Influence of Age on Certain Blood Biochmical Parameters in Turkey Birds

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ABSTRACT

The experiment was conducted on one hundred turkey birds to study the influence of age on the blood biochemical parameters. Turkey birds with the age ranging between 8-10, 11-13, 14-16, 17-19 and above 26 weeks were categorized as Group I, II, III, IV and V, respectively each containing 20 turkey birds which includes males and females. Significantly, higher values of Serum Total Protein and Serum Albumin in adults than younger birds might be associated with the advancement of age because of quick somatic. It was observed that age has partial influence on serum globulin concentration especially in early age of 16 weeks. There was no influence of age on Serum Glucose, HDL cholesterol and Serum triglycerides. Age plays an important role in the concentration of Serum total cholesterol and LDL cholesterol with almost an increasing and clear increasing trend; respectively up to 19 weeks which declined thereafter .

Key words: Turkey; Serum Biochemical parameters;

Indian poultry sector has made a remarkable progress during the last three decades evolving from backyard venture to a full-fledged commercial agro-industrial business. This poultry sector with well developed broiler and layer industry is one of the important contributors to the economy of rural and semiurban India. Turkey (*Meleagris gallopavo*) is a large gallinaceous bird of the family Meleagridae that was native of North America, domesticated in Europe and is now important source of food in many parts of the world (*Brant, 1998*).These birds mostly thrive on tropical climate (*Aarif and Mahapatra, 2013*). Turkey, occupies an important position next to chicken, duck, guinea fowl and quail, which is playing a significant role in augmenting the economic and nutritional status of varied population across the globe. They form almost 2 % of the total poultry population. Turkeys are reared for their tasty and high-quality meat all over the world besides its link with celebrations of "Chirstmas"

(*Gattani et al.,2016*). In India, turkey population is mostly concentrated in and around cosmopolitan cities. Serious efforts are being made by Central Poultry Development Organization (CPDO, Southern Region), Hessarghatta, Bangalore and Central Poultry Development Organization (Western Region) Mumbai to promote turkey farming, due to which it is getting popularity in southern region as well as western region of India including Maharashtra. In India, indigenous and non-descript turkeys are found in good numbers in Punjab, Orissa, Tamil Nadu, Kerala, Uttar Pradesh and Bihar. Under this circumstance turkey industry has been gaining momentum in India especially because turkey's meat while providing all essential substances as other meat, has comparatively low percentage of fat and high percentage of proteins (*Nixey and Grey, 1985*). Nutrition, age, sex, genetics (breed and crossbreeding), reproductive status, starvation, environmental factors, stress and transportation are known to affect

biochemical parameters (*Balikci et. al., 2007*). Evaluation of blood biochemical parameters can be used to assess animal health which might be useful for the field veterinarians. Similarly, serum biochemical values can be obtained easily and are useful in determining the health and general condition of birds (*Schmidt et. al., 2009*). A review of the literature reveals a lack of data on the biochemical composition of turkey blood (*Schmidt et. al., 2009*). Some studies were reported with a small number of birds and give no details concerning the age, sex, state of reproduction, or other conditions. While turkeys are emerging as an important source of animal proteins, the available records of their biochemical profile are very scanty. Hence, considering the above facts, the present study was planned to study the influence of age on certain biochemical parameters of turkey birds.

METHODOLOGY

The experiment was conducted on one hundred turkey birds to study the influence of age on the blood biochemical parameters and the experimental turkey birds were categorized into different groups as shown in Table I.

Table 1: Turkey birds were categorized in different age groups as follows.

Groups	Age groups	No. of Birds (Male+Female)
I	8-10 week old birds	20(10+10)
II	11-13 weeks old bird	20(10+10)
III	14-16 week old birds	20(10+10)
IV	17-19 week old birds	20(10+10)
V	Above 26 weeks old birds	20(10+10)

Blood Sample collection: Twenty blood samples, 10 from the birds of either sex were collected from each group in morning hours for age wise study by wing vain puncture using sterile needle of 23 gauges. The blood samples were collected in sterile test tubes. The serum was separated from these blood samples and was stored at -20°C until analysis.

