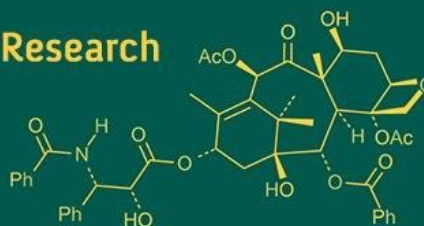


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Dhaval M Chauhan
Department of Veterinary
Anatomy & Histology, College
of Veterinary Science & A.H.,
Anand, Gujarat, India

AN Rathva
Department of Veterinary
Anatomy & Histology, College
of Veterinary Science & A.H.,
Anand, Gujarat, India

PR Vasava
Department of Veterinary
Anatomy & Histology, College
of Veterinary Science & A.H.,
Anand, Gujarat, India

Corresponding Author:
Dhaval M Chauhan
Department of Veterinary
Anatomy & Histology, College
of Veterinary Science & A.H.,
Anand, Gujarat, India

Comparative study on Differential Leucocytes Count (DLC) of different breeds of fowl (*Gallus gallus domesticus*)

Dhaval M Chauhan, AN Rathva and PR Vasava

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Abstract

There is lack of information regarding the Differential Leucocytes Count (DLC) in the poultry breeds i.e. Rhode island red, Kadaknath, naked neck and frizzled feather, so that present study was carried out. 2-3 ml of blood from wing vein of 6 fowls of each breed was collected in the vacutainer containing K₃E.D.T.A. The mean $\pm$ SE (range) of the Differential Leucocytes Count (DLC) was differed non-significantly ($p>0.05$) amongst different breed of fowl studied presently.

Keywords: Differential leucocyte count, poultry breeds, Rhode Island Red, Kadaknath, naked neck

Introduction

Indian Poultry Industry is one of the fastest growing segments of the agricultural sector today in India. Today India is world's fifth largest egg producer and the eighteenth largest producer of broilers (Mehta and Nambiar, 2002) [7]. There are various breeds of poultry reared in the India. Among those breeds, the Rhode Island Red (American class breed), kadaknath, Frizzled Feather and Naked neck (Indian class breed) are covered under present study for counting of the diffential leucocyte count.

Materials and Methods

The present study was carried out on the diffential leucocyte count of the Kadaknath, Naked neck, Rhode Island Red and Frizzled feather female fowl (*Gallus gallus domesticus*). The blood sample of about 2-3 ml quantity was collected aseptically from the wing vein, in the Vacutainer (EzeeVAC) containing K₃E.D.T.A as an anticoagulant. The samples were immediately then transferred to physiological laboratory for Total Erythrocytes Count (TEC).

Requirements

Modified Wright stain (300 mg of Wright stain & 30 mg of Giemsa stain grounded in mortar until dissolved in 100 ml of absolute methyl alcohol. This stain can be used after 24 hours.

Staining procedure

1. Place the slide on the staining rack and with the help of dropper pour, 4-10 drops of stain. Allow the concentrated stain to act for 1 minute. Sufficient stain must be pour as to prevent evaporation of alcohol during the fixation period.
2. Equal drops of distilled water or buffer must be added and mixed thoroughly by blowing or by applying air with the medicine dropper. Continue mixing until a metallic film forms on the surface of the stain-distilled/buffer mixture.
3. The diluted stain was allowed to act for 2-4 minutes.
4. The metallic film was floated off with the distilled water by flooding the slide with water.
5. The smear was air dried and then viewed under microscope.

The differential count was obtained by Battlement method. It is the method in which count is made of three horizontal edge fields followed by two fields towards the centre (so as to give

three vertical fields), followed by two fields in a horizontal and then two fields in the vertical direction to reach the edge again. A total of hundred cells are counted and each type of cells are expressed in percentage (Jain, 1986) [4].

Results and Discussion

Differential Leucocytes Count (DLC)

Heterophils

Heterophils (%) in Naked neck was found to be the highest 28.33 ± 1.68 (%) (22.00-30.00) followed by Rhode Island Red 27.68 ± 1.25 (%) (21.00-28.00), Frizzle feather 26.20 ± 0.80 (%) (18.00-29.00) and least in Kadaknath 25.67 ± 0.55 (%) (17-28.00)

The observations of present study are not in agreement with the result of Adnan and Babji (1985) [1], who made a study on blood of Malaysian jungle fowl and determined that the mean value of the Heterophils (%) was 51.30 ± 7.16 which is nearly double then present results. The value of heterophils is higher in Malaysian jungle fowl due to probably during domestication a change in ratio of lymphocytes and heterophils could have taken place.

