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CLINICO-BIOCHEMICAL PROFILES IN FASCIOLIOSIS OF BUFFALOES

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SUMMARY

All the buffaloes found positive for fascioliosis on coprological examination were harbouring *Fasciola gigantica*. Clinical cases recorded in this study were of chronic nature and clinically ill buffaloes were dull, weak, debilitated and anorectic, and most of them had submandibular oedema, reduced body weight and dehydration due to persistant diarrhoea. Clinical examination revealed decreases in rectal temperature, ruminal movements and increases in heart rate and respiration rate. Decreases in serum copper, iron and magnesium were recorded in fascioliosis-affected buffaloes. Serum zinc values remained unchanged.

INTRODUCTION

The domestic buffalo (*Bubalus bubalis*), a premier dairy and meat producing food animal, occupies an important place as draught animal in Indian farming. Fascioliosis due to *Fasciola gigantica* appears to be a major constraint upon to its productivity, leading to economic losses due to reduced milk yield, poor body weight, poor carcass quality, reduced draught capacity and liver condemnation. The haematophagic nature of the parasite and the migrating of young flukes result in hepatic dysfunction and blood loss leading to anemia and hypoproteinemia (Kumar et al., 1982, a,b; Maru et al., 1982). Limited survey reports in India have shown that amongst bovines, buffaloes suffer more frequently than cows (Swaroop and Pachauri, 1987). There exists a paucity of information on clinico-biochemical changes associated with this disease in Indian buffaloes. The present communication is an effort to put on record some clinico-biochemical profiles of buffaloes suffering with *Fasciola gigantica* infection.

MATERIALS AND METHODS

Routine faecal examination of lactating buffaloes maintained at Livestock Research Centre, Nagla and at various livestock farms under the livestock extension service were carried out. In a total of 516 buffaloes examined, 126 (24.4%) were found to be harbouring *Fasciola gigantica* infection and were clinically ill. Clinical studies were carried out on these clinically ill animals, whereas for biochemical studies, 20 buffaloes of same population group, breed, age and severity of infection were randomly selected. The severity of infection was judged by counting fasciola eggs per gram of faeces as described by Soulsby (1982) and the identity of fasciola eggs was established on the basis of morphological characterization (Yamaguti, 1975).

Clinical examination of clinically ill animals along with daily milk yield were recorded throughout the study period. Blood samples were drawn in clean glass vials by venepuncture of the jugular vein, using a sterile glass syringe with 16 gauge needle for each collection. The blood was then allowed to clot for an hour in cold (+ 10° C) and the serum was harvested from the clotted blood. Serum separated from clotted blood was assayed for copper, zinc, iron and magnesium using an atomic absorption spectrophotometer (Hitachi 207 Atomic Absorption Spectrophotometer, Hitachi Ltd., Tokyo, Japan).

RESULT

On clinical examination, buffaloes with fasciolosis were found to be dull, weak, debiliated and anorectic. Heavily infected buffaloes showed shooting diarrhoea with foetid odor resulting in marked reduction in body weight and dehydration. In most of the clinically ill buffaloes, the visible mucous membranes were pale and the skin was

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rough, dry and doughy. In some of the infected buffaloes, submandibular oedema was present. Marked reduction in milk yield was recorded in all the cases under study. However, complete cessation of milk production was observed in only a few buffaloes, especially in those which were in late lactating stage. The rectal temperature, heart rate, respiration rate and ruminal movements differed significantly between healthy and clinically ill buffaloes (Table 1).

Large-sized, thin-shelled, yellow-coloured, operculated eggs were observed when the faecal samples of affected animals were examined. The size of the eggs varied from 170 to 190/μ in length and 95 to 105/μ in width. Morphological characteristics indicated that these were eggs of the fluke *Fasciola gigantica*. The average egg count per gram of faeces ranged between 250 and 450.

The serum mineral analysis in *Fasciola gigantica* infected buffaloes revealed significant decreases in serum copper, iron and magnesium values in comparison to buffaloes without fascioliosis. Serum zinc level did not differ in healthy and fasciola-infected buffaloes (Table 2).

Analysis of milk for moisture content, total solids, protein, fat, solids not fat, ash content and specific gravity revealed no alteration in moisture content, total solids and protein content values. Lowered but non-significant changes in fat and solids not fat values and significant decrease in the ash content of milk was in recorded buffaloes suffering with fasciolosis as compared to healthy ones (Table 3).

