

Hematological and serobiochemical changes in camel calves affected with neonatal diarrhea in Al Ahsa region, Kingdom of Saudi Arabia

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Abstract: The aim of this study was to investigate neonatal diarrhea in Majaheem camel calves (Saudi Arabia). Fifty three, one week old diarrheic camel calves weighing 20 kg. in average, and fifty three healthy camel calves of the same age and weight were used. Clinical, hematological and serobiochemical tests were carried out on all camel calves and the results obtained from the diarrheic camel calves were compared those that of the healthy group. Pale mucus membranes, in appetite, colic, high temperature and respiratory rate were observed in the diarrheic group. In addition higher values of PCV, total Leukocyte and neutrophils counts were observed in the diarrheic calves compared to the healthy group. Lower values of sodium, and potassium and higher values of creatinine, urea, ALT, AST and AP were observed in diarrheic calves compared to the healthy calves.

Key words: Camel calves, Neonatal diarrhea, Majaheem breed, Clinical assessment

Introduction

Neonatal camel calf diarrhea (NCCD) is an economically important disease causing great losses in camel calves all over the world. In general camel calves mortality is considered to be the major hindrance for production. Mortality ranging from 20 to 50% has been reported in some pastoral areas in Ethiopia and Kenya (Tuffa and Baas, 1998, Kaufmann, 2005, Megersa, et. al., 2008). Financial losses occur not only from mortality, but also from the cost of medication and labor needed to treat sick calves. The primary signs of NCCD, also known as calf scour is the appearance of white yellow grey or blood stained, and often foul-smelling watery feces. Since a calf contains approximately 70% water at birth, loss of fluids through diarrhea can produce rapid dehydration, loss of electrolytes, change in acid-base balance and change in body chemistry leading to death. Rotavirus, and corona virus appear to be the

primary etiologic factor of NCCD, but enteric bacteria like E.coli, salmonella, clostridia or protozoa like coccidiosis, cryptosporidium may be involved (Wernery and Kaaden, 1995).

Treatment of dehydration and correction of acidosis is better achieved by intravenous administration of fluid therapy especially when dehydration is 8% or greater (Naylor, 1991, Roussel, 1991).

This study was undertaken to investigate the hematological and serobiochemical parameters in diarrheic neonatal camels in Al Ahsa region, Kingdom of Saudi Arabia.

Materials and Methods

Animals and Housing

Fifty three camel calves suffering from diarrhea and fifty three healthy camel calves, all of Majaheem breed, less than one week old and weighing 20 kg. in average

were included in this study. The animals were kept in private farms at Al Ahsa region in the Kingdom of Saudi Arabia and provided with water ad libitum.

Collection of blood samples

Blood samples were collected by juglar venipuncture for six consecutive days ; at 12 hours intervals in the first three days and subsequently at 24 hours intervals. Blood samples were collected in heparinized tubes for hematology and in plain tubes for harvesting serum. Serum was separated by centrifugation of the clotted blood and stored at -20⁰ c till used.

Clinical assessment

The animals were closely observed twice daily for appearance of any clinical abnormalities Pulse rate was recorded twice a day from coccygeal artery. Rectal temperature (using an electronic thermometer) and respiration rates were recorded twice a day.

Hematological methods

Total erythrocyte counts (TEC). Hemoglobin concentration (Hb.), and packed cell volume (PCV), were determined by coulter counter (Model 2BL Coulter Electronics, Hialeah, FL USA). Total leukocyte counts (TLC) and differential leukocyte counts (DLC) were determined following the method described by Benjamin (1979). Blood pH was determined with pH meter.

Serobiochemical methods

Serum total proteins were determined by biuret method as described by Oser (1976). Sodium and potassium were determined by flame photometric method as described by

Tennant et al.(1972). Serum creatinine, urea and the serum enzymes alanine transaminase (ALT), aspartate transaminase (AST) and alkaline phosphatase (AP) were determined spectrophotometrically using commercially available kits (Randox Laboratories Ltd. Curmlin. UK Cat.No.AL 1205.AS 1204 and AP 502), according to manufacturers instructions.

Statistical analysis

Results are expressed as mean \pm SD and presence of significant differences among means of the groups was determined using one way ANOVA with a Tukey-Kramer post-test for significance. Values were considered significant when $P < 0.05$

Results

Diarrhoeic calves passed semisolid to watery feces which was yellowish to greenish in colour, mixed with blood flakes or mucus. The frequency of defecation varied from 6-10 times per day. The clinical findings in diarrhoeic calves are given in table 1. Most of calves showed pale mucous membrane, inappetence and colic but no mortality. Healthy calves appeared alert with good appetite and normal mucous membranes. Their pulse rate ,respiratory rate and rectal temperature were 110, 20, and 38.5 respectively.

The haematological findings of healthy and sick calves are given in table 2. Significantly ($P < 0.05$) higher values for PCV, and neutrophil counts and lower lymphocyte counts were demonstrated in diarrhoeic calves compared to the healthy ones.

