



Hemato-biochemical profile of turkey birds selected from Sherpur district of Bangladesh

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Abstract

Turkey is an integral part of poultry, provides all essential substances as other meat, has a comparatively low percentage of fat and a high percentage of proteins. The available records on hematology and biochemical profile of turkeys are very scanty. The study has been carried out to measure hematological and biochemical parameters in turkey birds concerning sex. A total of 20 turkeys at the age of 18 to 22 weeks consisting of 10 male and 10 female birds maintaining under existing environmental and feeding management in farm conditions at Nakla Upzilla of Sherpur district were used. Blood samples were collected from wing veins of each bird consistently in the morning hours to avoid diurnal variation. Hematological and biochemical analyzed were done according to standard methods. The result showed that Hb concentration, PCV and TEC values were higher in male turkey than those in female turkeys. The values were statistically significant ($p < 0.05$) between male and female birds. In biochemical data, the serum total protein and serum albumin values were slightly higher in female turkeys than those of male ones but the values were not statistically significant. The serum glucose level was found higher in male than the female. Among the lipid profile, the total cholesterol, triglycerides and LDL-c levels were higher in females than males. The data were statistically significant ($p < 0.05$) except total cholesterol which was not significantly differed. On the other hand, HDL-c values were higher in male turkeys. The mean values of ALT, AST and creatinine in both males and female birds were more or less similar. Although the ALT and AST levels were slightly higher in female birds than males, the values were statistically insignificant. The study concluded that there are variations in hematological parameters and lipid profiles between male and female turkey birds of 18-22 weeks.

Keywords: Turkey, Hematological and biochemical analyze, lipid profiles.

Introduction

Farmers and scientists are looking out for newer varieties of domesticated birds that have sufficient potentials to grow fast and supplement the availability of meat on an economic basis. Turkey (*Meleagris gallopavo*) is a large gallinaceous bird of the family Meleagridae. They are an essential source of food in many parts of the world (Brant, 1998). Turkey occupies a prominent position next to chicken, duck,

guinea fowl, and quail, which plays a significant role in augmenting the economic and nutritional status of the varied population across the globe. They form almost 2% of the total poultry population. Turkeys are reared mainly for their tasty and high-quality meat all over the world. Turkey industry has been gaining momentum in India, mainly because of turkey's meat while providing all essential substances as other meat has a comparatively low percentage of fat and the high percentage of proteins (Nixey and Grey, 1985).

Blood plays a vital role in the transportation of nutrients, metabolic waste products, and gases around the body (Zhou *et al.*, 1999). Moreover, blood represents a means of assessing the clinical and nutritional health status of animals (Olorode and Longe, 2000). Many factors can influence the level of a particular blood constituent. Hematological values of birds are influenced by age, sex, breed, climate, geographical location, season, nutritional status, life habits of species, and other physiological factors (Dukes 1955). So, the physiological values of birds may likely be different. The values need to be compared during disease diagnosis and veterinary practices. The haemato-biochemical profiles are most commonly used in nutritional studies for chickens (Adeyemi *et al.*, 2000) and other birds like pigeon (Pavlak *et al.* 2005), guinea fowl (Onyeausi 2007), bronze turkey (Schmidt *et al.* 2009) and Japanese quail (Arora, 2010). Most reports of avian blood are restricted only on chickens. Since turkeys are an emerging source of animal protein and the available records on hematology and biochemical profile of turkeys are very scanty. For this reason, this study was aimed to get some baseline values of blood and serum biochemical parameters in both male and female turkey birds of similar age.

Materials and Methods

The experiment was conducted at the Department of Physiology, Faculty of Veterinary Science of Bangladesh Agricultural University, Mymensingh, during the period from 10 March, 2019 to 28 April, 2019.

Source of the turkey birds:

The turkey birds were collected from different farms situated in NaklaUpozila under Sherpur district.

