

**Short Communication**

**SERUM PROTEIN LEVELS IN LOCAL AND EXOTIC ADULT CHICKENS SUFFERING FROM HIGHLY PATHOGENIC AVIAN INFLUENZA**

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**INTRODUCTION**

The outbreak of highly pathogenic avian influenza (HPAI) at a commercial farm in Kaduna State, Nigeria was the first outbreak of the H5N1 Asian strain on the African continent (Adene *et al.*, 2006). The National Veterinary Research Institute (NVRI), Vom in Nigeria isolated influenza viruses from the dying chickens. Food and Agricultural Organization (FAO) Reference Laboratory in Rome confirmed that the isolates were highly pathogenic avian influenza A subtype H5N1, and genetically similar to influenza (H5N1) clade 2 viruses from China, Indonesia, Japan, South Korea and other countries. Serum proteins have been known to play important roles in infections accompanied by invasion of the body by foreign materials, whether it is of bacterial, viral, protozoal or parasitic origin (Oladele *et al.*, 2005). It has also been established that a decrease or increase in TP is one of the parameters used to assess the health status of animals (Coles, 1974). Therefore in avian species, the knowledge on serum proteins is valuable in the diagnosis of some diseases and the determination of the extent of damage to these proteins (Oladele *et al.*, 2005). This article therefore presents serum protein levels in local and exotic chickens suffering from HPAI in some parts of Jigawa, Kaduna and Katsina States of Nigeria. The implications of the findings are discussed.

**KEY WORDS:** Total proteins, Albumin, Globulin, Local chickens, Exotic chickens

**MATERIALS AND METHODS**

The study was conducted in Auyo, Gagarawa, Gumel and Maigatari (Jigawa State), Kaduna North, Sabon Gari and Giwa (Kaduna State), Katsina and Dutsinma (Katsina State). Blood samples were collected by simple random sampling from 250 each of CSL, CSE, AHL and AHE chickens. The samples from CSL and CSE chickens were collected during the outbreaks of HPAI in the aforementioned areas in March, 2006. While the AHL and AHE chickens were bled from the same area 6 months after the

outbreaks. The blood was allowed to clot at room temperature. Sera were separated by centrifugation at 447.2g for 5 minutes. The sera were stored in the refrigerator at -4°C until used. The serum samples from the CSL and CSE chickens were first confirmed to be positive for the presence of AI antibodies by haemagglutination inhibition (HI) test as described by OIE (2004). According to OIE (2004), the presence of AI antibodies in the sera samples confirmed the disease in the flocks. Serum total protein levels were determined by Biuret method (Coles, 1974). Albumin levels

were determined by the Modified Batholomew and Delaney technique (Bush, 1991). While globulin levels were determined by subtraction of albumin values from total protein values (Bush, 1991). All the data obtained were expressed as mean  $\pm$  standard error of the mean ( $X \pm S.E.M.$ ). Student's "t" test was used to compare data between groups. Values of  $P < 0.05$  were considered significant.

## RESULTS AND DISCUSSION

The values of TP obtained from CSL and CSE chickens were  $3.6 \pm 0.0$  and  $3.0 \pm 0.0$  g/dl, respectively, which were significantly ( $p < 0.001$ ) lower than those obtained for AHL and AHE chickens ( $6.5 \pm 0.1$  g/dl and  $7.8 \pm 0.1$  g/dl, respectively). This might be attributed to liver damage (Bush, 1991). TP concentrations may decrease in birds having severe liver damage that the TP is not synthesized in the right quantity, because the liver is primarily responsible for protein synthesis, and any disease condition that interferes with the normal functioning of the liver may lead to a decrease in the concentration of TP (Oladele *et al.*, 2005).

The values of albumin levels obtained from CSL and CSE chickens were  $2.1 \pm 0.0$  g/dl and  $1.9 \pm 0.0$  g/dl, respectively, which were significantly ( $p < 0.001$ ) lower than those obtained for AHL and AHE chickens ( $3.3 \pm 0.0$  g/dl and  $4.1 \pm 0.1$  g/dl, respectively). This might also be due to necrosis and degeneration of the liver, and renal tubular and glomerular necrosis of the kidneys. HPAI has been associated with liver and kidney pathology (Abdu *et al.*, 2005), and this could eventually lead to albumin loss (Bush, 1991). The implication of this decrease in serum albumin concentration in clinically sick birds is that, when HPAI infection is actively taking place, chemotherapy might be of little or no value, since albumin level may not be sufficient enough to bind with drugs and transport them to tissues (Coles, 1974).

A significant decrease ( $p < 0.001$ ) in globulin levels was observed in CSL and CSE chickens ( $1.5 \pm 0.0$  g/dl and  $1.1 \pm 0.0$  g/dl, respectively), as compared

to AHL and AHE chickens ( $3.2 \pm 0.1$  g/dl and  $3.7 \pm 0.1$  g/dl, respectively). Although, it is expected that clinically sick birds should have higher globulin levels than apparently healthy birds during infections, because globulins (especially gamma globulins) essentially produce antibodies that act against disease agents in the body during infections (Coles, 1974), the decrease in globulin levels that was observed in the CSL and CSE chickens in this study might have been caused by conditions of enteropathies and nephropathies associated with HPAI in which the levels of globulins may fall drastically due to protein loss (Abdu *et al.*, 2005). Similarly, it was reported that some AI virus isolates may induce the aforementioned conditions in form of severe lymphoid necrosis in the spleen, thymus, Bursa of Fabricius, intestine, liver and kidneys that can lead to destruction of lymphocytes which in turn could result into depletion of globulins (Abdu *et al.*, 2005).

## CONCLUSION

The devastating effect of HPAI on chickens in this study resulted into a decrease in TP, albumin and globulin levels (which play important roles in immunity). Public enlightenment and extension service through a participatory approach on the need to improve poultry nutrition in order to augment their total proteins, albumin and globulins levels is highly recommended.

## REFERENCES

- ABDU, P. A., WAKAWA, A. M., SA'IDU, L. and UMOH, J. U. (2005): Avian influenza: A review. *Nig. Vet. J.*, **26** (1):34-44.
- ADENE, D.F., WAKAWA, A.M., ABDU, P.A., LOMBIN, L.H., KAZEEM, H.M., SA'IDU, L., FATIHU, M.Y., JOANNIS, T., ADEYEFA, C.A.O. and OBI, T.U. (2006): Clinico-pathological and

husbandry features associated with the maiden diagnosis of avian influenza in Nigeria. *Nig. Vet. J.*, **27**(1):32-38.

BUSH, B.M. (1991): Total plasma proteins, albumin, and globulins. Interpretation of Laboratory Results for Small Animal Clinicians. Blackwell Scientific Publications: 238-255.

COLES, E.H. (1974): Liver Function. In: *Veterinary Clinical Pathology*, 2<sup>nd</sup> Ed. W.B. Saunders Company. Philadelphia: 202-215.

OFFICE INTERNATIONAL DES EPIZOOTIES (OIE) (2004): Avian influenza. In: *Manual of Diagnostic Tests and Vaccines for Terrestrial Animals*, 2:1-27.

OLADELE, S.B., NOK, A.J., ESIEVO, K.A.N., ABDU, P.A. and USEH, N.M. (2005): Haemagglutination inhibition antibodies, rectal temperatures and total proteins of chickens infected with a local Nigerian isolate of velogenic Newcastle disease virus. *Vet. Res. Comm.*, **29**:171-179.