Laboratory Analysis: All the biochemical estimations were carried out on automatic biochemical analyzer using biochemical kits manufactured by Transasia Biochemical's ltd., (ERBA), Mumbai, following the manufactures protocol and instructions. The Serum Total Protein was estimated by Biuret method described by *Tietz (1986).* Serum Albumin was estimated by BCG Dye Method (*Benjamin, 1985*) and Serum Globulin values were calculated by subtracting the Serum Albumin levels from that of Serum Total Protein level. The Serum Glucose was estimated by Trinder's Method and Serum Triglycerides were estimated by GPO-Trinder method. The Serum Cholesterol was estimated by CHOD-PAP method described by *Allain et al., (1974).*

For age wise comparison Completely Randomized Design (CRD) was used as a tool for statistical analysis as described by *Snedecor, G.W. and Cochran, W.G. (1994).*

RESULTS AND DISCUSSION

Results in the form of Mean ± S.E. values of different biochemical parameters of Turkey birds according to age are given in Table: 2

Table 2: Mean ± S.E. values of different biochemical parameters of Turkey birds for age wise comparison

Groups	Age (Wks)	Total Protein (g/dl)	Albumin (g/dl)	Globulin (g/dl)	Glucose (mg/dl)	Triglycerides (mg/dl)	Cholesterol (mg/dl)	HDL Cholesterol (mg/dl)	LDL Cholesterol (mg/dl)
I	8-10	2.95 ±0.45[b]	1.46 ±0.36[c]	1.48 ±0.08[b]	159.30 ±4.79[a]	71.77 ±3.42[b]	168.44 ±2.48[b]	26.22 ±0.57[bc]	127.86 ±2.98[bc]
II	11-13	3.10 ±0.42[b]	1.47 ±0.03[c]	1.62 ±0.07[ab]	161.66 ±4.74[a]	82.27 ±4.68[a]	173.44 ±2.25[b]	25.10 ±0.46[c]	131.88 ±2.88[b]
III	14-16	3.27 ±0.58[b]	1.46 ±0.02[c]	1.81 ±0.12[a]	174.2 ±6.78[a]	87.37 ±2.47[a]	184.04 ±0.80[a]	26.43 ±0.30[b]	140.11 ±0.82[a]
IV	17-19	3.10 ±0.55[b]	2.53 ±0.15[b]	0.56 ±0.08[c]	171.26 ±5.18[a]	54.38 ±1.16[c]	185.21 ±2.45[a]	31.94 ±0.39[a]	142.38 ±2.45[a]
V	Adult (>26)	4.17 ±0.58[a]	4.00 ±0.14[a]	0.70 ±0.08[c]	176.57 ±3.21[a]	79.81 ±2.01[ab]	170.15 ±2.53[b]	33.08 ±0.37[a]	121.10 ±2.65[c]
	Grand Mean	3.32 ±0.42	2.73 ±0.10	1.23 ±0.06	168.60 ±2.32	75.12 ±1.75	176.25 ±1.19	28.56 ±0.37	132.67 ±1.34

Note: In columns, similar superscripts indicate no significance difference, while dis similar superscripts indicates Significant difference

Effect of age on Serum Total Protein: The Serum Total protein (g/dl) in different age groups ranged from 2.95 ± 0.45 to 4.17 ± 0.58 with the overall mean value observed was 3.32 ± 0.42. The Serum Total protein levels of turkey birds were comparable from 8 to 19 weeks of age (Group I to IV) with no significant effect. However, it was significantly (p<0.01) higher (4.17 ± 0.58) in turkey birds above 26 weeks of age (Group V) as compared to other Groups. *Priya and Gomathy (2008)* observed that the mean total protein value was increased with the age up to a mean value of 3.16 ± 0.03 g/dl in the age group of 12-18 weeks of turkey poults and it was slightly reduced to 3.08 ± 0.03 03 g/dl at 18-26 weeks which was further increased in adult turkey birds. Present findings in arbitrarily similar age groups were in close agreement with these findings. *Kundu et al. (1993)* suggested that age had significant effect on the serum protein level. Thus, it can be inferred that significantly higher values of Serum Total Protein in adults than younger birds might be associated with the advancement of age in present study. Quick somatic growth might be the reason associated with the higher values of the total protein in adults (*Szabo et al., 2005*).

