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Quantitative Changes in Serum Chemical Constituents of Local and Exotic Chickens Experimentally Infected with Infectious Bursal Disease Virus

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ملخص البحث

تم الكشف عن التغير في تركيز بعض مكونات المصل الكيميائية للدجاج المحلي و الأجنبي بعد حقنه بفيروس مرض إلتهاب الجراب المعدى (IBD). جمعت عينات المصل قبل يوم من الحقن و أربعة أيام بعده0 أظهرت الإختبارات الكيميائية حدوث نقص معنوى (إحتمال < 0.05) في تركيز زلال المصل (serum albumin) والمغنسيوم والفوسفور غير العضوى والبوتاسيوم وزيادة معنوية (إحتمال < 0.05) في تركيز حمض البوليك (uric acid) والكرياتينين في مصل الدجاج الأجنبي بعد أربعة أيام من حقنه بالفيروس. لم يطرأ أي تغير على مكونات المصل الكيميائية للدجاج البلدى عدا زيادة معنوية في تركيز حمض البوليك (إحتمال < 0.05)0

Summary

The changes in some serum chemical constituents of local and exotic chickens experimentally infected with IBDV were detected. The sera were collected at one day pre-IBDV inoculation and four days post inoculation. There was a significant decrease (P<0.05) in concentrations of albumin, magnesium, inorganic phosphate and potassium and a significant increase (P< 0.05) in uric acid and creatinine concentrations in sera of infected exotic chickens. No changes were detected in parameters examined for local chickens with exception of a significant increase (P<0.05) in uric acid concentration.

Introduction

Infectious bursal disease (IBD), an acute viral disease of young chickens, was first described by Cosgrove (1962) and is caused by birna virus (Murphy *et al.*, 1999) which causes suppression of the immune system, anorexia, depression and occasionally nephrosis (Anon, 2000). In Sudan, IBD was first reported in El-Obeid town in 1981 (Shuaib *et al.*, 1982).

IBD virus (IBDV) causes changes in blood chemical constituents of infected chickens (Afaleg, 1998; Cosgrove, 1962; ELBatrawi and Awad, 1993; Ley *et al.*, 1983; Panigraphy *et al.*, 1986).

The objectives of this study were to compare the changes that could occur in the concentration of some serum chemical constituents of local and exotic chickens experimentally infected with IBD virus.

Materials and Methods

Chicks:

One-day-old exotic chicks of Bovans breed were obtained from Coral Farm Hatcheries and one-day-old local chick (Baladi) from a commercial supplier. All chicks used were free from IBD antibodies as detected by the agar gel precipitation test (AGPT).

Virus:

The IBDV used, was isolated from 2- month-old chicks during an outbreak that occurred at ELGereif West, Khartoum State in 1999. The isolated virus was identified by AGPT as IBDV and labelled G/99; its $CHID_{50}$ and EID_{50} were $10^{6.5}$ and $10^{6.2}$ / ml, respectively.

Experimental plan:

Eleven Baladi and 25 exotic, 5- week-old chicks were each inoculated intraocularly and intranasally with 0.1ml (10^4 $CHID_{50}$) dose of IBDV strain G/99. Blood samples were collected from the birds at one day before inoculation and, five days thereafter. Concentration of serum total proteins was determined by the method adopted by Weichselbaum (1964), albumin by Bartholomew and Delany method (1966), uric acid by Carway method (1963), inorganic phosphate by the method of Varley, (1963), calcium by Trinder (1960) and sodium and potassium according to Varley (1975).

Results

The mean concentrations of blood serum constituents in local and exotic chickens, one-day pre-IBDV inoculation and four days post inoculation are shown in Table 1. Compared to their values one-day pre-infection, there was a significant decrease ($P<0.05$) in concentrations of albumin, magnesium, inorganic phosphate and potassium, and an increase in concentrations of uric acid and creatinine in serum of exotic chickens 4 days post IBDV infection. No significant differences were observed between pre- and post IBDV inoculation serum values of Baladi chicken ($P>0.05$). However, a significant increase in the concentration of uric acid was detected ($P<0.05$) in sera of the infected Baladi chickens. No changes were detected in the concentrations of total proteins, calcium and sodium in sera of the infected exotic chickens.

Discussion

The decrease in albumin concentration is in agreement with the results of Cheville, (1967) who has reported a decrease in albumin in sera of 4-week-old White Leghorns chickens, 4 and 5 days after IBDV infection. Similarly Panigraphy *et al.* (1986) have found a significant decrease in serum albumin in 5-week-old SPF chickens infected with different strains of IBDV . This decrease might be attributed to loss

Table 1: The mean values (± SD) of serum chemical constituents in Baladi and exotic chickens one day before and 4 days after inoculation with IBDV.

Parameter	Baladi chickens		Exotic chickens	
	Pre-infection	Post-infection	pre-infection	post-infection
Total protein(gm /100 ml	6.81 ± 1.46	6.93 ± 0.68	5.26 ± 1.35	5.64 ± 1.04
Albumin (mg/100ml)	2.85 ±0.54	2.82 ±0.74	2.95 ±1.04	2.39* ±0.69
Uric acid (mg/100ml)	4.38 ±0.11	4.49* ±0.15	2.02 ±0.87	5.2* ±2.11
Creatinine (mg/100ml)	1.36	1.44	2.0	7.4*
Magnesium (mg/100ml)	2.93 ±0.11	2.88 ±0.12	2.13 ±0.54	1.68* ±0.29
Calcium (mg/100ml)	7.68 ±0.37	7.65 ±0.43	9.34 ±0.89	8.72 ±1.20
Inorganic phosphate (mg/100ml)	4.56 ±0.19	4.29 ±1.23	3.34 ±0.16	3.18* ±0.42
Sodium (mmol/litre)	160.86 ±4.41	161.74 ±3.86	189.14 ±1.80	191.29 ±1.67
Potassium (mmol/litre)	19.6 ±5.06	18.61 ±7.94	27.88 ±4.74	23.65* ±8.63

SD = standard deviation

* *Significantly different from the mean (P<0.05)*

of serum albumin during inflammatory exudation into the bursa and subsequent excretion with faecal material (Cheville, 1967).

In this study, the increase in the concentrations of uric acid and creatinine and the decrease in potassium concentration are consistent with the findings of Ley *et al.* (1983) and Elbatrawi and Awad (1993). The former authors assumed that the increase in uric acid was a result of kidney damage and subsequent decreased elimination of this product, dehydration, reduction in feed intake or absorption. In a previous study, Egbal (2001) has reported a kidney damage in both local and exotic chickens experimentally infected with IBDV; a finding that may explain the increase in uric acid and creatinine and decrease in potassium concentrations. Kumar and Rao, (1991) reported an increase in creatinine and, in contrast to the present finding, a decrease in uric acid following experimental infection with IBDV. Moreover, a significant decrease in uric acid and no changes in creatinine and potassium concentrations in IBDV-infected birds were detected by Panigraphy *et al.* (1986).

Obviously, local chickens showed no significant differences in their pre- and post-infection values of the parameters measured except that of uric

acid. This stability in values of serum chemical constituents indicated a difference between local and exotic chickens in their biochemical reactivity to IBDV.

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