



ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2022; SP-11(9): 2693-2695
© 2022 TPI
www.thepharmajournal.com
Received: 09-07-2022
Accepted: 13-08-2022

Kulajit Kalita
Department of Anatomy and
Histology, College of Veterinary
Science, AAU, Guwahati, Assam,
India

Jiten Rajkhowa
Department of Anatomy and
Histology, College of Veterinary
Science, AAU, Guwahati, Assam,
India

Snehangsu Sinha
Department of Anatomy and
Histology, College of Veterinary
Science, AAU, Guwahati, Assam,
India

Shantanu Tamuly
Department of Biochemistry,
College of Veterinary Science,
AAU, Guwahati, Assam, India

Nikhil Ch. Nath
Department of Physiology,
College of Veterinary Science,
AAU, Guwahati, Assam, India

Joga Dev Mahanta
Department of Poultry Science,
College of Veterinary Science,
AAU, Guwahati, Assam, India

Studies of serum biochemical and hematological parameters of Pati ducks (*Anas platyrhynchos domesticus*) of Assam

Kulajit Kalita, Jiten Rajkhowa, Snehangsu Sinha, Shantanu Tamuly, Nikhil Ch. Nath and Joga Dev Mahanta

Abstract

In the present investigation was undertaken for study of serum biochemical and hematological parameters of Pati ducks in their postnatal development. Randomly selected 24 birds were divided into four groups and they were kept for different ages i.e. 1 week, 8 weeks, 16 weeks and 24 weeks. It was observed that ALP decreased significantly ($p \leq 0.01$) with age i.e. for 1 to 24 weeks while AST and ALT increased significantly ($p < 0.05$) with age. The GGT level and RBC count was non-significant. The WBC count and Hb level was found significantly ($p < 0.01$) low in 1 week Pati duck compared to other age groups. The PCV was found significantly ($p < 0.01$) highest at 24 week of Pati duck.

Keywords: Ducks, Pati, hematological, biochemical, age

1. Introduction

Duck farming is an important component of an integrated farming system and plays a significant role in women's empowerment and improving the socioeconomic status of the farming community in Assam. Assam's 'Pati' duck is commonly used for meat, eggs and ritual sacrifices. It was recognized as a registered breed of duck by the ICAR Breed Registration Committee with accession number INDIA_DUCK_0200_PATI_11001 in the year 2017 [National Bureau of Animal Genetic Resources, Karnal (Haryana), India. 2010] with the estimated population of about 18.21 lakhs. Since, there is scanty literature on the detailed serum biochemical and hematological parameter of pati duck and therefore, this study was designed on pati ducks aiming at understanding the changes of certain biochemical and hematological parameters with age.

2. Materials and Methods

The present study used 24 Pati ducks. The ducks were randomly divided into four (4) groups, each group containing six birds and they were kept for different ages i.e. 1 week, 8 weeks, 16 weeks and 24 weeks. Blood samples were collected from the wing veins of each bird under aseptic condition by using 5ml syringes and transferred to 2 ml K3EDTA(EDTA/K3E) tube for routine examination of blood constituents such as red blood cell (RBC), white blood cell (WBC), hemoglobin (Hb) and packed cell volume (PCV). Those samples were transferred to 4ml Gel and Clot Activator (Gel/SST) tubes were left to clot at room temperature. In the next step, the tubes were centrifuged for five minutes at 2000 rpm. After serum separation, kept in plastic vials and stored in a -20°C freezer for estimation of enzymes such as aspartate aminotransferase (AST), alanine aminotransferase (ALT), alkaline phosphatase (ALP), Gamma-glutamyltransferase (GGT). The methods used to estimate biochemical parameters are presented in Table 1.