Levi *et al.*, (1989) [6] conducted a study on the blood of clinically normal 35 Ostriches and reported that the mean value of Heterophils (%) was 62.6 ± 7.6 .

Fudge (1995) [16] observed the haematological parameters of adult Emu and found that the mean value of Heterophils (%) was 78.8 (54.00-88.00).

Reddy *et al.*, (2003) [13] in their study on the blood samples of Emu of two years reported that the Heterophils (%) was 42-78.

Chemmalar S. (2012) [3] studied the blood samples of 6 Emu and found that the mean value of Heterophils (%) was 66.5 ± 3.47 , the present study in all breed of fowl have lower value than the results reported.

The results obtained in present study are very much similar with the results of various scientists viz. Simarks *et al.*, (2004) [15], who carried out studies on the blood sample of 20 Thai chicken in each male and female bird and found the mean value of Heterophils were (%) 25.40 ± 5.12 and 22.00 ± 8.78 , respectively.

Pampori and Iqbal (2007) [10] conducted a study on the blood of 55 native chicken of Kashmir and reported the mean value of Heterophils was (%) 26.32.

Agboola *et al.*, (2013) [17] reported the Heterophils (%) was 27.75 in Nigerian broiler chicken.

Hachesoo *et al.*, (2013) [18] observed that in adult chicken of North-West Iran, the mean value of Heterophils was (%) 28.30 ± 3.77 .

Kumar and Kumbhakar (2015) [5] worked on blood of aseel bird and observed that the Heterophils (%) was 25.70 ± 0.68 .

Sharmin and Myenuddin (2004) [14] conducted a study on the blood of 40 native each male and female chicken of Bangladesh and reported the mean value of Heterophils (%) in male and female were (%) 22.8 ± 1.06 and 19.4 ± 0.60 , respectively.

Orawan and Aengwanich (2007) [9] reported the Heterophils (%) was 16.9, which is lower than the value obtained in the present study.

Lymphocytes

The men value of lymphocytes was the highest in Naked neck (%) 66.83 ± 0.81 (52.00-74.00), followed by Frizzle feather (%) 65.66 ± 1.52 (53.00-70.00), Kadaknath (%) 65.33 ± 1.62 (50.00-69.00) and least in Rhode Island Red (%)

64.37 ± 1.38 (48.00-67.00).

The present findings are in agreement with the study of Simarks *et al.*, (2004) [15], who carried out studies on the blood sample of 20 Thai chicken in each male and female bird and found the mean values of Lymphocytes (%) were 60.30 ± 5.33 and 67.05 ± 11.49 respectively. Agboola *et al.*, (2013) [17] reported that Lymphocytes (%) was 62.92 in Nigerian broiler chicken. Hachesoo *et al.*, (2013) [18] observed that in adult chicken in North-West Iran Lymphocytes (%) was 65.39 ± 4.50 . Kumar and Kumbhakar (2015) [5] worked on blood of aseel bird and observed that the Lymphocytes (%) was 60.23 ± 0.26 .

Adnan and Babji (1985) [1] made a study on blood of Malaysian jungle fowl and determined the mean value of the Lymphocytes (%) as 31.3 ± 5.55 . Pampori and Iqbal (2007) [10] conducted a study on the blood of 55 native chicken of Kashmir and reported the mean value of Lymphocytes (%) was 49.48. Levi *et al.*, (1989) [6] conducted a study on the blood of clinically normal 35 Ostriches and reported that the Mean $\pm$ SE of Lymphocytes (%) was 34.1 ± 7.0 . Fudge (1995) [16] observed the haematological parameters of adult Emu and gave the mean value of Lymphocytes (%) was 19.8 (10.00-44.00). Reddy *et al.*, (2003) [13] in their study on the blood samples of Emu of two years reported that the lymphocytes (%) were 10-39. Chemmalar S. (2012) [3] studied the blood samples of 6 Emu and found that the mean value of Lymphocytes (%) was 30.38 ± 3.47 , which is very much low than the present results studied in different breed of fowl.

