

Different Blood Biochemistry Parameters of Broiler Chicken in Response to Newcastle Disease Virus in Hyderabad, Sindh

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ABSTRACT

Newcastle disease (ND) is a severe life-threatening viral infection of poultry birds in Pakistan. Current study was performed to evaluate effects of Newcastle disease virus on haematological changes in broiler chicken. Eighty (80) blood samples were collected from twenty (20) different farms of District Hyderabad clinically suspected of Newcastle disease infection & eighty (80) samples were collected from the healthy (ND free Broiler Flock) raised individually in the Department of Poultry Production, Sindh Agriculture University Tandojam. The data revealed that there is a sharp decline in values for total erythrocyte count, hemoglobin concentration, HCT, MCH & MCV for ND affected birds viz; (1.65±0.08, 8.9±0.22 & 22.78^b±1.07, 52.5^a±7.3 & 1.35.63^a±27 respectively) was significant (*p*-value<0.05) as compared to healthy broiler birds viz; (2.60^a±0.09, 10.5^a±0.35 & 27^a±0.53, 37.8^b±1.3 & 107.3^b±2.5 respectively). Values for MCHC (37.3^a±1.7 for healthy & 39.7^a±4.8 for ND-affected broiler birds) were not significant. Whereas for leukogram of group A, TLC, Heterophils, lymphocytes, monocytes & eosinophils for ND infected birds viz; (19.9^a±1.6, 19^b±0.05, 76^a±0.18, 4^b±0.18 & 3.5^b±0.04 was significant as compared to healthy broilers viz; (16.2^b±0.6, 25^a±0.05, 65^b±0.19, 8^a±0.19 & 4^a±0.03 respectively). Basophils of ND-infected & healthy broilers viz; 0.5^a±0.02 & 0.3^b±0.02 respectively were not found significant as *p*>0.05. It was also observed that ND virus has significantly affected haematology parameters in broiler birds.

Keywords: Broiler, Newcastle disease, Total erythrocyte count, Total leukocyte count

INTRODUCTION

In the last few decades, the poultry industry of Pakistan has shown extraordinary growth and instilled a lot in the economy of the country. However, this increasing growth of poultry is threatened by various factors most importantly deadly viral and bacterial diseases which affect negatively on its economic impact (Tripathy, 2004, Harrison et al.,

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2011) [1,2]. Newcastle disease is one of those infectious and contagious diseases which are badly affecting our broiler flocks. The very first outbreaks of Newcastle disease (ND) in poultry were noticed in 1926 in Java, Indonesia (Kraneveld, 1926) [3]. Afterward, this disease progressed in many countries of the world including Asian countries. In Pakistan, many outbreaks of ND were reported in different geographic areas in different time periods of the year. Broilers of all ages are susceptible to this infection & the severity of infection was seen in unvaccinated broilers, mixed infection, bad managemental conditions, and unhealthy feeding systems. Measurement of different parameters of blood provided valuable information about the health status of both humans and animals (Talebi et al., 2005) [4]. Esonu et al. (2001) [5] assured that hematological constituents reveal the physiological sensitivity of the animal to its inside and external environment. There is insufficient of information related to the effect of ND on the total erythrocyte count and haemoglobin concentration in Pakistan. This study was designed to study the effect of ND on Haemogram of broiler birds and to compare the haematological values of healthy broilers with the ND affected broiler birds.

MATERIAL AND METHODS

STUDY AREA

The study was carried out at the Department of Poultry Production, Sindh Agriculture University Tandojam. Twenty (20) broiler flocks clinically affected with ND reared in different areas of the District Hyderabad were selected for sampling. To record normal hematologic values, a broiler flock of eighty (80) birds was reared in the Department of Poultry Production, Sindh Agriculture University Tandojam.

SAMPLE COLLECTION

1.5 ml of blood from each broiler bird (infected & healthy) was collected in sterile, labeled anticoagulant (EDTA) added vacutainers. These tubes were place in ice box and shifted to

haematology laboratory of Faculty of Animal Husbandry and Veterinary Sciences, Sindh Agriculture University Tandojam for hematology studies. Blood Samples were divided into two groups i.e., Group A for normal broilers and Group B for ND infected broilers.

PROCESSING OF SAMPLES

Anticoagulant added whole blood was processed through automatic heamtology analyzer (URIT-2900) for estimation of hematological profile including; total erythrocyte count (TEC), haemoglobin concentration (Hb), hematocrit values (HCT), total leukocyte count (TLC) and differential leukocyte count (DLC). Erythrocytic indices including; mean corpuscular volume (MCV), mean corpuscular haemoglobin (MCH), and mean corpuscular haemoglobin concentration (MCHC) were also estimated (Shah et al., 2017) [6]. Total leukocyte count (TLC) and differential leukocyte count (DLC) were estimated manually through the standard procedure (Fudge and Alan, 2000) [7]. MCHC was calculated as according to the method as de- scribed by Jain (1993) [8]. HCT was calculated automatically by using an automatic heamtology analyzer (URIT-2900).

STATISTICAL ANALYSIS

The data thus obtained was compiled in Microsoft excel sheet and analysed through statistical analytical software (Statistics version 8.1). General analyses of variance test was used for haematological differences and means were compared by LSD at $p < 0.05$ level of significance (Shah et al., 2017) [9].

