



ISSN (E): 2277- 7695  
ISSN (P): 2349-8242  
NAAS Rating 2017: 5.03  
TPI 2017; 6(3): 223-225  
© 2017 TPI  
www.thepharmajournal.com  
Received: 04-01-2017  
Accepted: 05-02-2017

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## Changes in serum biochemical constituents of *Pati* ducks (*Anas platyrhynchos domesticus*)

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### Abstract

In the present investigation, the randomly selected 30 birds were divided into 6 groups. The five groups of birds were kept for different periods i.e. 2 weeks, 8 weeks, 20 weeks, 30 weeks and 40 weeks. Blood samples about 2-3 ml were collected from the wing veins of each bird under aseptic condition by using insulin syringe. From the study it is observed that Alkaline phosphatase decreased significantly with age i.e. for 2 to 40 weeks while AST, ALT, CPK, glucose, protein, cholesterol, creatinine and triglycerides increased significantly ( $P < 0.0001$ ) with age.

**Keywords:** *Pati* ducks, biochemical, age, thyroid gland

### 1. Introduction

The '*Pati*' duck population constitutes a major indigenous non-descript duck variety in Assam. Duck rearing plays an important role in the upliftment of the socio-economic condition of the rural population and thus playing a vital role in rural economy of Assam. Literature on the biochemical studies in '*Pati*' ducks is scanty and therefore, this research programme was taken up on ducks aiming at understanding the changes of certain biochemical parameters with age.

### 2. Materials and methods

In the present investigation, a total of 30 *Pati* ducks were utilized. The ducks were randomly divided into five (5) groups consisting of six (6) birds in each group the five groups of birds were sacrificed at 5 different age viz. 2 weeks, 8 weeks, 20 weeks, 30 weeks and 40 weeks. Blood samples 2-3 ml were collected from the wing veins of each bird under aseptic condition by using insulin syringe for day old ducks and 5ml syringes for the other age groups. Collected blood samples were transferred to 15ml glass centrifuge tubes and to sterilized test tubes with anticoagulant sodium fluoride (10mg/ml) and EDTA (1ml/ml) for blood glucose and blood glucose was estimated immediately after collection of samples. The samples those were transferred to 15ml glass centrifuged tubes allowed to clot in room temperature. Then the tubes were centrifuged at 3000 rpm for 15 minutes. After the serum was separated, it was kept in plastic vials and stored in deep freeze at  $-20^{\circ}\text{C}$  for estimation of blood constituents. The various biochemical parameters considered for estimation are alkaline phosphatase, alanine transaminase, total protein, creatinine, glucose, aspartate transaminase, creatinine phosphokinase, cholesterol, and triglycerides. The methods used for the estimation of biochemicals are shown in table 1.

### 3. Results

The serum alkaline phosphatases level in Assam *Pati* ducks showed decreasing trend with age from day-old duckling to adults. The average serum alkaline phosphatase (ALP) level in 2 weeks old ducks was  $185.062 \pm 1.365$  U/L and in 40 weeks old ducks was  $12.912 \pm 0.209$  U/L. The level of serum alanine transaminase (ALT) increased with age from 2 weeks to 40 weeks birds. The average serum ALT level in 2 weeks old ducks was  $250.971 \pm 0.597$  U/L and in 40 weeks adults was  $1021.240 \pm 0.590$  U/L. The serum Aspartate transaminase (AST) level in serum increased with age in ducks. The average serum level of AST in 2 weeks old ducks was  $46.398 \pm 1.305$  U/L and in 40 weeks old adults was  $419.553 \pm 1.169$  U/L. The level of serum creatine phosphokinase (CPK) increased with age from 2 weeks old ducks to 40 weeks birds. The mean serum CPK level in 2 weeks old ducks was  $1205.20 \pm 1.256$  U/L and in 40 weeks old ducks was  $3783.06 \pm 37.739$  U/L. The level of protein increased with age from 2 weeks old ducks to 40 weeks birds.

The mean protein level in 2 weeks old ducks was 3.085± 0.061 g/dl and in 40 weeks old ducks was 4.783± 0.014 g/dl. The glucose level increased from 2 weeks old ducks to 40 week birds. The serum level of glucose in 2 weeks old ducks was 16.306 ± 0.016 mg/dl while in 40 weeks adults was 109.921 ± 0.001 mg/dl. The level of creatinine increased with age from 2 weeks old ducks to 40 weeks birds. The average serum creatinine level in 2 weeks old ducks was 3.135± 0.058 mg/dl and in 40 weeks old adults was 6.616± 0.041 mg/dl. The serum cholesterol level increased from 2 weeks old ducks

to 40 weeks old birds. The average serum level of cholesterol in 2 weeks old ducks was 138.338 ± 0.033 mg/dl while in adult ducks was 270.469 ± 0.792 mg/dl. The triglycerides level increased with age from 2 weeks old ducks to 40 weeks. The mean serum triglycerides level in 2 weeks old ducks was 104.188± 0.057 mg/dl and in 40 weeks old adult ducks was 295.594± 0.026 mg/dl. The serum level of all the estimated biochemicals from 2 weeks old ducks to 40 weeks old are shown in table 2.

