HAEMATOLOGY AND SERUM ELECTROLYTE PATTERNS DURING NEWCASTLE DISEASE IN LAYER CHICKS

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Locally isolated virus of Newcastle disease was injected I/M, S/C and was also given by oral route in layer chicks in groups A, B and C at the age of 6th week. Chicks showed predominant respiratory and nervous involvement. The mortality noted in group A was 55%, group B 45% and in group C 40%, while there was no mortality in control group D. Blood from the heart of chicks in each group was collected on 5th, 10th and 15th day postinfection to study the haematology and serum electrolyte (Na, K) patterns. There was a significant decrease in total red blood cells, white cells, haemoglobin, packed cell volume and in serum electrolytes (Na, K) level in postinfection period.

INTRODUCTION

Newcastle *(Ranikhet)* is an acute, highly contagious and a fatal disease of poultry. Its infectivity to turkeys, guinea fowls, ducks, geese, pigeon, pheasants, partridges and crows as well as unidentified species of free flying birds has also been reported. Birds of all ages, breeds and sex are equally susceptible (Brandly *et al*., 1946). The disease is found in various forms in the field. The casual agent is a virus, demonstrable in the blood for a short time only at the height of attack, but can be found in the secretion of organs for a longer period.

Ranikhet was first reported in India in 1928. Because of its acute nature, the disease appears suddenly and respiration rate is increased. A greenish watery diarrhoea is common and nervous disorders may appear within a day or so. Dark red lesions in the intestine and linear haemorrhages seen on the glandular surface of proventriculus are the main pathological lesions. Relatively little work has been done on the clinical haematology and serum electrolyte patterns (Na, K) of this disease in chickens. Thus an experiment was planned to study the haematology and serum electrolyte (Na, K) patterns of this disease in male layer chicks.

MATERIALS AND METHODS

Preparation of suspension of virus of Newcastle disease: Specimens of spleen, brain and bone marrow of the birds died of Newcastle disease were triturated in a sterile pestle and mortar. Streptomycin and penicillin were added to the suspension to check bacterial contamination. The triturated material was centrifuged and preserved in sterile screwcapped specimen bottles for administration through different routes to the experimental chicks.

Identification of the virus: The collected suspensions from infected birds were identified by:

i. Inoculating 10-day old embryonated eggs. Suspension thus collected was injected at the rate of 0.2 ml/egg. All

embryos died within 96 hours after injection, and by.

ii. Inoculating in non-vaccinated chicks. The collected suspension was injected I/M at the rate of 0.2 ml per chick to unimmunized 43-day old chicks. All the chicks showed respiratory and nervous symptoms of Newcastle disease within 3 to 4 days.

groups A, B, C and D were studied on 5th, 10th and 15th day postinoculation.

Blood analysis: Haemoglobin and packed cell volume were estimated as described by Coles (1986). Total erythrocytic counts (TEC) and total leucocytic counts (TLC) were determined as described by Natt and Herrick (1952).

Serum electrolyte patterns: Serum electrolyte (Na, K) patterns were estimated by spectro-photometer using Stanbio commercial kit.

Table 1. Values of blood parameters and serum electrolytes resulting from different routes of inoculation

Route of inoculation		Blood parameters				Serum electrolytes	
		RBC ($10^6/\mu l$)	WBC ($10^3/\mu l$)	Hb (g/dl)	PCV (%)	Na (mmol/L)	K (mmol/L)
Intramuscular	Mean	2.07	18.70	7.84	23.17	123.17	6.93
Subcutaneous	Mean	2.17	18.40	8.01	23.16	21.01	6.95
Oral	Mean	2.19	18.60	8.00	23.45	123.30	7.02
Control	Mean	2.33	19.08	8.10	25.28	143.63	7.79

ED_{50} of virus was calculated by the method of Reed and Muench (1938). Suspension of pathogenic virus of Newcastle disease contained 1.0 or 10 virus particles per 0.2 ml.

Chick inoculation: Eighty day-old layer chicks were reared upto 6 weeks of age. They were randomly divided into 4 groups (A, B, C, and D) of 20 chicks each. The collected suspension at the dose of 0.2 ml per chick was given to chicks in groups A, B and C through intramuscular, subcutaneous and oral route respectively, while D was kept as the control group. Clinical signs of Newcastle disease started appearing within four days postinfection. Chicks died in groups A, B and C upto 15 days postinfection were autopsied and typical gross lesions of Newcastle disease were confirmed. The blood parameters and serum electrolyte pattern of

RESULTS AND DISCUSSION

The chicks were kept under constant observation upto 15 days and the clinical signs of Newcastle disease started appearing within 4 days postinfection. The birds that died in groups A, B and C upto 15 days postinfection were autopsied and typical lesions of Newcastle disease were confirmed. The results indicated that maximum penetration of Newcastle disease virus was through I/M route because the mortality observed in group A was maximum (55%), followed by group B (45%) and it was minimum in group C (40%). No mortality was observed in control group D. These

results indicated that if the birds can be protected from infection through prophylactic measures, the outbreak of Newcastle disease can safely be avoided.

postinoculation days significantly ($P<0.05$) affected the blood parameters and serum electrolyte pattern (Table 2). The proportional increase between all the four blood

Table 2. Blood parameters and serum electrolytes on 5th, 10th and 15th day postinoculation

Route of inoculation		Blood paramcters				Serum electrolytes	
		RBC ($10^6/\mu l$)	WBC ($10^3/\mu l$)	Hb (g/dl)	PCV (%)	Na (mmol/L)	K (mmol/L)
5th day	Mean	2.01[a]	14.81[a]	7.28[a]	19.32[a]	98.45[a]	4.27[a]
10th day	Mean	2.15[a]	19.95[b]	8.00[b]	24.24[b]	119.79[b]	6.81[a]
15th day	Mean	2.28[b]	20.94[b]	8.62[c]	25.82[b]	149.17[c]	9.72[b]

The same superscript for means in a row show non-significant difference.

The clinical symptoms observed in infected birds from groups A, B and C were rise in temperature, dullness, depression with nasal discharge and greenish watery diarrhoea accompanied by thirst and anorexia. Nervous symptoms observed were staggering gait, shaking of head and in last stages paralysis of legs and wings.

The lesions observed during postmortem examination were linear haemorrhages on the proventricular and duodenal mucosa alongwith petechial haemorrhages. The intestinal wall was thickened and ulcers were also noted on the internal surface. The size of the spleen was markedly reduced. Serous exudate was present in nasal passage, larynx and trachea.

Haematological examination and serum electrolyte patterns: Haematological alterations and serum electrolyte patterns were studied in all experimental chicks of groups A, B, C and D on 5th, 10th and 15th day postinfection. It was observed that route of infection had no significant influence on blood parameters and serum electrolyte patterns (Table 1). It was further noted that parameters and serum electrolytes with postinoculation days was observed. There was significant decrease in TEC, TLC, Hb, PCV and serum electrolytes (Na, K) on the 5th day of postinfection.

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