DISCUSSION

Fascioliosis due to *Fasciola gigantica* is widespread in India and affects all species of domestic ruminants. The disease occurs in acute and chronic forms. The acute form is usually fatal due to migration of large numbers of young, immature flukes through the liver parenchyma, causing severe anemia due to haemorrhage, not invariable but more commonly in older animals. In the chronic form, adult flukes establish in the bile ducts and anemia occurs due to haematophagic activities. The cases recorded under this study were of chronic nature, and the majority of clinically ill buffaloes were dull, weak, debiliated and anorectic, showing considerable reduction in milk production, submandibular oedema and persistant diarrhoea leading to reduction in body weight and dehydration.

Slight to moderate decrease in rectal temperature possibly due to debilitated condition and persistant diarrhoea was recorded in clinically ill buffaloes (Table 1). The contradictory finding of Singh (1981), reporting 103° F rectal temperature in cases of fascioliosis, appears to be misleading as the high rise of temperature recorded by Singh (1981) might have resulted from some concomitant infection. The non-significantly higher heart rate in fasciola-infected buffaloes recorded in this study may be a compensatory increase due to the anemic condition to meet the requirement for oxygen by body tissues for normal metabolic activities. The rise in respiration rate of clinically ill buffaloes can be attributed to anemia associated with low oxygen carrying capacity of erythrocytes and would more permit greater exchange of air. The significant decrease in the mean ruminal movements might have resulted from toxic substances excreted by the flukes and also from general weakness causing decreased contractile activites of the gastro-intestinal tract.

Inorganic and organic blood constituents of buffaloes naturally infected with *Fasciola gigantica* have not been fully explored except for a few reports (Pachauri, 1981, Singh, 1981). Analysis of serum mineral profiles revealed a decrease in serum copper, iron and magnesium in *Fasciola gigantica*-infected buffaloes (Table 2). The role of copper is well known in haemoglobin production. Since a decrease in ceruloplasmin and. the occurrance of macrocytic hypochromic anemia have been shown in clinical cases of fasciolosis (Pachauri, 1981), this decrease in serum copper may result in a decrease in ceruloplasmin and albumin proteins synthesized in liver.

The decrease in serum iron recorded in this study may be associated with low serum copper content (Table 2). Earlier studies have indicated that iron excretion through the bile is increased up to 32 times above normal and falls with decrease in fluke burden (Symunds et al., 1981). The significant decrease in serum magnesium recorded in clinically ill buffaloes appears to be the result of ruminal atony and diarrhoeic condition, causing

increased flow of intestinal contents and allowing less absorption of magnesium from the ingesta in the rumen and small intestine. The serum zinc level remained unchanged in *Fasciola*-infected buffaloes when compared with healthy controls.

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Table 2. The mean ± S. D. of the calving-to-first service intervals (days) in Nili-Ravi buffaloes.

Months of calving	Number of calvings	Mean ± S.D. (days)
Nov - Jan	13	41.5 ± 14.4 **
Feb - Apr	35	185.9 ± 89.1**
May - Jul	18	100.6 ± 52.2
Aug - Oct	27	134.3 ± 100.3
Total	93	134.2 ± 93.1

** Significant ($P < 0.05$).

Table 1. Physiological parameters in *Fasciola gigantica*-infected buffaloes as compared to healthy controls (Mean ± S.E.)

Physiological parameters	Groups *Fasciola*-infected buffaloes	Control
Rectal temperature (F°)	100.20 ± 0.30	101.20 ± 0.52
Heart rate (per minute)	57.23 ± 6.30	50.30 ±13.85
Respiration rate (per minute)	25.61 ± 5.92*	15.78 ± 2.60
Ruminal movements (per 5 minute)	0.58 ± 0.15*	3.80 ± 0.30
Milk yield (litre/day/animal)	4.06 ± 0.24*	5.47 ± 0.18

* P <0.01

Table 2. Serum minerals in *Fasciola gigantica*-infected and healthy buffaloes

Serum minerals	Healthy buffaloes	*Fasciola*-infected buffaloes
Copper (μ mol/l)	1.298 ± 0.148	0.507 ± 0.113*
Iron (μ mol/l)	18.168 ± 0.467	14.363 ± 0.408**
Magnesium (m mol/l)	1.267 ± 0.001	0.845 ± 0.002**
Zinc (μ mol/l)	17.959 ± 0.585	16.881 ± 0.359

* Significant at 5 percent level (P <0.05)
** Significant at 1 percent level (P <0.01)