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Biochemical as well as hematological studies of pati duck (*Anas platyrhynchos domesticus*) of Assam at their different stages of development

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Abstract
Purpose: The study on biochemical and hematological studies of Pati duck (*Anas platyrhynchos domesticus*) of Assam at their different stages of development is of great value in regard to diseases control. The aim of the study was to evaluate the biochemical and hematological studies of Pati duck of Assam at their different stages of development.
Materials and Methods: The present studies were conducted on 45 numbers of Pati duck of Assam of irrespective of sex at different stages of development. The birds were divided into five groups *viz.*, 1st week, 4th week, 16th week, 24th week and 42nd week of age. The ducks were procured from Pathsala and nearby area of Bajali district of Assam. 10ml of blood samples were collected from each bird of each experimental group, 5ml of which were transferred to sterilized test tube containing EDTA for hematological study *viz.* Total Leucocytes Count, Total Erythrocytes Count, Haemoglobin and Packed Cell Volume. The remaining 5 ml blood were transferred to 15ml glass centrifuged tube to be centrifuged at 3000 rpm for 15 minutes, the supernatant (serum) of which were utilized for different biochemical test *viz.* alkaline phosphatase and acid phosphatase. The data were analyzed as per methods described by Snedecor and Cochran (1994) and were presented accordingly.
Results: In the present study the serum alkaline phosphatase was found in Pati ducks at 1st, 4th, 16th, 24th and 42nd week of age was 337.01 ± 8.77 U/L, 194.46 ± 1.28 U/L, 123.02 ± 4.98 U/L, 103.79 ± 0.97 U/L and 72.33 ± 3.07 U/L, respectively. The serum acid phosphatase level estimated in the present study was found in Pati duck recorded as was 5.11 ± 2.12 IU/L,6.09 ± 0.81 IU/L,7.90 ± 1.76 IU/L, 5.35 ± 0.23 IU/L and 7.27 ± 0.59 IU/L during 1st, 4th, 16th, 24th and 42nd week of age of duck, respectively. The mean value of hemoglobin in 1st week, 4th week, 16th week, 24th week and 42th week old duck were 12.29 ± 0.64 g/dl, 14.93 ± 1.42 g/dl, 17.26 ± 0.30 g/dl, 16.01 ± 1.00 g/dl and 15.38 ± 0.42 g/dl, respectively. The average Total Leucocytes Count levels in 1st and 16th week age groups were found to be 55.78± 4.16 m/mm^3 and 66.52 ± 0.32 m/mm^3, respectively. There was significant difference (P< 0.05) of Total Leucocytes Count level between age group I and III and also between group II and IV. The average Total Erythrocyte Count level in group I. II, III, IV and V were 2.28 ± 0.15 m/mm^3, 2.07 ± 0.08 m/mm^3, 2.05 ± 0.01 m/mm^3, 2.30 ± 0.09 m/mm^3 and 2.44 ± 0.03 m/mm^3, respectively. The average value of Packed Cell Volume was 36.52 ± 1.09,40.10 ± 1.69, 34.81 ± 0.53,41.21± 0.82 and 42.38 ± 0.40% during 1st week, 4th week, 16th week, 24th week and 42 weeks of age of Pati duck, respectively.

Keywords: Biochemical, haematological, pati, duck, different, stages

Introduction
Duck husbandry plays an important role in the Socio-economic upliftment of the rural poor people of Assam. They require lesser attention and thrive well in scavenging conditions. The peculiar agro-climatic condition with marshy and waterlogged areas prevailing throughout the state provides a very congenial environment for rearing ducks in Assam. Duck husbandry provides an additional source of income to the rural women of these states. The Pati is a major indigenous duck breed in the state of Assam. The Annual egg production per *Pati* duck is70-95eggs, (Kalita *et al*., 2009). Since there is very scanty literature on the details biochemical and haematological parameter of Pati duck being a local breed of Assam, hence the present study was designed to established biochemical as well as haematological norms of Pati duck at their different stages of development.

Aim and Objective
The aim of the study was to evaluate the biochemical and hematological studies of Pati duck of Assam at their different stages of development being a local breed of Assam.

