Haematological Analyses of Japanese Quail (Coturnix Coturnix Japonica) At Different Stages of Growth

Puspamitra Sujata¹, Mohanty P.K.¹ and Mallik B.K.²
¹P.G. Department of Zoology, Utkal University, Vani Vihar, Bhubaneswar-751 004, Odisha, INDIA
²Central Poultry Development Organisation (CPDO), Eastern Region, Govt. of India, Bhubaneswar-751 012, Odisha, INDIA

Available online at: www.isca.in, www.isca.me
Received 3rd August 2014, revised 8th October 2014, accepted 9th November 2014

Abstract

Japanese quail is a more disease resistant species than that of chicken and as poultry bird is a commercially much viable option due to its several other characteristics. The present study was carried out to compare the basic haematological parameters in Japanese quail reared in Central Poultry Development Organisation (CPDO), Eastern Region (ER), Govt. of India, Bhubaneswar. Blood samples were taken from the wing vein of 10 Japanese quails at different stages of growth, i.e., 1st, 2nd, 3rd, 4th, 5th, 6th and 9th week. Haematological parameters such as Haemoglobin (Hb), Red Blood Cell (RBC), White Blood Cell (WBC), Packed Cell Volume (PCV), and Erythrocytic indices, i.e., Mean Corpuscular Volume (MCV), Mean Corpuscular Haemoglobin(MCH), and Mean Corpuscular Haemoglobin Concentration(MCHC) of 10 clinically healthy birds were measured and expressed as mean±SE. Samples of different age groups are compared by using One Way ANOVA to assess the significance of differences at p<0.05, p<0.01 and p<0.001 by the help of Paleontological statistics (PAST) version 2.17. The mean value of Hb, RBC and PCV differed highly significantly (p<0.001) between different age groups of Japanese quail. WBC, MCH (p<0.01) and MCV, MCHC (p<0.05) indicate significant difference between different age groups. The study would help to draw conclusive findings regarding the health status of Japanese quail and serve as a suitable model organism for experimental study.

Keywords: Japanese quail, blood cell, haematological parameters, erythrocyte indices.

Introduction

Recently Japanese quail has emerged as a suitable option for diversification of poultry farming and exploration of popular delicacy of egg and meat. Japanese quail as poultry bird is a commercially much viable option due to its low volume and weight, early maturity and growth, high rate of egg laying, short generation interval, low feed and floor space requirement. Quail possesses excellent disease resistance than that of chickens¹. The Japanese quail belongs to the order Galliformes, family Phasinidae, genus Coturnix and species japonica. The scientific designation for Japanese quail is Coturnix japonica which is different from common quail (Coturnix coturnix)²³. The Haematological analysis is undertaken to evaluate the health status of bird along with diagnosis and clinical monitoring of any disease⁴. Haematological and biochemical analysis of the Japanese quail at different growth phases were done which showed that with age the biochemical profile of the bird changes, but on the other hand it does not seem to affect the haematological parameters⁵. Changes in the haematological profile in breeding and sexual maturation of Japanese quail were studied⁶. A haematological analysis is one method that contributes to detection of some changes in health status which may not be apparent during physical examination, but which affect the fitness of the birds⁷. Both haematological and biochemical blood values serve as indicators of the physiological state of birds⁸. The present study was designed to assess various haematological profiles of Japanese quails at different growth phases.

Material and Methods

The research work which involved laboratory experiments were done at Cytogenetic Laboratory of P.G. Department of Zoology, Utkal University, Vani Vihar, Bhubaneswar-751 004. The blood samples were collected from the poultry farm of Central Poultry Development Organisation (CPDO) Eastern Region (ER), Govt. of India, Bhubaneswar-751 012 where the birds were reared under standard management practice. The blood samples were collected by puncture of wing vein at different interval, i.e., 1st, 2nd, 3rd, 4th, 5th, 6th, and 9th week of age which marks different stages of growth and production. The bird attains its sexual maturity at 6th week and is at its fully laying stage during 9th week of its growth. For the haematological analysis, blood sample was collected from the birds with the proper restraint method by a 2.5ml capacity disposable syringe and were transferred immediately into the anti-coagulated vacutainer tubes and mixed properly. The collected samples were carried to the laboratory in ice box and preserved in refrigerator until analysed.

