5, 6 and 7 week of age were obtained by bleeding from the lunar vein. Also, blood samples (3 mL) were obtained by bleeding from the jugular vein during 20 min after broiler chickens died from SDS. Serum were separated and obtained by centrifugation of the coagulated blood (2500 rpm: 15 min).

The CPK, LDH and GOT activities was measured by Spectrophotometric method^[9]. The final absorbance of standard and test against blank are read at 340 nm. The coloration was stable for 30 min. An enzyme unit is defined as the amount of enzyme that catalyses the release of 1 μ M of product per min at 37°C. Specific activity is in terms of units per mg of protein. The protein contents of various enzyme extracts relative to standard solutions of bovine serum albumin were determined by Lowery method^[10].

Results expressed as the mean±SD. Data were analyzed using a students t-test. $p < 0.05$ designated significant difference between test points.

RESULTS AND DISCUSSION

As shown in Table 1 the mean serum CPK activity in broiler chickens died from SDS was increased compared to that in the healthy group (174.6 ± 12.3 vs. 116.3 ± 9.7 U L⁻¹). Results showed that mean serum GOT activity in broiler chickens died from SDS was increased compared to that in the healthy group, respectively (34.6 ± 4.1 vs. 15.2 ± 3.6 U L⁻¹), as shown in Table 2. Also, results showed that mean serum LDH activity in broiler chickens died from SDS was increased compared to that in the healthy group, respectively 689.3 ± 28.4 vs. 395.7 ± 21.4 U L⁻¹) (Table 3).

In the present study, activities of enzymes in association with the failure of the cardiovascular system were investigated in serum samples from healthy broilers

chicken and from broilers chicken suffering from sudden death within 20 min after death. Data demonstrated that CPK, LDH and GOT activities were significantly increased in the serum of broilers chicken died by SDS. Present results were in good agreement with those reported previously^[1,11,12].

It is clear that CPK, LDH and GOT are derived from degenerated cardiac in the heart. Increased serum CPK, LDH and GOT activities seem likely to be characteristic sign of SDS. These finding may indicate that the cardiovascular enzymatic system in SDS was impaired. This observation is in agreement with the results of other authors^[1,8,11]. Hence, these results suggest that SDS is associated with some failure of the cardiovascular system. In the meantime, increases of serum in cardiovascular enzymatic system show that serum CPK, LDH and GOT probably begin to rise at a time when a weak disturbance of the cardiovascular system occurs before death due to SDS.

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Table 1: The mean serum CPK activity in healthy broiler chickens and broiler chickens died from SDS. Data represent mean values±SD of at least three separate experiments

Age (week)	Enzyme activity (U L ⁻¹)	
	Healthy group	Died from SDS group
1	112.6±8.5	149.7±11.5
2	114.5±8.6	176.3±11.1
3	116.3±9.7	174.6±12.3
4	115.2±9.3	171.3±12.2
5	114.5±9.1	168.4±12.1
6	112.3±8.6	164.3±11.2
7	112.7±8.7	161.5±10.3

Table 2: The mean serum GOT activity in healthy broiler chickens and broiler chickens died from SDS. Data represent mean values±SD of at least three separate experiments

Age (week)	Enzyme activity (U L ⁻¹)	
	Healthy group	Died from SDS group
1	13.9±3.2	28.3±3.5
2	14.5±3.4	29.8±3.7
3	14.8±3.5	32.1±3.9
4	15.2±3.6	34.6±4.1
5	15.4±3.7	31.5±3.8
6	15.7±3.8	30.7±3.6
7	15.8±3.9	29.6±3.5

Table 3: The mean serum LDH activity in healthy broiler chickens and broiler chickens died from SDS. Data represent mean values±SD of at least three separate experiments

Age (week)	Enzyme activity (U L ⁻¹)	
	Healthy group	Died from SDS group
1	339.4±17.9	612.5±23.2
2	367.3±18.2	643.2±25.3
3	375.5±18.5	685.4±27.8
4	387.6±19.8	689.3±28.4
5	389.3±20.6	683.5±26.5
6	395.7±21.4	679.6±24.5
7	396.7±22.3	656.2±23.7

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