Materials and Methods

The present studies were conducted on 45 numbers of Pati duck of Assam of irrespective of sex at different stages of development. The birds were divided into five Groups *viz.*, 1st week, 4th week, 16th week, 24th week and 42nd week of age. The ducks were procured from Pathsala and nearby area of Bajali district of Assam. The research was carried out in the Department of Veterinary Biochemistry and Veterinary Anatomy & Histology, College of Veterinary Science, Assam Agricultural University, Khanapara, Guwahati, Assam for period of five years from 2013-2018. 10ml of blood samples were collected from each bird of each experimental group, 5ml of which were transferred to sterilized test tube containing EDTA for hematological study *viz.* Total Leucocytes Count, Total Erythrocytes Count, Haemoglobin and Packed Cell Volume. The remaining 5ml blood were transferred to 15ml glass centrifuged tube to be centrifuged at 3000 rpm for 15 minutes, the supernatant (serum) of which were utilized for different biochemical test *viz.* alkaline phosphatase and acid phosphatase. The data were analyzed as per methods described by Snedecor and Cochran (1994) [9] and were presented accordingly.

Results

In the present study the serum alkaline phosphatase was found in Pati ducks at 1st, 4th, 16th, 24th and 42nd week of age was 337.01 ± 8.77 U/L, 194.46 ± 1.28 U/L, 123.02 ± 4.98 U/L, 103.79 ± 0.97 U/L and 72.33 ± 3.07 U/L, respectively (Table.1). It showed decreasing trend with age from 1st to 42nd week of age of Pati duck. The mean value of serum alkaline phosphatase level in 1st week of age was 337.01±8.77 and 42nd week of age of duck was 72.33±3.07 U/L respectively. There was significant difference ($P< 0.01$) between the various age groups in serum alkaline phosphatase level.The serum acid phosphatase level estimated in the present study was found in Pati duck recorded as was 5.11 ± 2.12 IU/L,6.09 ± 0.81 IU/L,7.90 ± 1.76 IU/L, 5.35 ± 0.23 IU/L and 7.27 ± 0.59 IU/L during 1st, 4th, 16th, 24th and 42nd week of age of duck, respectively. (Table. 2). The mean value of serum acid phosphatase level during duckling (1st week) and adult stage (42nd week) was 5.11 ± 2.12 IU/L and 7.27 ± 0.59 IU/L, respectively. There was no significant difference ($P< 0.05$) among the various age groups of Pati duck in serum acid phosphatase level.

The hemoglobin level was from 1st weeks to 42th week 11age of Pati duck and presented in Table. 3. The mean value of hemoglobin in 1st week, 4th week, 16th week, 24th week and 42th week old duck were 12.29 ± 0.64 g/dl, 14.93 ± 1.42 g/dl, 17.26 ± 0.30 g/dl, 16.01 ± 1.00 g/dl and 15.38 ± 0.42 g/dl, respectively (Table.3). There was significant difference ($P< 0.05$) among the different age groups. Total leukocyte count of 1st weeks to 42 weeks age of age of Pati duck are presented in Table.3. The average TLC levels in 1st and 16th week age groups were found to be 55.78± 4.16 m/mm^3 and 66.52 ± 0.32 m/mm^3, respectively. There was significant difference ($P< 0.05$) of TLC level between age group I and III and also between group II and IV. The total erythrocyte counts of 1st weeks to 42 weeks age of Pati duck are presented in Table 4.21. The average TEC level in group I. II, III, IV and V were 2.28 ± 0.15 m/mm^3, 2.07 ± 0.08 m/mm^3, 2.05 ± 0.01 m/mm^3, 2.30 ± 0.09 m/mm^3 and 2.44 ± 0.03 m/mm^3, respectively (Table.3). There was highly significant difference ($P< 0.05$) among the age groups. The average value of PCV was 36.52 ± 1.09, 40.10 ± 1.69, 34.81 ± 0.53,41.21± 0.82 and 42.38 ± 0.40% during 1st week, 4th week, 16th week, 24th week and 42 weeks of age of Pati duck, respectively (Table.3). The mean value of the PCV was highly significant ($P< 0.01$) between the various age groups.