Sharmin and Myenuddin (2004) [14] conducted a study on the blood of 40 native each male and female chicken of Bangladesh and reported that the Lymphocytes (%) was 62.0 ± 2.85 and 70.6 ± 0.37 , respectively. Orawan and Aengwanich (2007) [9] reported that in Thigh indigenous chicken, Lymphocytes (%) was 73.13 which are higher than the values obtained in the present study.

Eosinophils

The mean value of Eosinophils (%) was the highest in Kadaknath, 2.67 ± 0.66 (1.00-5.00), followed by Frizzle feather 2.66 ± 0.33 (2.00-4.00), Naked neck 2.50 ± 0.42 (1.00-4.00) and least in Rhode Island Red 2.33 ± 0.42 (1.00-4.00).

The present study is in agreement with the result of Fudge (1995) [16], who observed that the haematological parameters of adult Emu and gave the mean value of Eosinophils (%) was 2.58 (0-6.00). Reddy *et al.*, (2003) [13] in their study on the blood samples of Emu of two years reported that the Eosinophils (%) were 2-3. Agboola *et al.*, (2013) [17] reported that in Nigerian broiler chicken the Eosinophils (%) was 2.57. Hachesoo *et al.*, (2013) [18] observed in adult chicken in North-West Iran and found that the Eosinophils (%) was 2.60 ± 1.26 .

Levi *et al.*, (1989) [6] conducted a study on the blood of clinically 35 normal Ostriches and reported that the Mean $\pm$ SE of Eosinophils (%) was 0.3 ± 0.5 , Chemmalar S. (2012) [3] studied the blood samples of 6 Emu and found that the mean value of Eosinophils (%) 1.5 ± 0.38 , which is very low than the results of present study.

The mean value of Eosinophils (%) studied presently in all fowl are lower than the observations of Adnan and Babji (1985) [1], who made a study on blood of Malaysian jungle fowl and determined the mean value of the DLC as Eosinophils (%) was 4.3 ± 1.80 . Sharmin and Myenuddin (2004) [14] conducted a study on the blood of 40 native each

male and female chicken of Bangladesh and reported that in male and female the Eosinophils (%) were 3.15 ± 0.75 and 1.80 ± 0.52 , respectively. Simarks *et al.*, (2004) [15] carried out studies on the blood sample of 20 Thai chicken in each male and female bird and found the mean value of Eosinophils (%) were 7.35 ± 2.91 and 4.30 ± 3.59 , respectively. Orawan and Aengwanich (2007) [9] reported that the Eosinophils (%) was 3.90 in the blood samples of Thai indigenous chicken. Pampori and Iqbal (2007) [10] conducted a study on the blood of 55 native chicken of Kashmir and reported that the Eosinophils (%) was 8.69. Kumar and Kumbhakar (2015) [5] worked on blood of aseel bird and observed that mean value of Eosinophils (%) was 6.59 ± 0.18 .

Basophils

Basophils (%) was the highest in Kadaknath 1.83 ± 0.60 (0.00-4.00), followed by Frizzle feather 1.67 ± 0.55 (0.00-4.00), Rhode Island Red 1.66 ± 0.55 (1.00-4.00) and least in Naked neck 0.83 ± 0.52 (0.00-2.00).

The present study is in agreement with the observations of Reddy *et al.*, (2003) [13] in their study on the blood samples of Emu of two years reported that the value of Basophils (%) was 0-2. Sharmin and Myenuddin (2004) [14] conducted a study on the blood of 40 native each male and female chicken of Bangladesh and reported that in male and female the mean value of Basophils (%) were 1.0 ± 0.00 and 1.80 ± 0.52 , respectively. Chemmalar S. (2012) [3] studied the blood samples of 6 Emu and found that the mean value of Basophils (%) was 0.75 ± 0.16 .

