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Serum Metabolic Profile of Idiopathic Emaciated Buffaloes

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Abstract: The goal of the present study was to evaluate the serum metabolic profile of idiopathic emaciated buffaloes. A total number of 20 non-pregnant buffaloes were subjected to study. Out of them, 10 buffaloes had poor coat, poor general body condition score which constituted the emaciated group. The remained animals (10) were clinically healthy and kept as control group. There were no postmortem pathological affections in the internal organs of animals except loss of fat depot and decrease of skeletal muscle mass. Serum biochemical analysis revealed significant decreases in serum total proteins ($p<0.01$), albumin ($p<0.05$), phosphorus ($p<0.05$) and zinc ($p<0.01$) levels. It could be concluded that the cause of emaciation in the investigated buffaloes may be attributed to zinc and phosphorus deficiency.

Key words: Buffaloes, emaciation, phosphorus, zinc, serum, muscle mass, Egypt

INTRODUCTION

The water buffalo (*Bubalus bubalus*) is important to the economy of several countries and used primarily as a source of milk and meat. The body condition of animals is classified into normal body condition, obese, thin or emaciated. Emaciation is more severe than thinness in an emaciated animal the coat is poor, the skin is dry and leathery and work performance is reduced (Radostitis *et al*., 2006). There are a variety of diseases that cause emaciation in buffaloes such as nutritional deficiency (Teleni *et al*., 1993), internal parasites (Abd-El-Salam *et al*., 1998), chronic eneteritis (Radostitis *et al*., 2006), tuberculosis (De Vos *et al*., 2001), liver cirrhosis (Abd-El-Salam *et al*., 1998), chronic traumatic reticuloperitonitis (Saleh *et al*., 2008) and pyelonephritis (Radostitis *et al*., 2006). Diseases causing emaciation usually had its characteristic clinical signs which can be confirmed by laboratory examination.

On the other hand, some buffaloes may be emaciated without any obvious clinical signs which make the diagnosis is more difficult, studying the serum metabolic profile of emaciated buffaloes is the goal of the present study.

MATERIALS AND METHODS

Animals: A total number of 20 non-pregnant buffaloes (8-11 years old) were subjected to study. Animals were slaughtered in Mosha slaughterhouse (Mosha, Assiut governorate, Egypt). Out of them, 10 buffaloes had poor general body condition score and constituted the emaciated group. The remained animals (10) were clinically healthy and free from any postmortem pathological affection and kept as control group.

Samples: Blood smear was prepared in the slaughterhouse, fixed in ethyl alcohol and stained with Giemsa stain and then examined for blood parasites. Blood samples were collected from the jugular vein in plain vacutainer tube and processed for separation of serum according to Coles (1986).

Serum samples were used for measuring serum levels of total protein, albumin, chloride, potassium, phosphorus, magnesium, glucose, cholesterol, triglyceride, Blood Urea Nitrogen (BUN), creatinine and serum activities of Lactate Dehydrogenase (LDH), Aspartate aminotransferase (AST) and Alanine aminotransferase (ALT) activities using commercial test kits supplied by spectrum diagnostics (Cairo, Egypt) and by means of Digital VIS/Ultraviolet Spectrophotometer (Cecil instruments, Cambridge, England, Series No. 52.232).

Statistical analysis: Data were expressed as mean±SD, statistical analysis was conducted using SPSS 13.0 for windows (SPSS, Chicago, USA). The difference in the biochemical parameters in were compared using one way analysis of variance.

RESULTS AND DISCUSSION

Clinical findings: Animals belong to the emaciated group had poor coat, poor general body condition score.

Postmortem findings: There were no postmortem pathological affections in the internal organs of animals from the emaciated group except loss of fat depot and decrease of skeletal muscle mass. Emaciated animals that had pathological affections at postmortem inspection were excluded from the study.

Serum biochemical findings: Serum biochemical analysis revealed significant decreases in serum total proteins ($p<0.01$), albumin ($p<0.05$), phosphorus ($p<0.05$) and zinc ($p<0.01$) levels. Results are shown in Table 1-4. The present study was carried out in one slaughterhouse and in the same season to ensure that animals approximately subjected to the same conditions. Hypoproteinaemia ($p<0.01$) and hypoalbuminaemia ($p<0.05$) in the emaciated group (Table 1) reflect decrease protein synthesis which may be attributed to malnutrition or feeding on ration with low quality and digestibility (Radostitis *et al*., 2006). Hypoproteinaemia of the present study is not due to hepatic disease as there were no hepatic affections at postmortem and also no significant changes in serum enzyme activities were observed (Table 2).

No significant changes were found in serum levels of BUN or creatinine which support the meat inspection findings regarding absence of kidney diseases (Table 3). Analysis of serum macro- and micro-elements revealed significant decreases in serum zinc ($p<0.01$) and phosphorus ($p<0.05$) as shown in Table 4. Mean value of serum zinc in the present study was 4.62±1.07 μmol L^{-1} in the emaciated group which is considered evidence of deficiency as reported by Radostitis *et al*. (2006).

Zinc deficiency results in decreased feed intake in all animal species (Underwood, 1981) and is considered one of the reasons for the depression of body weight in mature animals (Kalkan *et al*., 1999; Radostitis *et al*., 2006).

It was reported that phosphorus deficiency is usually primary (Radostitis *et al*., 2006) and may be attributed to malnutrition due to feeding low quality ration. Retarded growth is one of the earliest signs of phosphorus deficiency (Radostitis *et al*., 2006) which make phosphorus deficiency contributing factor for emaciation in the investigated animals.

Table 1: Serum proteins in control and emaciated buffaloes

Groups	Total protein	Albumin	Globulins	A/G ratio
	----------(g dL^{-1})----------			
Control	6.85±0.40	3.48±0.37	3.36±0.59	1.08±0.37
Emaciated	5.89±0.83**	3.07±0.49*	2.82±0.89	1.24±0.60

Data expressed as mean±SD; **: $p<0.01$

Table 2: Serum enzyme activities in control and emaciated buffaloes

Groups	AST	LDH	ALT
	----------(U L^{-1})----------		
Control	71.44±20.06	313.89±95.84	21.86±5.340
Emaciated	65.57±8.300	310.92±94.22	33.03±26.96

Data expressed as mean±SD

Table 3: Serum biochemical constituents of control and emaciated buffaloes

Groups	Glucose	Total cholesterol	Triglyceride	BUN	Creatinine
	----------(mmol L^{-1})----------				(μmol L^{-1})
Control	3.00±0.75	2.17±0.57	0.21±0.09	5.66±1.29	54.81±15.03
Emaciated	3.71±1.16	2.42±0.65	0.26±0.14	6.99±2.58	59.22±16.79

Data expressed as mean±SD

Table 4: Serum levels of some electrolytes, macro- and micro-elements in control and emaciated buffaloes

Groups	Chloride	Potassium	Magnesium	Phosphorous	Copper	Zinc
	----------(mmol L^{-1})----------				-------(μmol	L^{-1})------
Control	103.11±5.3	5.16±1.00	0.56±0.14	2.09±0.42	33.12±8.32	8.22±0.40
Emaciated	110.12±6.9	5.11±0.79	0.57±0.26	1.22±0.68*	29.90±8.26	4.62±1.07**

Data expressed as mean ±SD; **: $p<0.01$; *: $p<0.05$

CONCLUSION

In this study, the cause of emaciation in the investigated buffaloes may be attributed to zinc and phosphorus deficiency.

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