Discussion

In the present study the serum alkaline phosphatase was found in Pati ducks at 1st, 4th, 16th, 24th and 42nd week of age was 337.01 ± 8.77 U/L, 194.46 ± 1.28 U/L, 123.02 ± 4.98 U/L, 103.79 ± 0.97 U/L and 72.33 ± 3.07 U/L, respectively (Table.1). It showed decreasing trend with age from 1st to 42nd week of age of Pati duck. It might be due to decrease metabolism of liver as reported by Sinha *et al.* (2017) [8] in Pati duck of Assam. The mean value of serum alkaline phosphatase level in 1st week of age was 337.01±8.77 and 42nd week of age of duck was 72.33±3.07 U/L respectively. There was significant difference ($P< 0.01$) between the various age groups in serum alkaline phosphatase level. Sinha *et al.*, (2017) [8] recorded that the serum alkaline phosphatase level of Pati duck was 185.062 ± 1.365, 168.029 ± 0.756, 89.063 ± 0.318, 45.060 ± 0.781 and 12.912 ±0.209 at 2nd, 4th, 20th, 30thand 40th week of age, respectively. Deka *et al.* (2017) [2] recorded that the serum alkaline phosphatase level in Pati and Chara-Chemballi ducks at 42nd week of age were 28.10±1.87 U/L and 51.03±51.03±1.52 U/L, respectively. The level of ALP reported in Pati duck of Assam was 82.46±5.29 µ moles p-nitrophenol/min/liter (Mahanta *et al.*, 1994) [5]. Further Mahanta *et al.* (1997) [6] reported that the mean value of ALP during laying period was 28.3±2.5 and 32.24± 3.11 KA Units/100ml in Chara and Chemballi duck, respectively.The serum acid phosphatase level estimated in the present study was found in Pati duck recorded as was 5.11 ± 2.12 IU/L,6.09 ± 0.81 IU/L,7.90 ± 1.76 IU/L, 5.35 ± 0.23 IU/L and 7.27 ± 0.59 IU/L during 1st, 4th, 16th, 24th and 42nd week of age of duck, respectively.(Table.2).The mean value of serum acid phosphatase level during duckling (1st week) and adult stage (42nd week) was 5.11 ± 2.12 IU/L and 7.27 ± 0.59 IU/L, respectively. There was no significant difference ($P< 0.05$) among the various age groups of Pati duck in serum acid phosphatase level. Mahanta *et al.* (1994) [5] found that the mean value of acid phosphatase was 3.90±0.10 µ moles p-nitrophenol/min/liter in Pati duck of Assam during pre-laying period.

The hemoglobin level was from 1st weeks to 42th week 11age of Pati duck and presented in Table. 3. The mean value of hemoglobin in 1st week, 4th week, 16th week, 24th week and 42th week old duck were 12.29 ± 0.64 g/dl, 14.93 ± 1.42 g/dl, 17.26 ± 0.30 g/dl, 16.01 ± 1.00 g/dl and 15.38 ± 0.42 g/dl, respectively (Table.3). There was significant difference ($P< 0.05$) among the different age groups. Mulley (1979) [7] found the mean value of hemoglobin as 12.96±1.36 (g/100ml) in Black duck. The mean value of hemoglobin (g/dl) was recorded to be 9.72 ± 0.27 in the indigenous chicken of Assam. (Kalita *et al.* 2011) [3]. Dalai *et al.* (2015) [1] recorded that the mean value of Hb of Indian Runner duck was 13.76±0.31g/dl. The variation of values of hemoglobin concentration in different studies might be due to species variation. The Total leukocyte count of 1st weeks to 42 weeks age of age of Pati duck are presented in Table.3. The average TLC levels in 1st and 16th week age groups were found to be 55.78± 4.16 m/mm^3 and 66.52 ± 0.32 m/mm^3, respectively. There was significant difference ($P< 0.05$) of TLC level

