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Alterations in serum constituents of different duck varieties of Assam in healthy and duck plague outbreak

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Abstract

Alterations of serum constituents in three different varieties of duck namely Pati, Khaki Campbell and Nageswari from different parts of the state were evaluated in healthy and duck plague outbreak. A significant reduction ($P<0.05$) in protein and albumin level was observed in all the varieties of ducks under study during disease than that of the healthy ducks. A significant rise ($P<0.05$) in the level of globulin was recorded during duck plague outbreak in Pati and Nageswari breed of ducks. An increased level of glucose (162.35 ± 9.45 mg/dl) was recorded in Pati duck group during disease outbreak which differed significantly ($P<0.05$) from the healthy group (145.69 ± 10.12 mg/dl). The healthy and the diseased group of Khaki Campbell showed glucose level of (159.78 ± 9.23 mg/dl) and (172.95 ± 8.21 mg/dl) respectively. The level of glucose in healthy and diseased group of Nageswari variety of duck was recorded 171.62 ± 7.63 and 185.11 ± 5.6 mg/dl respectively. A significant ($P<0.05$) rise in blood urea nitrogen level of diseased Pati duck (1.95 ± 0.15 mg/100 ml) was recorded as compared to the healthy group of Pati duck (1.27 ± 0.06 mg/100 ml).

Keywords: Serum Constituents, Duck Plague, Duck, Health Status

Introduction

Among all the poultry species, ducks are mostly preferred across the globe for their table egg production next to chickens. According to the (19th) Livestock census of Govt. of India, the ducks constitute about 3% (23.539 millions) of total poultry (729.2 million), in India (GOI, 2012) [8]. The Pati duck population constitutes a major indigenous non-descript duck variety in the state of Assam, India. The Annual egg production per duck (Pati) is 70-95 eggs, (Kalita *et al.*, 2009) [10]. Generally Ducks are more disease resistance than poultry. In duck rearing the diseases of importance are duck plague, pasteurellosis and aflatoxicosis. The agro-climatic condition with marshy and waterlogged areas prevailing throughout the state provides a very congenial environment for rearing ducks in Assam (Kalita *et al.*, 2009 [10]; Deka *et al.*, 2014 [6]). Serum constituents of ducks provide valuable information for evaluation of health status, immunity which reflects many metabolic alterations of organs and tissues. However, available reports on serum biochemistry of these three varieties of ducks are scarce, as compared to other avian species. Comparative studies of serum biochemistry in chicken versus ducks are limited (Franco *et al.*, 2010 [7]; Kabir, 2012 [9]). Biochemical parameters in indigenous ducks in various regions of the world differ from each other. It is important to investigate and create baseline information on serum biochemical profiles of the indigenous ducks locally for accurate interpretation of health status. Keeping this in view, the present investigation was carried out to study the alterations in serum biochemical profile in indigenous duck breeds of Assam under healthy and disease conditions.

Materials and Method

In the present study, 300 blood samples (5ml) from different varieties of duck namely Pati (150), Khaki Campbell (100) and Nageswari (100) were collected from different parts of the state from healthy as well during duck plague outbreak. Blood samples were collected from the wing veins of each bird under aseptic conditions. For estimation of the biochemical constituents, the blood was collected in sterile test tube without adding any anticoagulant and was left undisturbed in slanting position for 2-4 hours for serum separation. The separated

serum samples were cleared by centrifugation at 3000 rpm for 5 minutes. After the serum was separated, it was kept in plastic vials and stored in deep freeze at -20 °C until analysis. Different biochemical parameters namely total protein, albumin, globulin, glucose, blood urea nitrogen and uric acid were estimated using commercially available kit procured from Invitro Diagnostic Kits manufactured by Span Diagnostic Limited (Autospan Liquid Gold), GIDC, Sachin-394 230 (Surat), Gujarat, India. Data generated from the study were analyzed statistically (Snedecor and Cochran, 1994) [17].