Collection of blood:

Blood samples were collected from 20 turkey birds where 10 male turkeys and others 10 were female. Blood was collected through sterilized syringe from the wing vein of turkey birds individually. It was collected into sterile tubes containing sodium citrate or without sodium citrate and was immediately stored into the icebox for further use.

Preparation of serum: test tubes containing blood without anticoagulant were kept in a slanting position at room temperature. These samples were refrigerated overnight at 4°C. The separation of serum from the

clotted blood was achieved following centrifugation at 1000 rpm for 15 min. These cell-free serum samples were preserved at -20°C for further biochemical analysis.

Hemato-biochemical analysis:

The selected hematological parameters (Hb, TEC, and PCV) were performed within two hours of the collection according to standard procedures described (Khalil *et al.*, 2020). MCV, MCH and MCHC values were calculated as per formula. The biochemical tests were performed in collaboration with Professor Muhammad Hossain Central Laboratory, Bangladesh Agricultural University, Mymensingh. The serum total cholesterol, triglycerides, high density lipoproteins (HDL), creatinine, alanine aminotransferase (ALT) and aspartate aminotransferase (AST) were performed according to standard procedure (Shovon *et al.*, 2020) with a UV spectrophotometer T 80, PG instruments, Great Britain. Specific reagents from High Technology Incorporation (HTI), USA were used for each test.

Statistical analysis: The data obtained in the laboratory was placed stored in Microsoft Excel-2013 and imported to the software Graph Pad Prism 8 for analysis. Descriptive statistics analysis was done to measure the mean, SE and P values of different parameters. The hematological and biochemical parameters of broilers corresponding to male and female are compared by performing student's unpaired t-tests as described by (Steel and Torrie, 1980)

Results and Discussion

Hematological parameters:

The results of hematological values of turkey birds are presented in table 1. The mean values of hemoglobin concentration (Hb conc.), total erythrocyte count (TEC) and Packed cell volume (PCV) were significantly ($P < 0.05$) higher in male turkey birds (Hb: 7.32 ± 0.23 g% , TEC: 2.50 ± 0.30 million/uL and PCV: 38.90 ± 1.79 %) than female turkey birds (Hb: 6.84 ± 0.34 g % , TEC: 2.23 ± 0.22 million/uL and PCV: 30.60 ± 1.83 %) of 18-22 weeks old (Table 1). Among the erythrocyte indices, mean corpuscular volume (MCV) and mean corpuscular hemoglobin concentration (MCHC) were significantly ($P < 0.05$) higher in male birds compared to female birds. In contrast, the values of mean corpuscular hemoglobin (MCH) were found the same between male and female

birds. The findings of the current study are similar to that of Lisano and Quay *et al.*, (1977), who investigated that Hb concentration in turkeys increased with age during the active growth period till 26-34 weeks of age and then gradually declined. Cason and

Teeter *et al.*, (1994) reported that TEC increased by 47 % between 10 and 30 weeks of age in turkeys. Hunsaker *et al.* (1969) reported that PCV values were higher in male turkeys than in females.

Table 1.Hematological profile of turkey birds (age 18-22 weeks).

Parameters	Male	Female	P values
Hb (g%)	7.32 ± 0.23	6.84 ± 0.34	0.0017
TEC(million/ µL)	2.50 ± 0.30	2.23 ± 0.22	0.0296
PCV (%)	38.90 ± 1.79	30.60 ± 1.83	<0.001
MCV (FL)	157.22 ± 17.9	138.09 ± 7.43	0.006
MCH (%)	29.60 ± 3.55	30.93 ± 2.32	0.285
MCHC (pg)	18.83 ± 0.79	22.40 ± 1.28	<0.001

Biochemical parameters:

The results of the biochemical values of turkey birds are presented in table 2. The mean values of serum total protein and serum albumin in male were 5.13±0.67 and 2.91±0.42 g/dl, and in female, the values were 5.70±0.60 and 3.13±0.33 g/dl respectively in the same age group. It was observed that both serum total protein and albumin of female birds were higher in female than the male. The data were statistically significant. The findings of the current study are similar to that of Lisano and Quay *et al.*, (1977) who reported that total protein values were higher in females than in the males. Ibrahim *et al.* (2012) and Aarif and Mahapatra (2013) observed that the serum albumin values in males were higher in all the age groups. The mean value of serum glucose in male was 90.72± 7.22 mg/dl and in female was 87.17± 8.47 mg/dl. The values were higher in males than the females. The result obtained coincide with the findings of Aarif and Mahapatra (2013).