The Haematological parameters were determined using 10 clinically healthy Japanese quails. Blood samples were collected...
mostly during morning hours in between 8:00 am to 9:00 am from January to February. Blood cell analysis, i.e., Hemoglobin (Hb) was estimated by using Sahil’s Haemometry. Red Blood Cell (RBC) and White Blood Cell (WBC), was done with the help of Neubauer Haemocytometer having Neubauer chamber slide and Hund Wetzlar microscope. Packed cell volume (PCV) was determined with microhematocrit tube at 3500 rpm for 15 minutes by centrifuge machine. From these basic data erythrocytic indices, i.e., mean corpuscular volume (MCV), mean corpuscular haemoglobin (MCH) and mean corpuscular haemoglobin concentration (MCHC) were estimated by following procedures. The data was analysed and presented as mean± standard error (S.E) by using statistical software Microsoft office excel 2007 and one way analysis of variance (ANOVA) was used to assess the significance of differences at p<0.05, p<0.01 and p<0.001 by the help of Paleontological Statistics (PAST) version 2.17.

**Results and Discussion**

The mean and standard error on the haematological analysis of Japanese quail (Coturnix coturnix japonica) at different phases of growth, i.e., 1st, 2nd, 3rd, 4th, 5th, 6th, and 9th week of age were recorded which show significant difference (table-1). It is observed that the parameters namely Hb, RBC, WBC, PCV, MCV, MCH and MCHC are significant within different age group weeks. The haemoglobin level of the bird was observed to remain almost stable up to 5th week of age. A significant increase was observed between week 6 and week 9 of the laying period. The haemoglobin amount, red blood cell count, white blood cell and haematocrit (PCV) value increased with increase in age where as the values were lowest in chicks and highest in adults. This collaborates with studies done by some other researchers.

Haemoglobin (p<0.001), Red blood cell (p<0.001), white blood cell (p<0.01) and packed cell volume (p<0.001) show highly significant with the weekly growth performance of the birds. Packed cell volume or haematocrit determines the percentage of volume of red blood cells in whole blood, which was found to be the highest in ninth week and lowest in first week of age. PCV was also increased with age. An increase in PCV value is probably due to its higher growth rate, metabolic activities and production of gonadotropins, sex and metabolic hormones. The observation shows highly significant difference, i.e., (p<0.0001) within the age groups. The 1st, 2nd and 3rd weeks have significant difference with 9th week of growth period.

### Table-1

Mean and SE (n=10) of haematological parameters of Japanese quail at different stages of growth (age)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Chick</th>
<th>Grower</th>
<th>Adult</th>
<th>F value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1st week</td>
<td>2nd week</td>
<td>3rd week</td>
<td>4th week</td>
</tr>
<tr>
<td>Hb (g/dl)</td>
<td>7.16±0.71</td>
<td>7.09±0.23</td>
<td>7.57±0.14</td>
<td>8.75±0.32</td>
</tr>
<tr>
<td>RBC (10^6 mm^-3)</td>
<td>0.97±0.20</td>
<td>1.94±0.10</td>
<td>1.89±0.10</td>
<td>1.43±0.29</td>
</tr>
<tr>
<td>WBC (10^6 m^-3)</td>
<td>10307±181.38</td>
<td>10512.4±1097.23</td>
<td>17471.1±2934.3</td>
<td>17015±1676.14</td>
</tr>
<tr>
<td>PCV (%)</td>
<td>23.21±2.32</td>
<td>27.9±1.64</td>
<td>31.85±1.93</td>
<td>32.14±1.25</td>
</tr>
<tr>
<td>MCV (m3)</td>
<td>364.15±92.15</td>
<td>146.75±11.07</td>
<td>73.34±14.11</td>
<td>682.33±284.70</td>
</tr>
<tr>
<td>MCH (pg)</td>
<td>110.28±27.19</td>
<td>37.76±2.89</td>
<td>40.88±1.78</td>
<td>189.89±78.99</td>
</tr>
<tr>
<td>MCHC (%)</td>
<td>31.75±1.56</td>
<td>26.45±2.21</td>
<td>24.77±1.97</td>
<td>27.37±0.91</td>
</tr>
</tbody>
</table>

**Note:** * significant at (p<0.05), ** Significant at P<0.01, *** significant at P<0.001. Similar alphabet in the superscripts represents significant difference among the different age groups (weekly)
Conclusion

The study indicates that the Japanese quail possesses an excellent adaptation capacity as far as its haematological parameters are concerned for requirements of space flights, and seems to be a suitable species for long-time exposure to cosmic life conditions. This will provide a database for quail farmers, poultry industries, ornithologist, naturalists, pathologists, biologists and will be also helpful for veterinarians. It will also helps in analysis of summative health status of the quail approaching towards bird’s physiological and pathological conditions. This study concludes that the majority of haematological parameters for Japanese quail increases with advancement of growth.

Acknowledgement

The authors express their gratefulness to the Head and Cytogenetic laboratory, P.G. Dept. of Zoology, Utkal University, Vani Vihar, Bhubaneswar-751 004, Odisha for providing facilities. Thanks are also due to the Director, Central Poultry Development Organisation (CPDO), Eastern Region, Govt. of India, Bhubaneswar-751 012, Odisha, for providing blood samples from the farm for the investigation.

References