RESULTS AND DISCUSSION

A total of eighty (160) blood samples were analysed. Eighty samples collected from normal birds and eighty from birds infected with ND. The samples were processed for Hb, TEC, MCH, MCHC, MCV, TLC and DLC values. The detailed values for haematological parameters of ND infected and normal broiler birds are presented in Table 1.

Table 1: Haematological parameters of healthy and ND affected broiler birds

Parameter	Normal (Group A)	Infected (Group B)	P-value
TEC ($\times 10^6/\mu\text{l}$)	2.60 ^a \pm 0.09	1.65 ^b \pm 0.08	0.00*
Hb (g/dl)	10.5 ^a \pm 0.35	8.9 ^b \pm 0.22	0.02*
HCT (%)	27 ^a \pm 0.53	22.78 ^b \pm 1.07	0.00*
MCH (pg)	37.8 ^b \pm 1.3	52.5 ^a \pm 7.3	0.02*
MCV (fl)	107.3 ^b \pm 2.5	135.63 ^a \pm 27	0.04*
MCHC (g/dl)	37.3 ^b \pm 1.7	39.7 ^a \pm 4.8	0.06
TLC ($\times 10^3/\mu\text{l}$)	16.2 ^b \pm 0.6	19.9 ^a \pm 1.6	0.03*
Heterophil (%)	25 ^a \pm 0.05	19 ^b \pm 0.05	0.00*
Lymphocytes (%)	65 ^b \pm 0.19	76 ^a \pm 0.18	0.00*
Monocytes (%)	8 ^a \pm 0.19	4 ^b \pm 0.18	0.04*
Eosinophils (%)	4 ^a \pm 0.03	3.5 ^b \pm 0.04	0.01*
Basophils (%)	0.3 ^b \pm 0.02	0.5 ^a \pm 0.02	0.13

a, b means with different superscript with in row are significant at P-value <0.05; TEC: Total erythrocytes count; Hb: Hemoglobin; HCT: Hematocrit; MCV: Mean corpuscular volume; MCH: Mean corpuscular hemoglobin; MCHC: Mean corpuscular hemoglobin concentration; TLC: Total leukocytic count

As presented in the above table it is revealed that total erythrocyte count (TEC) of the normal health chicken were greater than that of ND affected Birds. This change was found significant ($p\text{-value}<0.05$). The results of this study are parallel to the study of Ripon et al. (2013) [10] which also revealed the same results for normal birds while that of ND affected birds is comparable to studies of Chekwube et al. (2014) [11]. Moreover, it was also observed that TEC was lowered in ND affected flocks of broiler birds.

Haemoglobin concentration (Hb) of normal broiler birds was noticed as 10.5^a \pm 0.35(g/dl) while that of ND affected birds was 8.9^b \pm 0.22 (g/dl). This decrease in Hb concentration in ND affected birds was significant ($p\text{-value}<0.05$). Results obtained in this study support the findings of Adeyemo and Sani (2013) [12], which also obtained the same results.

HCT (%) of healthy broiler chicken was found greater than ND affected broilers and was found significant ($p\text{-value}<0.05$). The findings of current study for HCT are supporting the findings of Adeyemo and Sani (2013). HCT% of infected broilers was very much lowered. The severe anemia (decrease in Hb & TEC) observed in ND affected chickens may likely be due to possible loss of blood from gastrointestinal tract ulcers, haemorrhages in proventriculus and also due to intravascular hemolysis (Chekwube et al., 2014; Calderon et al., 2005) [11,13].

MCV (fl) values of normal broiler flock were found which is lower than ND affected flocks i.e. 135.63^a \pm 27. This increase in MCV values is significant ($p\text{-value}<0.05$) which is supported by the studies of Chekwube et al. (2014) [11]. MCH (fl) values for normal birds was significantly lower than the ND infected broilers ($p\text{-value}<0.05$).

MCHC (g/dl) of normal experiment flock was found significantly lower than that of ND affected flock. Hb (g/dl) and MCHC(g/dl) of normal experiment flock were found this is referred to Sebastian et al. (2012) [14] and MCH(pg) of normal Group A was found 52.5 \pm 1.6 this shows similarities to Talebi et al. (2005) [4]. Normal values of broilers were also correlated to Zinki (1986) [15]. The results of MCHC in the present study are also correlated to (Kral, 2000; MS Islam et al., 2004) [16,17] which also revealed the same results.

TLC and Lymphocytes values were found significantly higher than the normal healthy chickens, heterophils were decreased significantly in infected broilers. This is correlated to studies of Calderon et al. (2005) [13]. Monocytopenia is a decrease in monocytes than normal and was observed in the present study. This might be due to acute infection of ND in broilers. Monocytes play a role in all viral and bacterial infections (Harrison et al., 2011) [2]. Basophils values were no significant difference ($p>0.05$).

All the values of TLC, TEC, MCH, MCV, MCHC, Hb, HCT and DLC of group A values were compared with values as discussed by Brar et al. (2014) [18]. These all values were found in the required range.

The present study showed that the haematological values of broiler chicken was significantly ($p < 0.05$) influenced by Newcastle disease virus, and results of this study are also correlated to Galindo et al. (2001) [19].

CONCLUSION

The present study revealed that TEC, Hb and HCT was lowered while TLC, Lymphocytes MCH, MCV, and MCHC was increased significantly in Newcastle disease affected broiler birds. So it is concluded that ND affects the Haemogram and leucogram significantly when compared to healthy broiler birds.

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