Effect of age on Serum Albumin : The Serum Albumin (g/dl) in different age groups ranged from 1.46 ± 0.02 to 4.00 ± 0.14 with the overall mean value observed was 2.73 ± 0.10 g/dl. The Serum Albumin levels of turkey birds were comparable from 8 to 19 weeks of age (Group I to IV) with no significant effect. However, it was significantly (p<0.01) higher (4.00 ± 0.14) in turkey birds above 26 weeks of age (Group V) as compared to other Groups. Present findings in arbitrarily similar age groups were in close agreement with the findings of *Priya and Gomathy (2008) and Schmidt et al. (2009). Szabo et al. (2005)* observed and recorded that the albumin value (g/dl) exhibits an increasing trend in all the age groups studied of the turkey birds. Thus, it can be inferred that significantly higher values of Serum Albumin in adults than younger birds might be associated with the advancement of age in present study. The early increase may be a direct consequence of the quick somatic growth in this period, since anabolic process and growth hormone are well known factors for increasing serum albumin levels. (*Szabo et al.2005*)

Effect of age on Serum Globulin : The Serum Globulin (g/dl) in different age groups ranged from 0.56 ± 0.08 to 1.81 ± 0.12 with the overall mean value observed was 1.23 ± 0.06. Statistical analysis revealed that there was a significant difference among the mean values of Serum Globulin among all age groups. Mean values obtained in the study showed an increasing trend till Group III (14-16 weeks old) and then declined further which was in agreement with the findings of *Priya and Gomathy (2008)* who observed that the globulin values showed an increasing trend till the age of 18-26 weeks and then declined gradually. Present findings in arbitrarily similar age groups were in close agreement with these findings. *Szabo et al. (2005)* reported that there was an increasing trend in mean globulin (g/L) values with the advancement of age in turkey birds. *Schmidt et al. (2009)* observed the mean values of globulin as 0.4 ± 0.1, 0.5 ± 0.1, 0.5 ± 0.1 and 0.5 ± 0.1 in 76, 118, 133 and 148 day old turkey birds , respectively. However, present findings are not in accordance with the results of *Ibrahim, et al (2012)* who reported no significant different age groups. From the present study it was observed that age has partial influence on serum globulin concentration especially in early age.

Effect of age on Serum Glucose : The Serum Glucose (mg/dl) in different age groups ranged from 159.30 ± 4.79 to 176.57 ± 3.21 with no specific trend and the overall mean value observed was 168.60 ± 2.32. Statistical analysis revealed that there was no significant difference in the values of Serum Glucose almost among all age groups. From the data in the current study it was observed that the values of Serum Glucose followed no specific trend with the increase in value up to age of 14-16 weeks with a Grand mean value of 174.2 ± 6.78 mg/dl which are in close agreement with the findings of *Priya and Gomathy (2008)* who reported that values of Plasma Glucose increased gradually till the age group 12-18 weeks with the value of 178.55 ± 2.30 and further observed that the value of Plasma Glucose fluctuated without following any specific trend. *Suchy et al. (2009)* recorded the levels of blood glucose in 10 month old wild turkeys, Helmeted guinea fowl and in Japanese quail as 17.980 ± 1.566, 18.650 ± 2.275 and 18.320 ± 1.385 mmol/l, respectively. Thus, it can be concluded from present study that Serum Glucose followed nonspecific, non-significant trend with increasing in age indicating no influence of age.

Effect of age on Serum Triglycerides : The Serum

Triglycerides (mg/dl) in different age groups ranged from 54.38 ± 1.16 to 87.37 ±2.47 with no consistent trend and with the overall mean of 75.12 ± 1.75. Statistical analysis of the data revealed that there was no significant difference between Group II and III. However, these two groups were significantly different (p<0.01) from the values of Serum Triglycerides of Group I and IV. Further, there was no significant difference in the values of Group I and Group V. Present findings are in agreement with *Szabo et al. (2005)* who observed no trend in the mean values of triglycerides (Mmol/L) and reported mean values as 1.58 ± 0.15, 0.50 ± 0.10, 0.75 ± 0.36, 0.58 ± 0.04, 0.41 ± 0.06, 0.89 ± 0.46 at 3 days, 4 weeks, 8 weeks, 12 weeks, 16 weeks and 18 weeks of age in turkeys, respectively.