between age group I and III and also between group II and IV. Mulley (1979) [7] found the mean value of leucocytes as 19.70±6.60 ($X10^3/mm^3$) in Black duck. The mean values of leukocytes were 25.70 ±0.68% in the indigenous chicken of Assam (Kalita *et al*. 2011) [3]. Dalai *et al.* (2015) [1] recorded that the mean values of TLC of 6282 ± 343.23 thousands/mm^3. It might be due to species variation as well as agro-climatic condition of the birds. The total erythrocyte counts of 1st weeks to 42 weeks age of Pati duck are presented in Table 4.21. The average TEC level in group I. II, III, IV and V were 2.28 ± 0.15 m/mm^3, 2.07 ± 0.08 m/mm^3, 2.05 ± 0.01 m/mm^3, 2.30 ± 0.09 m/mm^3 and 2.44 ± 0.03 m/mm^3, respectively (Table.3). There was highly significant difference ($P< 0.05$) among the age groups. Mulley (1979) [7] recorded that in Black duck the mean value of Erythrocytes was 2.78±0.22($X10^6/mm^3$). The mean values of total RBC 2.66±0.06 million/cu mm in the indigenous chicken of Assam. (Kalita *et al*. 2011) [3]. Dalai *et al.* (2015) [1] recorded that the mean value of TEC of Indian Runner duck was 2.46 ± 0.11 million/mm^3.The average value of PCV was 36.52 ± 1.09,40.10 ± 1.69, 34.81 ± 0.53,41.21± 0.82 and 42.38 ± 0.40% during 1st week, 4th week, 16th week, 24th week and 42 week of age of Pati duck, respectively (Table.3). The mean value of the PCV was highly significant ($P< 0.01$) between the various age groups Koch *et al.* (1973) reported that the mean value of PCV in duck was 39.5%. Mulley (1979) [7] found that in Black duck the mean value of packed cell volume 40.24±4.29%. The mean values of PCV 35.67±0.80% in the indigenous chicken of Assam. (Kalita *et al*. 2011) [3]. Dalai *et al.* (2015) [1] recorded that the mean value of PCV of Indian Runner duck was 41.24±1.40%. It might be due to different varieties of duck as well as different agro-climatic condition of the birds.

Table 1: Mean ± SE value of serum alkaline phosphatase level of pati duck at different age group

Experimental Group	Age in week	Alkaline Phosphatase
I	1st	337.01±8.77a
II	4th	194.46±1.28b
III	16th	123.02±4.98c
IV	24th	103.79±0.97d
V	42nd	72.33±3.07e

Mean with different superscripts are significantly different from each other

Table 2: Mean ± se value of serum acid phosphatase level of pati duck at different age group

Experimental Group	Age in week	Acid Phosphatase
I	1st	5.11±2.12
II	4th	6.09±0.81
III	16th	7.90±1.76
IV	24th	5.35±0.23
V	42nd	7.27±0.59

Mean with different superscripts are not significantly different among the various age groups

Table 3: Mean ± SE value of the TLC, TEC, Hb and PCV of Pati duck at different age group.

Experimental Group	Age in week	TLC (m/mm^3)	TEC (m/mm^3)	Hb (g/dl)	PCV (%)
I	1st	55.78±4.16	2.28±0.15ab	12.29±0.64b	36.52±1.09b
II	4th	53.91±5.59	2.07±0.08b	14.93±1.42a	40.10 ± 1.69a
III	16th	66.52±0.32	2.05±0.01b	17.26±0.30a	34.81±0.53b
IV	24th	53.29±4.24	2.30±0.09ab	16.01±1.00a	41.21±0.82a
V	42nd	58.31±1.60	2.44±0.03a	15.38±0.42a	42.38±0.40a

Mean with different superscripts are significantly different from each other.