**Table 1:** The methods used for the estimation of biochemicals as given below

Sl. No.	Biochemical parameter	Diagnostic Kits	Methods
1.	Alkaline phosphatase (U/L)	Siemens Lid., 589,Sayajpura,Ajwa Road Vadodara-390019	PNPP Method
2.	Alanine transaminase (U/L)	Siemens Lid., 589,Sayajpura,Ajwa Road Vadodara-390019	IFCC Method
3.	Aspartate transaminase(U/L)	Siemens Lid., 589,Sayajpura,Ajwa Road Vadodara-390019	UV Kinetic (IFCC) Method
4.	Creatinine phosphokinase(U/L)	Siemens Lid., 589,Sayajpura,Ajwa Road Vadodara-390019	UV Kinetic (IFCC) Method
5.	Total Protein (g/dl)	Siemens Lid., 589,Sayajpura,Ajwa Road Vadodara-390019	Biuret Method
6.	Glucose(mg/dl)	Coral clinical systems; Verna Ind. Estate, Verna, Goa-403722.	GOD/POD Method
7.	Creatinine (mg %)	Coral clinical systems; Verna Ind. Estate, Verna, Goa-403722.	Alkaline-Picrate method
8.	Cholesterol (mg/dl)	Coral clinical systems; Verna Ind. Estate, Verna, Goa-403722.	CHOD/PAP Method
9.	Triglycerides (mg/dl)	Coral clinical systems; Verna Ind. Estate, Verna, Goa-403722.	GPO/PAP Method

**Table 2:** The serum level of all the estimated biochemicals from day-old ducklings to 40 weeks old are shown below

Biochemical Parameters	Age groups				
	2 weeks	8 weeks	20 weeks	30 weeks	40 weeks
Alkaline phosphatases (U/L)	185.062 ± 1.365 <sup>b</sup>	132.407 ± 0.877 <sup>d</sup>	89.063 ± 0.318 <sup>e</sup>	45.06 ± 0.781 <sup>f</sup>	12.912 ± 0.209 <sup>g</sup>
Alanine transaminase (U/L)	250.971± 0.597 <sup>b</sup>	787.461± 0.823 <sup>d</sup>	835.170± 0.557 <sup>e</sup>	920.630± 0.850 <sup>f</sup>	1021.240± 0.590 <sup>g</sup>
Aspartate transaminase (U/L)	46.39 8± 1.305 <sup>b</sup>	171.56 6± 2.962 <sup>d</sup>	287.839 ± 1.616 <sup>e</sup>	374.598 ± 4.056 <sup>f</sup>	419.553 ± 1.169 <sup>g</sup>
Creatine phosphokinase (U/L)	1205.20 ± 1.256 <sup>b</sup>	2049.64 ± 18.002 <sup>d</sup>	2969.99 ± 10.853 <sup>e</sup>	3233.81 ± 18.429 <sup>f</sup>	3783.06 ± 37.739 <sup>g</sup>
Protein (g/dl)	3.085± 0.061 <sup>b</sup>	3.795± 0.133 <sup>d</sup>	4.025± 0.876 <sup>e</sup>	4.334± 0.017 <sup>f</sup>	4.783± 0.014 <sup>g</sup>
Glucose (mg/dl)	16.306 ± 0.016 <sup>b</sup>	71.304 ± 0.128 <sup>d</sup>	96.905 ± 0.146 <sup>e</sup>	105.494 ± 0.547 <sup>f</sup>	109.921 ± 0.001 <sup>g</sup>
Creatinine (mg/dl)	3.135± 0.058 <sup>b</sup>	5.345± 0.114 <sup>d</sup>	5.776± 0.032 <sup>e</sup>	6.320± 0.013 <sup>f</sup>	6.616± 0.041 <sup>g</sup>
Cholesterol (mg/dl)	138.338 ± 0.033 <sup>b</sup>	192.205 ± 0.011 <sup>d</sup>	206.496 ± 0.014 <sup>e</sup>	221.223 ± 0.011 <sup>f</sup>	270.469 ± 0.792 <sup>g</sup>
Triglycerides (mg/dl)	104.188± 0.057 <sup>b</sup>	190.331± 0.097 <sup>d</sup>	265.303± 0.111 <sup>e</sup>	280.773± 0.276 <sup>f</sup>	295.594± 0.026 <sup>g</sup>

Means with different superscripts differ significantly.