Corresponding Author:

Kulajit Kalita
Department of Anatomy and
Histology, College of Veterinary
Science, AAU, Guwahati, Assam,
India



Fig 1: The Photograph shows the blood collection from the wing vein of pati duck

3. Results

The aspartate aminotransferase, alanine aminotransferase, alkaline phosphatase, gamma-glutamyltransferase, red blood cell, white blood cell, hemoglobin, packed cell volume observed in Pati ducks at 1 week, 8 weeks, 16 weeks and 24 weeks of age is presented in Table 2. The ALP level decreased significantly ($p \leq 0.01$) with age i.e. for 1 to 24 weeks while AST and ALT increased significantly ($p < 0.05$) with age. The GGT level and RBC count was non-significant. The WBC count and Hb level was found significantly ($p < 0.01$) lower at 1 week of Pati duck as compared to the other age groups. The PCV was found significantly ($p < 0.01$) highest at 24 week of Pati duck.

Table 1: Methods used for the estimation of biochemical parameters as given below

SI. No.	Biochemical parameter	Diagnostic Kits	Methods
1	Alkaline phosphatase (U/L)	Medsourse Ozone Biochemical Pvt. Ltd.	DGKC Method/DEA Buffer
2	Alanine aminotransferase (U/L)	Medsourse Ozone Biochemical Pvt. Ltd.	IFCC Modified
3	Aspartate aminotransferase (U/L)	Medsourse Ozone Biochemical Pvt. Ltd.	IFCC Modified
4	Gamma-glutamyltransferase (U/L)	Aspen Laboratories Pvt. Ltd.	SZASZ method

Table 2: Blood biochemical and hematological parameters from 1-week ducklings to 24 weeks old pati duck are shown below

Parameters	Age groups			
	1 week	8 weeks	16 weeks	24 weeks
Aspartate aminotransferase (U/L)	7.91±1.06 ^b	10.24±1.33 ^{ab}	11.68±1.79 ^{ab}	15.31±2.45 ^a
Alanine aminotransferase (U/L)	12.52±1.46 ^c	30.19±6.45 ^b	46.55±7.22 ^a	54.46±4.96 ^a
Alkaline phosphatase (U/L)	64.33±4.70 ^a	55.14±9.81 ^a	29.41±7.76 ^b	17.00±3.59 ^b
Gamma-glutamyltransferase (U/L)	3.96±1.08	2.90±0.60	4.15±0.69	4.44±1.73
RBC Count (million/mm ³)	2.83±0.16	3.09±0.28	2.92±0.19	2.83±0.38
WBC Count (thousand/mm ³)	35.48±1.97 ^a	46.55±1.37 ^b	43.59±1.19 ^b	42.00±1.07 ^b
Hemoglobin (g/dl)	7.63±0.17 ^b	10.4±1.31 ^a	11.28±0.85 ^a	11.43±0.21 ^a
Packed cell volume (%)	37.12±1.26 ^b	37.85±1.33 ^b	41.15±0.56 ^{ab}	42.7±0.81 ^a

Means with different superscripts in row were differ significantly.

4. Discussion

The serum aspartate aminotransferase level in Pati ducks significantly increased with increasing age i.e. from 1 week old ducklings to 24 weeks old birds. The mean serum AST level in 1 week, 8 weeks, 16 weeks and 24 weeks of age were 7.91±1.06 U/L, 10.24±1.33 U/L, 11.68±1.79 U/L and 15.31±2.45 U/L, respectively. This was similar to the findings of Hmangaihuali (2020) [6] in ducks. The serum alanine aminotransferase level in Pati ducks significantly increased with age from 1 week old to 24 weeks. Satish (2013) [12] had reported an increase in AST and ALT activity with increase in body weight. This might be responsible for the increase in AST and ALT activity with increase in age of the ducks in our investigation. The mean serum alanine aminotransferase level in 1 week, 8 weeks, 16 weeks and 24 weeks of age were 12.52±1.46 U/L, 30.19±6.45 U/L, 46.55±7.22 U/L and 54.46±4.96 U/L, respectively. This was similar to the findings of Newman (1997) [10] in adult ancient murrelet and Kalita *et al.* (2011) [7] in chicken. The serum alkaline phosphatases level showed significantly decreasing trend with age from 1 week duckling to 24 weeks old *Pati* ducks. It might be due to decrease metabolism of liver as reported by Sinha *et al.* (2017) [13] in *Pati* duck of Assam. The average serum alkaline phosphatase level in 1 week, 8 weeks, 16 weeks and 24 weeks old *Pati* ducks were 64.33±4.70 U/L, 55.14±9.81 U/L, 29.41±7.76 U/L and 17.00±3.59 U/L, respectively. This was similar to findings of Ahmed (2018) [2] in ducks. The serum gamma-glutamyltransferase level slightly elevated at 24 weeks of age in *Pati* ducks. Cafe *et al.* (2012) [3] had reported an increase GGT enzyme activity with increase in body growth. The mean GGT level in 1 week, 8 weeks, 16 weeks and 24 weeks of age were 3.96±1.08 U/L, 2.90±0.60 U/L,

