EFFECT OF HEAT STRESS ON HAEMATOLOGICAL AND IMMUNOLOGICAL PARAMETERS IN BROILER CHICKEN

R.K. Ravikumar, Amol S. Kinhekar, V. C. Ingle, Prashant Sonkusale, Sudhakar P. Awandkar, Prabhakar A. Tembhurne and Vipin Kumar

National Innovation Foundation-India, Satellite Complex, Premchand Nagar Road, Satellite, Ahmedabad, Gujarat 380 015

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Corresponding Author : ravikumar@nifindia.org

ABSTRACT

Environmental stress negatively affects health condition and immunity of broiler birds. The study was envisaged to understand the effect of heat stress on haematological and immunological parameters in broiler chicken under commercial production system. During summer season significant (P<0.05) increase in total erythrocyte count (TEC) and packed cell volume (PCV) was noticed. The environmental stress did not affect haemoglobin level among different age groups, however haematocrit values had shown significantly enhanced red blood cells. The total leucocyte count (TLC) was significantly (P<0.05) reduced from third week of age. Further, humoral response against Ranikhet Disease Virus (RDV) was significantly (P<0.05) decreased in fifth week of age. The study revealed that humoral immunity was affected and significant reduction in circulating white blood cells.

KEY WORDS : Broiler, Haematology, Heat Stress, Immunity

INTRODUCTION

Poultry production is an important economic activity for farming communities in tropical countries. The temperature above 30 ^{0}C leads to summer stress in broiler as well as in layer birds (Pandian *et al.*, 2012). Heat stress is significantly involved in homeostasis and cause negative effect on the health condition of broiler chickens (Toghyani *et al.,* 2006). Environmental thermal stress reduced immunity of broiler birds particularly against Ranikhet disease (Khattak *et al*., 2012). The haematological values are tools to assess health status of broiler chicks (Mohamed *et al.,* 2012). Altan *et al*., (2000) referred the response of leucocyte as an indicator of thermal stress in poultry. Hence, the study was conducted to ascertain the impact of heat stress on haematological and immune status of broiler birds.

MATERIALS AND METHODS

The study was carried out in the month of June-July 2014. During the study period the average temperature of the day was 37^{o} C with maximum temperature of 44 ^{o} C and relative humidity of 51 per cent. There were no rains during this period. The impact of heat stress was studied among different age groups of birds. A total of sixty broiler birds were randomly selected from main flock. They were kept separately under similar managerial conditions. All birds were vaccinated against Ranikhet disease on 7th and 21st day of age. Blood samples were collected randomly on 2nd, 3rd and 5th week of age from six birds per group. Haemagglutination Inhibition (HI) titre against New castle (Ranikhet) disease was assessed from each of these eighteen sera samples as per standard procedure (Tabidi *et al.* 2004). Blood samples were evaluated for hematological parameters such as haemoglobin (Hb%), packed cell volume (PCV%), total erythrocyte count (TEC) and total leucocyte count (TLC) as per Campbell (1995) and Nazify (1999). All parameters were statistically analysed using *t-test* as per method given by Gupta (2000) for inferring physiological response due to heat stress.

RESULTS AND DISCUSSION

Table 1. Haematological and Immunological response of Broiler birds (Mean±SE)

SN	Age	TEC ($x10^6$) (N=6)	TLC ($x10^3$) (N=6)	Hb% (N=6)	PCV% (N=6)	HI titre expressed at $Log_2 10$ (N=6)
1	2nd Week	1.06±0.21 a	14.49±4.07a	7.53±0.80 a	24.50±0.22 a	5.33±0.42a
2	3rd Week	1.92±0.32 b	3.99±2.76b	7.90±0.42 a	26.66±1.26 a	4.83±0.54a
3	5th Week	2.99±0.51 b	4.33±1.00b	7.77±0.11 a	28.66±0.67 b	3.67±0.42 b

Mean with different superscripts in a column differ significantly P< 0.05

The haematological and immunological parameters of broiler birds viz. TEC, TLC, Hb, PCV and HI titre are depicted in Table 1. The mean values of TEC of broiler birds during 3rd week (1.92±0.32) and 5th week (2.99±0.51) increased significantly (P<0.05) when compared with mean values during 2nd week (1.06±0.21). The haemoglobin (Hb) values did not show any significant changes (P<0.05) among different age groups. The study found that the summer stress did not affect haemoglobin concentration; however, increased total erythrocyte count was noticed. This is in accordance with findings of Ajakaiye *et al.* (2010) and Luger *et al*. (2003).

No significant (P<0.05) difference in mean value of PCV between 2nd week (24.50±0.22) and 3rd week (26.66±1.26) was noticed. However, the mean value of PCV differed significantly (P<0.05) during 5th week (28.66±0.67).

The mean value of total leukocyte count (TLC) during 3rd week (3.99±2.76) and 5th week (4.33±1.00) were decreased significantly (P<0.05) as compared to 2nd week (14.49±4.07). It reflected the status of immunity and response to heat stress among experimental birds (Elagib and Ahmed, 2011). Khattak *et al.* (2012) reported that broiler birds exposed to high ambient temperature cause release of corticosteroid from adrenal gland causing reduced immunity. The study was conducted to understand the protective nature of vaccination program in effectively preventing RDV infection. It was found that mean value of HI titre decreased in different age groups and significantly (P<0.05) decreased during 5th week (3.67±0.42). The RDV antibody titre tends to decrease after 3rd week of age in broiler birds due to summer stress. Similar finding were observed by Khattak *et al*. (2012) and Jadhav *et al.* (2014). Summer stress induces oxidative damage to lymphoid organs that leads to decreased antibody titre (Imtiaz *et al.,* 2014). The indigenous system of knowledge can complement poultry production system so as to alleviate broiler birds from heat stress (Patel *et al*., 2015).

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