The mean values of basophils studied presently in all fowl are lower than the results of Adnan and Babji (1985) [1] in the blood of Malaysian jungle fowl and found that the mean value of Basophils (%) was 4.6 ± 3.26 . Simarks *et al.*, (2004) [15] carried out studies on the blood sample of 20 Thai chicken in each male and female bird and reported that the mean values of Basophils (%) were 2.70 ± 2.13 and 2.60 ± 2.16 , respectively. Orawan and Aengwanich (2007) [9] reported that Basophils (%) was 2.33 in the blood samples of Thai indigenous chicken. Pampori and Iqbal (2007) [10] conducted a study on the blood of 55 native chicken of Kashmir and reported the Basophils (%) was 3.19. Kumar and Kumbhakar (2015) [5] worked on blood of aseel bird and observed that the mean value of Basophils (%) was 2.47 ± 0.10 .

Levi *et al.*, (1989) [6] conducted a study on the blood of clinically normal 66 Ostriches and reported that the mean value of Basophils (%) was 0.2 ± 0.5 . Fudge (1995) [16] observed the haematological parameters of adult Emu and gave the mean value of Basophils (%) was 0.2 (0-1.00). Agboola *et al.*, (2013) [17] reported that in Nigerian broiler chicken Basophils (%) was 0.25. Hachesoo *et al.*, (2013) [18] observed the haematological parameters of adult chicken in North-West Iran and found that the Basophils (%) 0.40, which is much lower than the present study.

Monocytes

Monocytes (%) was the highest in Naked neck, 2.83 ± 0.60 (1.00-4.00), followed by Kadaknath, 1.83 ± 0.30 (0.00-2.00) Rhode Island Red 1.16 ± 0.40 (0.00-3.00) and least in Frizzle feather 0.83 ± 0.30 (1.00-2.00).

The findings of present studies are in agreement with the results of Levi *et al.*, (1989) [6], who conducted a study on the blood of clinically normal 66 Ostriches and reported that

the mean value of Monocytes (%) was 2.8 ± 1.3 . Reddy *et al.*, (2003) [13] in their study on the blood samples of Emu of two years reported that the value of Monocytes (%) was 1-3. Sharmin and Myenuddin (2004) [14] conducted a study on the blood of 40 native each male and female chicken of Bangladesh and reported that the mean values in male and female Monocytes (%) were 1.65 ± 0.49 and 2.75 ± 0.79 , respectively. Hachesoo *et al.*, (2013) [18] observed the haematological parameters of adult chicken in North-West Iran and reported that the mean value of Monocytes (%) was 3.40 ± 1.07 . Chemmalar S. (2012) [3] studied the blood samples of 6 Emu and found that the mean value of Monocytes (%) was 0.88 ± 0.13 .

Fudge (1995) [16] observed the haematological parameters of adult Emu and gave the mean value of Monocytes (%) was 0.1 (0-1.00), which is lower than the present results.

The mean values of Monocytes studied in all fowl are much lower than the results of Adnan and Babji (1985) [1]. They studied the blood of Malaysian jungle fowl and determined the mean value of Monocytes (%) was 8.60 ± 4.79 . Simarks *et al.*, (2004) [15] carried out studies on the blood sample of 20 Thai chicken in each male and female bird and found that the mean values of Monocytes (%) were 4.35 ± 3.15 & 4.05 ± 3.39 respectively. Orawan and Aengwanich (2007) [9] reported that the Monocytes (%) were 3.68 in the blood samples of Thai indigenous chicken. Pampori and Iqbal (2007) [10] conducted a study on the blood of 55 native chicken of Kashmir and reported the Monocytes (%) was 10.85. Agboola *et al.*, (2013) [17] found that in Nigerian broiler chicken Monocytes (%) was 3.75. Kumar and Kumbhakar (2015) [5] worked on blood of aseel bird and observed that the mean value of the Monocytes (%) was 5.14 ± 0.28 .

Conclusion

The mean value of the Differential Leucocyte Count did not differs significantly ($p > 0.05$) amongst all the four breeds of fowl.

Authors' Contributions

DMC: Conducted the research work, which includes experimental design, a collection of the samples, staining procedure, micrometry of the stained sample and statistical analysis. ANR: Provided guidance during the entire experiment and corrected manuscript. PRV: Preparing and drafting the manuscript and Provided guidance. All authors read and approved the final manuscript.

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Competing Interests

The authors declare that they have no competing interests.

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