4.15±0.69 U/L and 4.44±1.73 U/L, respectively. This was similar to the findings of Szabo *et al.* (2014) [14] in adult barn owls. The average Red Blood Cell count of *Pati* duck in 1 week, 8 weeks, 16 weeks and 24 weeks of age were 2.82±0.16 million/mm³, 3.09±0.28 million/mm³, 2.92±0.19 million/mm³ and 2.83±0.38 million/mm³, respectively. There was no significant difference among the different age groups, thus no age related change in the RBC count was found in *Pati* duck of Assam. This was similar to the findings with Dalai *et al.* (2015) [4] in Indian runner duck (2.46±0.11 millions/mm³) and in Japanese quail (2.16±0.84 millions/mm³) and Kalita *et al.* (2011) [7] in the indigenous chicken (2.66±0.06 million/cu mm). The slight variation might be due to variation in age, species and breed, which affect the erythropoiesis. The average value of WBC count in 1 week, 8 weeks, 16 weeks and 24 weeks of age were 35.48±1.97 thousand/mm³, 46.55±1.37 thousand/mm³, 43.59±1.19 thousand/mm³ and 42.00±1.07 thousand/mm³, respectively. The WBC count was found significantly ($p < 0.01$) lower at 1 week of *Pati* duck as compared to the other age groups. The findings were similar with Hmangaihuali (2020) [6] in 1 month duckling (58.20±1.55 thousand/mm³) and 40 weeks duck (30.82±3.88 thousand/mm³). However, the findings were higher than the recorded count by Aade *et al.* (2012) [1] in *Gallus gallus domesticus* (26.2±1.5 x10³ /ml). The difference might be attributed to the age and species variation and stress related to environment. The average value of hemoglobin in 1 week, 8 weeks, 16 weeks and 24 weeks of age were 7.63±0.17 g/dl, 10.4±1.31 g/dl, 11.28±0.85 g/dl and 11.43±0.21 g/dl, respectively. The level of Hb for 1 week was significantly lower ($p < 0.01$) than the other age groups. The values were similar with the observation by Kavitha *et al.* (2016) [8] in

white Peking duck (9.7 ± 1.15 g/dl) and in indigenous duck (10.39 ± 0.14 g/dl) and Ahmed (2018)^[2] in day old ducklings (12.86 ± 0.30 g/dl) and 24 weeks old duck (12.65 ± 0.45 g/dl). The slight variation of Hb level might be attributed to change demands of oxygen for activity. The average concentrations of PCV in 1 week, 8 weeks, 16 weeks and 24 weeks of age were $37.12 \pm 1.26\%$, $37.85 \pm 1.33\%$, $41.15 \pm 0.56\%$ and $42.7 \pm 0.81\%$, respectively. The PCV was found significantly ($p < 0.01$) higher at 24 week of Pati duck as compared to 1st week and 8th week age. The PCV of 16 weeks did not differ much as compared to other period of experiment. The findings were in the similar range with observation by Okeudo *et al.* (2003)^[11] in duck ($41.17 \pm 3.13\%$), Dalai *et al.* (2015)^[4] in Indian runner duck ($41.24 \pm 1.40\%$), Kalita *et al.* (2011)^[7] in the indigenous chicken ($35.67 \pm 0.80\%$) and Deka (2018)^[5] in 1 week duckling ($36.52 \pm 1.09\%$) and 42 weeks duck ($42.38 \pm 0.40\%$). It might be due to age, different varieties of duck as well as different agro-climatic condition of the birds.