Effect of age on Serum Total Cholesterol : The Serum Total Cholesterol (mg/dl) levels in different age groups ranged from 168.44 ± 2.48 to 185.21 ± 2.45 with almost an increasing trend and the Grand mean of 176.25 ± 1.19. These values showed an increasing trend up to the age of 17-19 weeks, which declines in adults. Statistical analysis of the data revealed that there was no significant difference between Group I and II and between groups III and IV along with significant difference (p<0.01) in the values between former two groups and later two groups. The Serum Cholesterol value of Group V was significantly different (p<0.01) from Group III and group IV both. However, this value of Group 1 and Group V did not differ significantly from Group I and II. These findings were in close agreement with Priya and Gomathy (2008), in arbitrarily similar age groups, who reported that the values of cholesterol showed an increasing trend up to an age group of 18-26 weeks and thereafter declined gradually. *Coles (1986)* reported that cholesterol level in avian blood is affected by age, heredity, nutrition and liver activities. *Konicki et al (1999)* estimated mean total cholesterol level of 121.5 ± 11.25 mg/dl in 9 weeks old turkeys, which was corroborated with Group I in the present findings. *Szabo et al. (2005)* reported the values in 3 days, 4 weeks, 8 weeks, 12 weeks, 16 weeks and 18 weeks as 3.03 ± 0.33, 3.34 ± 0.34, 4.16 ± 0.76, 3.47 ± 0.32, 2.81 ± 0.46 and 3.04 ± 0.47 mmol/l, respectively. *Huff et al. (2008)* reported the cholesterol value in 14 week old turkey birds as 164 .5 mg/dl which are in close agreement with our findings. The wide range observed in the values

was in agreement with *Coles (1986)* who had reported the range for cholesterol value as 100-200 mg/dl in most birds. From the data it was inferred that age plays an important role in the concentration of serum total cholesterol in different age groups with almost an increasing trend.

Effect of age on HDL Cholesterol : The HDL Cholesterol in different age groups ranged from 25.10 ± 0.46 to 33.08 ± 0.37 with inconsistent trend and the overall mean value observed was 28.56 ± 0.37. Statistical analysis of the data revealed that there was significant difference (p<0.01) between Group IV and V both and Group I, II and III. However, there was no significant difference between Group I and II and between Group I and III.

Szabo et al. (2005) observed an inconsistent trend in the mean values of HDL cholesterol and reported mean values as 1.57 ± 0.17, 1.82 ± 0.16, 2.38 ± 0.41, 2.19 ± 0.27, 1.80 ± 0.39 and 2.00 ± 0.34 in 3 days, 4 weeks, 8 weeks, 12 weeks, 16 weeks and 18 weeks as mmol/l, respectively in turkeys. It may be inferred from the present study that there is no influence of age on the values of HDL cholesterol. Present findings with respect to the values of HDL cholesterol in different age groups could not be compared much with the previous data since the information available with respect to their levels in different age groups is very scanty.

Effect of age on LDL Cholesterol : The LDL cholesterol (mg/dl) in different age groups ranged from 121.10 ± 2.65 to 142.38 ± 2.45 and the overall mean value observed was 132.67 ± 1.34.

Statistical analysis of the data revealed that there was no significant difference (p<0.01) between the values of Group I and II and between Group III and Group IV. However, these values of former two groups differs significantly (p<0.01) from that of latter two groups. Further there was no significant difference between the values of Group V and Group I. However, the value of Group V was significantly different from rest of the groups. The values observed in the study followed an increasing trend up to the age of 17-19 weeks which declined thereafter in Group V indicating partial influence of age. Present findings with respect to the values of LDL cholesterol in different age groups could not be compared with the previous data since the information is not available.

CONCLUSION

Thus, it can be concluded that there is a significant influence of age on biochemical parameters like serum total proteins and albumin. Age also has partial influence on serum globulin, Serum total cholesterol and LDL cholesterol especially at early age but there is no influence of age on Serum Glucose, HDL cholesterol and Serum triglycerides.

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