The mean values of serum alanine aminotransferase (ALT) and serum aspartate aminotransferase (AST) in male were 8.36±1.56 and 6.43±1.22 U/L and in female the values were 9.05±2.05 and 8.51±1.78 U/L respectively (table 2). It was observed that the ALT and AST activities were higher in female than the male. The result obtained is similar to the findings of Hochleithneret *et al.* (1994), who reported that AST values are age-dependent to varying degrees among different species, and in female turkey during laying, it may increase. In serum creatinine, the value was 0.90±0.13 U/L in male and 0.83±0.07 U/L in female turkey birds of 18-22 weeks age. The serum creatinine level was slightly higher in male than the female. The data were not statistically significant. Dietz *et al.* (1997) reported that the source of serum creatinine is the skeletal muscle, and its concentration is strongly related to either physical activity or the relative skeletal muscle mass within the whole body.

Table 2.Biochemical profile of turkey birds (age 18-22 weeks).

Parameters	Male	Female	P values
Total protein (g/dl)	5.13 ± 0.67	5.70 ± 0.60	0.1687
Serum albumin (g/dl)	2.91 ± 0.42	3.13 ± 0.33	0.0331
Glucose (mg/dl)	90.72 ± 7.22	87.17 ± 8.47	0.0484
ALT (U/L)	8.36 ± 1.56	9.05 ± 2.05	0.0120
AST (U/L)	6.43 ± 1.22	8.51 ± 1.78	0.0651
Creatinine (U/L)	0.90 ± 0.13	0.83 ± 0.07	0.3181

Lipid Profile:

The results of the lipid profile of turkey birds are presented in table 3. The lipid profile included in this study is total cholesterol, triglycerides, LDL-cholesterol, and HDL-cholesterol. The mean values of total cholesterol and LDL-c were lower in male (112.53 ± 11.51 mg /dl and 44.32 ± 10.55 mg/dl) compared to those values in female turkey birds (126.53 ± 17.17 mg/dl and 60.68 ± 11.64 mg/dl) of same

age group. On the other hand, the mean values of triglycerides level and HDL-c levels were higher in males (136.68 ± 10.26 mg/dl and 43.31 ± 2.60 mg/dl) than the female ones (120.81 ± 9.23 mg/dl and 37.09 ± 3.41 mg/dl). Szabo *et al.* (2005) observed similar trends in turkey birds. The data were statistically significant. Bierer, 1969 observed that male and female turkeys have some variation in LDL cholesterol level, and it mainly occur due to sex influence.

Table 3.Lipid profile of turkey birds (age 18-22 weeks).

Parameters	Male	Female	P values
Total cholesterol (mg/dL)	112.53 ± 11.51	126.53 ± 17.17	0.1687
Triglycerides (mg/dL)	136.68 ± 10.26	120.81 ± 9.23	0.0331
LDL-c (mg/dL)	44.32 ± 10.55	60.68 ± 11.64	0.0484
HDL- c (mg/dL)	43.31 ± 2.60	37.09 ± 3.41	0.0120

Conclusion

The study concluded that there are variations in hemato-biochemical parameters between male and female turkey birds. It is observed that the hematological parameters in male turkeys were higher than the female turkeys. It may be due to higher body weight in male turkey birds. In the case of biochemical parameters, total serum protein, serum albumin, AST and ALT, total cholesteol and LDL-c values were higher in female than male on the other hand serum glucose, triglycerides, HDL-c values were higher in male than female.

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