5. Conclusion

The present investigation revealed that most of the parameters under study except GGT level and RBC count showed significantly higher values between the various groups of *Pati* ducks. This might be due to the various anatomical, biochemical and physiological changes in body pertaining to growth with the advancement of age in *Pati* ducks. It can be concluded that the observations in the present study establish a major role in recording the biochemical and hematological parameters with advancement of age of *Pati* ducks of Assam. It might be helping the researchers for further study, preparation of effective production strategy and also in diagnosis of certain disease condition.

6. References

1. Aade UP, Wankhede HJ, Kaldate KD. Haematological parameters change in *Gallus gallus domesticus* infected with cestode parasite. International Multidisciplinary Research Journal. 2012;2(4):13-15.
2. Ahmed J. Post Natal Development of Some Lymphoid Organs of Pati Duck (*Anas platyrhynchos domesticus*) of Assam, M.V.Sc. Thesis, Assam Agricultural University; c2018.
3. Cafe MB, Rinaldi FP, Morais HR, Nascimento MRBM, Mundim AV, Marchini CFP. Biochemical Blood Parameters of Broilers at Different Ages under Thermoneutral Environment. WPC2012 - Salvador - Bahia - Brazil; c2012.
4. Dalai M, Puspamitra S, Bhattacharjee A, Acharya D, Acharya G, Mohanty PK. Comparative haematology of *Anas platyrhynchos* (Anseriformes) and *Coturnix coturnix japonica* (Galliformes). J Entomol. Zool. Stud. 2015;3(5):50-53.
5. Deka A. Postnatal Development of Lymph Node and Gut Associated Lymphoid Tissue (GALT) of Intestine in Relation to Bursa of Fabricius of Pati Duck (*Anas platyrhynchos domesticus*) of Assam. PhD Thesis, Assam Agricultural University; c2018.
6. Hmangaihzuoli EVL. Anatomical Study of the Post-Natal Development of Male Genital System of Pati Duck (*Anas platyrhynchos*) of Assam. PhD Thesis, Assam Agricultural University; c2020.
7. Kalita N, Barua N, Sarmah S, Islam R, Pathak N. Blood chemical profile in indigenous chicken of Assam, The Indian Veterinary Journal. 2011;88(12):59-61.
8. Kavitha K, Raj Manohar G, Vairamuthu S, Ramamurthy

- N. Haematological study in white pekin and indigenous ducks of Tamil Nadu. International Journal of Science, Environment and Technology. 2016;5(4):2621-2624.
9. NBAGR. Registered breeds of duck National Bureau of Animal Genetic Resources, Karnal-132001 (Haryana). nbagr.res.in/regduck.html; c2010.
10. Newman SH, Piatt JF, White J. Hematological and plasma biochemical reference ranges of Alaskan seabirds: their ecological significance and clinical importance. Colonial Water Birds. 1997;20(3):492-504.
11. Okeudo NJ, Okoli IC, Igwe GOF. Hematological characteristics of ducks (*Cairina moschata*) of Southeastern Nigeria, Tropicultura. 2003;21(2):61-65.
12. Satish K. Serum aminotransferase levels in healthy population from western India, Indian J Med. Res. 2013;138(6):894-899.
13. Sinha S, Sarma M, Nath R, Devchoudhury KB. Changes in serum biochemical constituents of Pati ducks (*Anas platyrhynchos domesticus*). The Pharma Innovation Journal. 2017;6(3):223-225.
14. Szabo Z, Klein A, Jakab C. Hematologic and plasma biochemistry reference intervals of healthy adult barn owls (*Tyto alba*). Avian Dis. 2014;58(2):228-231.