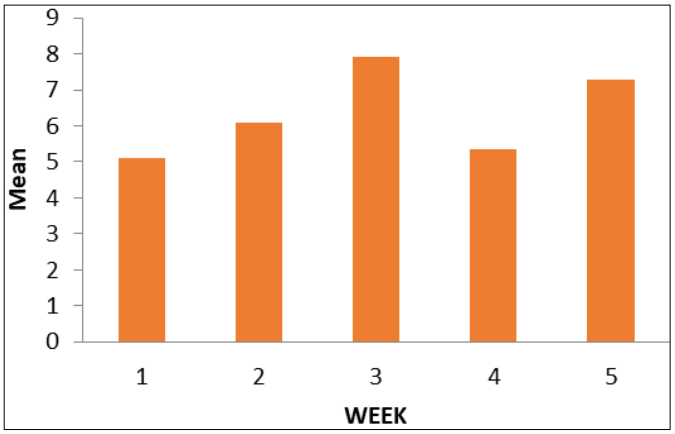

Fig. 1. Graphical representation of mean value of serum acid phosphatase level of Pati duck at different age groups

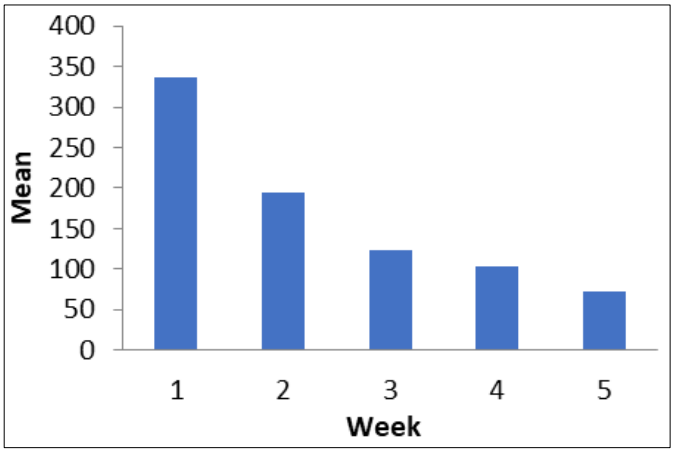

Fig 2 Graphical representation of mean value of serum alkaline phosphatase level of Pati duck at different age groups

Conclusion

Thorough knowledge of the biochemical and hematological studies of Pati duck (*Anas platyrhynchos domesticus*) of Assam at their different stages of development is very essential in elucidating its role in physiology, pathologist,

poultry scientists and microbiologist for effective production strategy as well as disease control regime. In the current study the serum alkaline phosphatise showed decreasing trend with age from 1st to 42nd week of age of Pati duck. The mean value of serum alkaline phosphatase level in 1st week of age was 337.01±8.77 and 42nd week of age of duck was 72.33±3.07 U/L respectively. There was significant difference ($P< 0.01$) between the various age groups in serum alkaline phosphatase level. The mean value of serum acid phosphatase level during duckling (1st week) and adult stage (42nd week) was 5.11 ± 2.12 IU/L and 7.27 ± 0.59 IU/L, respectively. There was no significant difference ($P< 0.05$) among the various age groups of Pati duck in serum acid phosphatase level. The mean value of hemoglobin in 1st week, 4th week, 16th week, 24th week and 42th week old duck were 12.29 ± 0.64 g/dl, 14.93 ± 1.42 g/dl, 17.26 ± 0.30 g/dl, 16.01 ± 1.00 g/dl and 15.38 ± 0.42 g/dl, respectively. There was significant difference ($P< 0.05$) among the different age groups. The average Total Leucocytes Count levels in 1st and 16th week age groups were found to be 55.78± 4.16 m/mm^3 and 66.52 ± 0.32 m/mm^3, respectively. There was significant difference ($P< 0.05$) of TLC level between age group I and III and also between group II and IV. The average Total Erythrocytes Count level in group I. II, III, IV and V were 2.28 ± 0.15 m/mm^3, 2.07 ± 0.08 m/mm^3, 2.05 ± 0.01 m/mm^3, 2.30 ± 0.09 m/mm^3 and 2.44 ± 0.03 m/mm^3, respectively. There was highly significant difference ($P< 0.05$) among the age groups. The average value of Packed Cell Volume was 36.52 ± 1.09,40.10 ± 1.69, 34.81 ± 0.53,41.21± 0.82 and 42.38 ± 0.40% during 1st week, 4th week, 16th week, 24th week and 42 weeks of age of Pati duck, respectively. The mean value of the Packed Cell Volume was highly significant ($P< 0.01$) between the various age groups. This study will helpful for poultry physiologist, pathologist, poultry scientists and microbiologist for effective production strategy as well as disease control regime.

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