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CHANGES IN LEVELS OF SODIUM AND POTASSIUM IN SERUM OF NON-DIARRHEIC CALVES AS COMPARED TO THE LEVELS IN THE SERUM OF CALVES WITH UNDIFFERENTIATED DIARRHEA

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Abstract

This survey include measuring level of sodium and Potassium which be more effect in the diarrhea cases in the blood of locally calves in Babylon province with ages (1 - 30) day, infected with undifferentiated diarrhea (100 calve) and compared with level of sodium and potassium in blood of healthy calves (40) calves by use Randox daytona plus (Clinical Chemistry Analyzer), (Fully automated system). Blood samples were Collected from diarrheic and no diarrheic calves during the period (January–September) ***l*** 2019, the serum was isolated from blood samples and keep by freezing to sodium and potassium measurement. The results show decrease in the level of sodium in the blood of the calves which infected with diarrhea when compared with results of no diarrheic calves, the result of sodium in no diarrheic calves is (128.39 ± 0.79 mEq *l* L) while this result is decrease in the diarrheic calves as follows (123.63 ± 0.84 mEq *l* L). The potassium show increase in the blood of diarrheic calves as compared with potassium in the no diarrheic calves as a follows (5.08 ± 0.09 mEq *l* L) in the healthy calves and (7.84 ± 0.27 mEq *l* L) in the diarrheic calves.

Keywords **:** Diarrhea, calves, Sodium, Potassium, hyponatremia, Hyperkalemia, electrolytes balance.

Introduction

Diarrhea is Excessive electrolyte and water loss during gastrointestinal tract (GIT) through diarrhea (Dratwa-chalupnik *et al* ., 2012) is the most common cause of dehydration (Walker *et al*., 1998), which in acute cases can lead to death (Azizzadeh *et al.,* 2012). Causes of diarrhea are viral, bacterial, dietetic, fungal, allergic, stress-bearing origins, toxic and parasitic (Scott *et al*., 2004). The most common causes of diarrhea in young calves, are a viral (corona and rota viruses) or bacterial (salmonella *and E. coli*) (Lorino *et al.,* 2005). Clinical signs of diarrhea in young calves include abdominal pain, loose watery stools and lack of appetite (Bednarski *et al .,* 2015). Persistent diarrhea may result in weakness, loss of suckling reflex and dehydration (Gomez *et al.,* 2013). In case of parameters of electrolytic balance, a significant decline in sodium with a simultaneous increase in the potassium level (Sobiechprzemyslaw and Kuleta, 2006). Administration of electrolytes and water to diarrheic calves improves survival (Naylor *et al* ., 2006).

Materials and Methods

All calves (140 calves) were subjected to clinical examination (heart rate, pulse, respiratory rate, rectal temperature and skin fold test). The study included a total of (140) blood samples, collected from no diarrheic calves and calves showing diarrhea and brought to the laboratory on ice box. Heart rate (beat/min) was measured by thoracic auscultation for a minimum of 30 seconds. Temperature through rectum, pulse rate (beat/min) through coccygeal vein and respiration rate (breath / min) were recorded along with grossly evident clinical signs (Benzamin , 2007). Elasticity of the skin of the neck and lateral thorax, which are assessed by pinching the skin between the fingers, rotating the skin fold 90° and noting the time required after release of the skin fold for the skin fold to disappear (normally < 2 s) (Radostits *et al*., 2007). Blood samples (10 ml) were collected from the jugular vein from each calf in sterile disposable test tube without anticoagulant for isolation of serum (Coles, 1986), serum samples were used to examine of Sodium and potassium by use Randox daytona plus (Clinical Chemistry Analyzer), (Fully automated system).

Results

General Clinical sings

In the this study survey , the most clinical signs seen in the diarrheic calves include were weakness**,** pale of mucous membrane by examining the third eyelid**,** late in the return of skin fold (more than 2 second)**,** the remains of feces on the tail and thigh (diarrhea)**.**

Table (1) represent the result revealing the blood electrolytes in undifferentiated diarrhea cases and non-diarrheic calves. There were significant ($P<0.01$) differences in Sodium (mEq *I* L) and Potassium (mEq *I* L) in diarrheic cases in comparison to normal values of healthy cases. The mean values of Na^+ and K^+ in diarrheic cases were (123.63 ± 0.84) mEq *I* L and (7.84 ± 0.27) mEq *I* L respectively.

Table 1 : Blood Sodium and potassium in undifferentiated diarrhea cases and non-diarrheic calves.

Groups	Mean ± SE	
	Na (mEq *I* L)	**K (mEq *I* L)**
Diarrheic calves	123.63 ± 0.84	7.84 ± 0.27
Non-diarrheic calves	128.39 ± 0.79	5.08 ± 0.09
T-test	2.834 **	0.871 **
** (P<0.01).		

Discussion

There were significant ($P<0.01$) differences in Sodium (mEq *I* L) and Potassium (mEq *I* L) in diarrheic cases in comparison to normal values of healthy cases. Water along with electrolytes, accumulated in gut lumen, are excreted with feces (Dratwa-Chałupnik *et al.,* 2012). The calves suffering from diarrhea were characterized by disturbances in gastrointestinal tract and increase of loss of sodium with feces in diarrhea calves is considered as the main cause of the mentioned disturbances (Ulutas and Sahai, 2005). A significant decrease in the concentrations of sodium ions in the blood of calves with diarrheic signs is connected with their loss with feces, while increase in the level of potassium ion has a direct relationship with disturbances in the acid-base balance. An increased pH value in serum results in a decreased concentration of potassium ions. In contrast, its decrease leads to an increased concentration of these ions. The mechanism of these interactions consists in the exchange of potassium ions and hydrogen between the extracellular and cellular spaces. This exchange may be evoked by the primary increase in the concentration of hydrogen ions (pH drop) in the cellular liquid, and results in their shift to cells . In accordance with the rule of electric inertness of systemic fluids, the potassium ions shift in an opposite direction (from a cell to extracellular fluid), thus causing an increase in their concentration in plasma (Grove-White and Michel, 2001; Rademacher *et al*., 2002).

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