Result and discussions

The value of the serum constituents (Mean± S.E) of different varieties of duck of Assam in healthy and duck plague outbreak of the present investigation is presented in table 1. Analysis of different biochemical profile in animals allow diagnosis of the subclinical symptom (Kaneko *et al.* 2009) [12]. In the present investigation, serum constituents of healthy Pati duck, Khaki Campbell and Nageswari ducks were estimated and compared with the same variety of ducks in duck plague outbreak. A significant reduction ($P<0.05$) in total protein and albumin level was observed in all the varieties of ducks under study during duck plague outbreak than that of the healthy ducks. The hypoproteinemia and hypoalbuminemia might be attributed primarily due to liver dysfunction associated with duck virus hepatitis infection, decreased feed intake and also disturbed overall metabolism (Lin *et al.*, 2011 and Ahmed *et al.*, 1975) [14, 1]. Albumin, which is synthesized only in the liver, is mainly responsible for maintaining the oncotic blood pressure. Decrease albumin concentration recorded in the present experiment during disease outbreak might be due to hepatic insufficiency, malnutrition and gastrointestinal disturbances (Meyer *et al.*, 1995) [15]. Significant decrease in the total serum protein and albumin in unhealthy birds could be due to severe damage to liver and kidney which result in failure of synthesis of plasma protein and protein loss respectively (Coles, 1986) [4]. Fall in total plasma protein in diseases birds might be due to acute stress that leads to cortisol secretion and catabolism of protein (Kaneko *et al.*, 1997) [11]. A significant rise ($P<0.05$) in the level of globulin was recorded during disease outbreak in all the three varieties of ducks. Globulin level of healthy Pati duck variety was found to be 1.79±0.10 g / dl whereas during disease outbreak the level recorded was 1.94±0.09 g/dl. Hyperglobulinemia is

associated with chronic diseases and bacterial septicaemia (Coles, 1986) [4]. Butler (1971) [3] also reported an increase in serum globulin level which might be due to an enhanced synthesis of immunoglobulins. An increased level of glucose (162.35±9.45 mg/ dl) was recorded in Pati duck during disease outbreak which differed significantly ($P<0.05$) from that of healthy group (145.69±10.12 mg/dl). The healthy and the diseased group of Khaki Campbell showed glucose level of (159.78±9.23 mg/dl) and (172.95±8.21 mg/dl) respectively. These findings are in accordance with the results of Daugherty and Herrick (1952) [5] who also reported significant rise in plasma glucose level to in a group of disease birds that might be due to increased glycogenolysis caused by stress induced release of adreno-corticoid leading to acute hyperglycemia. These results also corroborated with the findings of Kumar and Rawat (1975) [13]. Low feed intake during acute infective stage may lead to secretion of adrenal corticosteroids promoting glycogenolysis (Patra *et al.*, 2010) [16]. The level of glucose in healthy (171.62±7.63 mg/dl) and diseased group (185.11±5.6 mg/dl) of Nageswari differed significantly ($P<0.05$). The variation blood glucose concentration among the three groups of duck might be due to the genetic composition, hormonal level and availability of feed access. There was no significant variation in the level of uric acid in all the three varieties of birds under study during healthy and disease outbreak. A significant ($P<0.05$) rise in blood urea nitrogen (BUN) was observed in all three varieties of duck during disease outbreak as compared to the healthy groups. The elevation of blood urea nitrogen (BUN) might be due increased gluconeogenesis as well as well increase protein catabolism (Bell, 1971) [2]. From the present study it can be concluded that, there is a rise and fall of several biochemical parameters in response to disease in duck which can act as an indicator of the health status of duck. Considering the importance of ducks, further studies are warranted in this area to interpret the variation and fluctuations in serum biochemistry in response to different diseases.

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Table 1: Serum constituents (Mean± S.E) of different varieties of duck of Assam in healthy and duck plague outbreak

Parameters	Pati variety		Khaki Campbell		Nageswari		Level of Significance
	Healthy (N=125)	Out Break (N=45)	Healthy (N=75)	Out Break (N=35)	Healthy (N=50)	Out Break (N=20)	
Total Protein(g/dl)	5.84 ^a ±0.19	5.61 ^b ±0.21	6.83 ^a ±0.22	5.78 ^b ±0.23	5.93 ^a ±0.16	6.01 ^b ±0.18	0.05
Albumin (g/dl)	4.05 ^a ±0.10	3.67 ^b ±0.12	5.52 ^a ±0.19	4.49 ^b ±0.15	3.95 ^a ±0.12	3.35 ^b ±0.13	0.05
Globulin (g/dl)	1.79 ^a ±0.10	1.94 ^b ±0.09	1.31 ^a ±0.10	1.39 ^b ±0.10	1.98 ^a ±0.09	2.66 ^b ±0.16	0.05
Glucose (mg/dl)	145.69 ^a ±10.12	162.35 ^b ±9.45	159.78 ^a ±9.23	172.95 ^b ±8.21	171.62 ^a ±7.63	185.11 ^b ±5.6	0.05
BUN (mg/100ml)	1.27 ^a ±0.06	1.95 ^b ±0.15	1.23 ^a ±0.12	2.23 ^b ±0.51	1.65 ^a ±0.22	2.02 ^b ±0.28	0.05
Uric Acid (mg/100 ml)	4.51 ^a ±0.11	4.63 ^a ±0.19	4.15 ^a ±0.09	4.23 ^a ±0.08	4.44 ^a ±0.22	4.33 ^a ±0.19	NS

NS- None Significant, *Significant at 5 % ($P\leq 0.05$) between the same variety of duck for the same parameter

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