EFFECTS OF KETOSIS ON PLASMA METABOLITES IN BUFFALOES[#]

Usha Choudhary[1], Meenaxi Sareen, Anil Moolchandani and Amit Pandey
Department of Veterinary Biochemistry, College of Veterinary and Animal Science
Rajasthan University of Veterinary and Animal Sciences, Bikaner-334 001, Rajasthan, India

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ABSTRACT

The aim of present investigation was to determine the variations in concentration of plasma metabolites (viz. glucose, creatinine, urea and BUN) in ketotic buffaloes as compared to healthy buffaloes. The animals were divided into two groups: In the first group included ketotic buffaloes (n=18) and the second group included clinically healthy buffaloes (n=10). Biochemical examination of blood serum showed a highly significant ($P \leq 0.01$)reduction in blood glucose whereas serum creatinine, blood urea and BUN remains unaltered in ketotic buffaloes as compared to healthy buffaloes.

***Key words*:** Ketosis, buffaloes, plasma metabolites

Introduction

The production disease in livestock occupy an important place as they greatly affect high yielding dairy animal. Amongst these diseases, ketosis is a multifactorial metabolic disorder of energy metabolism which is caused by negative energy balance and characterized by relatively high concentration of ketone bodies with concurrent decrease of blood glucose level. It occurs in high producing dairy animal during early lactation in both industrialized and developing countries. The present study will be beneficial for early diagnosis of ketosis in buffaloes particular in arid and semiarid climatic condition of Rajasthan, which may help to reduce the economical losses of dairy industry because of impaired milk production, decreased productive efficiency, increased voluntary culling and increased treatment cost.

Materials and Methods

In this study, the blood samples were collected from Murrah buffaloes of 4-8 years of age, belonging to Kuchaman city, Nagaur, Rajasthan.

In this study animals were divided into two groups:

(1) Controlled group: comprising of ten clinically healthy buffaloes.

(2) Ketotic group: Comprising of eighteen diseased buffaloes clinically diagnosed with ketosis in recently partureted stage.

The average weight of these buffaloes were 400-480 kg and their age was 4-8 years. Clinically diagnosed ketotic buffaloes having 3rd to 6th lactation number and recently parturated about 15-20 days back and having history of inappetence, pica and sudden fall in milk production. Further the urine sample of suspected animal were analyzed by means of Rothera's test and strip test for confirmation of ketosis. Serum samples were analyzed for total serum glucose, creatinine, urea and BUN by using commercially available diagnostic kits on spectrophotometer-169 of Systronics. The data obtained were statistically analyzed as per explained by Snedecor and Cochran (2004).

Results and Discussion

In the present study, mean serum glucose level in ketotic buffaloes (34.91±1.64 mg/dl) was highly significantly ($P \leq 0.01$) decreasing than mean serum glucose level of healthy buffaloes (63.14±3.74mg/dl). The observed trend was in close agreement with the findings of Hagawane *et al.* (2009), Ghanem and El-Deeb (2010), Youssef *et al.* (2010), Farag and Metwally (2012) in different breeds of buffaloes. The justified reasons for the development of hypoglycaemia in post-parturient ketotic animals may be attributed to the negative energy balance reflecting greater demand of glucose in the mammary gland (Anantwar and Singh,1993). The lowered means of blood glucose concentration in early stage of lactation may due to large amount of blood glucose withdrawal by the mammary gland for the synthesis of milk lactose.

The mean±SE value of serum creatinine in ketotic buffaloes (0.88±0.21 mg%) and in healthy buffaloes (0.86±0.02 mg%). The mean value statistically increased nonsignificantly ($P>0.05$) in ketotic buffaloes as compared to control. This finding is partially supported by Sevinc *et al*. (1997) in ketotic cows in which they recorded significant increase in serum creatinine level in ketotic cows. In present study, ketotic animals were in the early stage of ketosis so nonsignificant difference observed in serum creatinine level in ketotic buffaloes as compared to healthy ones. This variation may be attributed to the different species, different feeding and managemental condition, climatic condition, experimental planning, duration of the experiment.

The mean±S.E. value of blood urea and blood urea nitrogen in ketotic and healthy buffaloes were (36.65±1.645), (17.137±1.584) and (28.09±1.022), (13.134±1.938), respectively. The mean value statistically increased nonsignificantly ($P>0.05$) in ketotic buffaloes as compared to control buffaloes. The observed trend in blood urea and BUN in present study is supported by Rezapor and Taghinejad-Roudbaneh (2011) and Anoushepour *et al*. (2014) in ketotic ewe and is partially supported in ketotic cows in which they reported significant increase in blood urea and BUN as a result of ketosis. Although, in our study nonsignificant increase in blood urea and BUN in ketotic buffaloes was observed. This variation may be attributed to the different species, composition of ration, different managemental condition,

[1#]Part of M.V.Sc. Thesis submitted to RAJUVAS, Bikaner-334 001, corresponding author. Email: tanuchoudhary0@gmail.com and present address-Teaching Associate, Veterinary Biochemistry, CVAS, Bikaner.

Table 1: Mean ± S.E. concentration and t-value of glucose, and creatinine in control and ketotic buffaloes

Phases	No. of observ.	**Glucose (mg/dl)			Creatinine^{NS} (mg%)		
		Mean ±S.E.	%Inc./dec	t-value	Mean ±S.E.	%Inc./dec	t-value
Control	10	63.148±3.749	–44.71	4.130744	0.861±0.021	2.20	0.123914
Ketotic	18	34.912±1.649			0.880±0.210		

NS = Non Significant (P>0.05), *=Significant at 5% level (P≤0.05), **=Significant at 1% level (P≤0.01)
Note: Mean comparison have been made within two phases.

Table 2: Mean ± S.E. concentration and t-value of urea and BUN in control and ketotic buffaloes

Phases	No. of observ.	Urea^{NS} (mg/dl)			BUN^{NS} (mg/dl)		
		Mean ±S.E.	%Inc./dec	t-value	Mean ±S.E.	%Inc./dec	t-value
Control	10	28.09±2.825	16.23	1.50622	13.134±1.162	16.14	1.005334
Ketotic	18	36.65±1.148			15.257±1.825		

NS = Non Significant (P>0.05), *=Significant at 5% level (P≤0.05), **=Significant at 1% level (P≤0.01)

climatic condition, experimental planning and duration of experiment.

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