#### 4. Discussion

The serum alkaline phosphatases activity in Assam *Pati* ducks showed decreasing trend with age from 2 weeks old ducks to 40 weeks adult. This might be due to decrease of metabolism in liver with age. This decreasing trend was also observed by Turan *et al.* (2011) [6] in humans. The mean serum alkaline phosphatase level in in 2 weeks old ducks was 185.062 ± 1.365 U/L and in 40 weeks old ducks was 12.912 ± 0.209 U/L. This was similar to findings of Newman (1997) [3] in adult horned puffin. The serum alanine transaminase activity in Assam *Pati* ducks from 2 weeks old ducks to 40 weeks birds increased with increasing age. The mean serum ALT level in 2 weeks old ducks was 250.971 ± 0.597 U/L and in 40 weeks adults was 1021.240 ± 0.590 U/L. This was similar to the findings of Newman (1997) [3] in adult Ancient murrelet. The serum AST activity in Assam *Pati* ducks increased with age from 2 weeks old ducks to 40 weeks. Satish (2013) [4] had reported an increase in ALT and AST activity with increase in body weight. This might be responsible for the increase in ALT and AST activity with increase in age of the ducks in our study. The mean serum level of AST in 2 weeks old ducks was 46.39 8 ± 1.305 U/L and in 40 weeks old adults was 419.553 ± 1.169 U/L. This was also similar to the findings of Scholtz (2009) [5] in adult Japanese quail. The serum creatinine phosphokinase activity in Assam *Pati* ducks from 2 weeks old ducks to 40 weeks increased with age. This might be due to the fact that with age the muscular activity increases so the level of CPK might have increased. The mean serum

CPK level in 2 weeks old ducks was 1205.20 ± 1.256 U/L and in 40 weeks old ducks was 3783.06 ± 37.739 U/L. Newman (1997) [3] also reported a similar finding in adult Pelagic cormorant. The serum protein level in Assam *Pati* ducks increased with age from 2 weeks old ducks to 40 weeks ducks. This might be due to increase of protein synthesis with advancement of age (Kaneko *et al.*, 2008) [1]. The mean protein level in 2 weeks old ducks was 3.085± 0.061 g/dl and in 40 weeks old ducks was 4.783± 0.014 g/dl. Our observations were in parallel to that of Newman (1997) [3] in adult murrelet birds. The serum glucose level in Assam *Pati* ducks also increased from 2 weeks old ducks to 40 week birds. This might be because of increased carbohydrate metabolism with age. The serum level of glucose in 2 weeks old ducks was 16.306 ± 0.016 mg/dl while in 40 weeks adults was 109.921 ± 0.001 mg/dl. This was in accordance to the reports of Mahanta *et al.* (1997) [2] in adult stage of *Pati* ducks. The serum level of creatinine increased with age from 2 weeks old ducks to 40 weeks birds. This might be due to the fact that creatinine is mainly produced by the metabolism of creatine or creatine phosphate in skeletal muscle which have increased with advancement of age. The average serum creatinine level in 2 weeks old ducks was 3.135± 0.058 mg/dl and in 40 weeks old adults was 6.616± 0.041 mg/dl. Similar pattern of finding was also observed by Scholtz (2009) [5] in Japanese quail. The serum cholesterol level increased with increasing age in Assam *Pati* ducks in our study. This might be related with lipid metabolism with advanced age. The

average serum level of cholesterol in 2 weeks old ducks was  $138.338 \pm 0.033$  mg/dl while in adult ducks was  $270.469 \pm 0.792$  mg/dl. Similar finding was also observed by Newman (1997) [3] in adult Glaucoco-winged cull birds. The mean serum triglycerides level in 2 weeks old ducks was  $104.188 \pm 0.057$  mg/dl and in 40 weeks old adult ducks was  $295.594 \pm 0.026$  mg/dl. Newman (1997) [3] also reported similar reports in adult Black legged kiitiwake.

## 5. Conclusion

It can be concluded that the observations in the present study establish a major role in recording blood biochemistry with advancement of age in *Pati* ducks of Assam. It will furthermore, help the researchers for further study and also in diagnosis of certain disease condition.

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