Table 1. Clinical findings in diarrhoeic camel calves (N=53)

Signs	Number of affected Calves
Pale mucous membrane	(48)90%
Normal mucous membrane	(5)10%
Anorexic	((42)80%
Colic	(53)100%
Cough	(11)2%
Rectal temperature(38.5 – 39°C)	(53)100%
Respiratory rate(10-30/min)	(53)100%
Heart rate (100-120)	(53)100%
Depression (dullness)	(53) 100%

Table 2 . Hematological parameters in healthy and diarrhoeic camel calves (n=53)

Parameter	Diarrhoeic calves	Healthy calves
Total RBC count ($X10^6/\mu\text{L}$)	8.65 ± 1.75	8.81 ± 2.50
Hemoglobin concentration (g/dL)	13.11 ± 1.02	14.0 ± 2.1
Packed cell volume (%)	33.6 ± 1.3 a	25.3 ± 1.4 b
Total leucocytes count ($X10^3/\mu\text{L}$)	13.3 ± 2.1	10.9 ± 1.8
Neutrophils (%) = $7.53 \times 10^3/\text{ul}$	55.3 ± 3.2 a	44.7 ± 2.6 b = $4.87 \times 10^3/\text{ul}$
Lymphocytes (%) = $5.38 \times 10^3/\text{ul}$	40.5 ± 2.1 a	50.9 ± 3.1 b = $5.54 \times 10^3/\text{ul}$
Monocytes (%) = $3.38 \times 10^3/\text{ul}$	2.75 ± 0.34	3.00 ± 1.6 = $3.27 \times 10^3/\text{ul}$
Eosinophils (%) = $1.83 \times 10^3/\text{ul}$	1.38 ± 0.11	1.35 ± 0.41 = $1.47 \times 10^3/\text{ul}$
Basophile (%) = $0.12 \times 10^3/\text{ul}$	0.09 ± 0.04	0.10 ± 0.06 = $0.11 \times 10^3/\text{ul}$

The serochemical changes in healthy and diseased calves are shown in Tables 3. Diarrhoeic calves had significantly ($P < 0.05$) lower values for sodium and potassium but

higher values ($P < 0.05$) for creatinine, urea, ALT, AST and AP when compared to healthy ones.

Table 3. Biochemical parameters in healthy and diarrhoeic camel calves (n=53)

Parameter	Diarrhoeic calves	Healthy calves
Total protein (mg/dL)	7.27 ± 1.6	8.11 ± 1.7
Creatinine	1.81 ± 0.18 a	1.62 ± 0.20 b
Urea	97.2 ± 4.1 a	72.4 ± 3.6 b
Sodium (m Eq)	101.5 ± 11.1 a	130 ± 12.1 b
Potassium	5.5 ± 0.82 a	7.1 ± 0.85 b
Alanin transaminase (U/L)	32.4 ± 2.33 a	12.4 ± 3.1 b
Aspartate transaminase	124.3 ± 4.3 a	100.1 ± 3.1 b
Alkaline phosphates	172.3 ± 9.4 a	106.2 ± 2.4 b

Values in each row with different letters are statistically different ($P < 0.05$).

Discussion

The observed increase in PCV during dehydration could be due to the shift of body fluids and the reduction of plasma volume as described in Merino sheep (Marcfarlane et al, 1961) and in cattle (Weeth et al, 1967). Similarly, dehydration led to an increase of PCV in dehydrated young Arabian camels (Al-Haidary, 2005) and gazelle (Al-Toum and Al-Johany, 2000). Total leukocyte counts (TLC) were significantly higher in diarrhoeic calves as compared to normal calves. In response to infectious agents in the body, leukocytosis usually takes place. Salania et al. (1985), Mert et al. (1990) and Aly et al. (1996) also reported leukocytosis in the diarrhoeic calves. Leukocytosis was mainly due to neutrophilia. Lower lymphocyte count was observed in this study. Horestke et al. (1982) and Sridhar et al. (1988) reported Lymphocytopenia in diarrhoeic calves. Due to diarrhoea various serobiochemical changes take place including decrease in sodium (Dalton et al. 1965, Tennant et al. 1972, Deshpande et al. 1993, Radositis et al. 1994, Doll and Trenti, 1996), increase in potassium (Dalton et al. 1965, Tennant et al. 1972, Groutides and Michell, 1990, Sahal et al. 1993, Radositis et al. 1994, Doll and Trenti, 1996). and increase in serum total protein (Radositis et al. 1994). However, increase in sodium decrease, in potassium and serum total protein have also been reported (Aly et al. 1996, Joshi et al. 1997). While increase in blood urea nitrogen (BUN), creatinine (Tennant et al. 1972, Groutides and Michell, 1990, Sahal et al. 1993, Brooks et al. 1997) and AST, ALT and AP (Grodzki et al. 1991, Lechowski, 1996) associated with diarrhoea, have been reported. The elevated values of serum urea, creatinine, and serum enzymes (AST, ALT and AP) obtained in diarrhoeic calves in this study, are a strong evidence for the degree of their liver and kidney damage.

Certain traditional practices followed by some camel herding tribes such as colostrum overfeeding or colostrum withdrawal were incriminated as predisposing factors for diarrhoea in dromedary calves (Khanna et al. 1992).

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التغيرات الدموية والبيوكيميائية في صغار الإبل المصابة باسهال الرضع في المملكة العربية السعودية

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المستخلص

أجريت هذه الدراسة بغرض التحقق من الإسهالات التي تصيب صغار الإبل من سلالة المجاهين (المملكة العربية السعودية). تم استخدام عدد 53 من صغار الإبل الرضع المصابة بالأسهال في عمر أسبوع واحد وتزن 20 كيلوجرام في المتوسط مع مجموعة أخرى سليمة بنفس العدد والعمر. أجريت الأختبارات الأكلينيكية والدموية والبيوحيوية على المجموعتين وتمت مقارنة نتائجهما. وقد أظهرت النتائج شحوبا في الأغشية المخاطية وفقدان للشهية مصحوبة بمغص مع ارتفاع بدرجة الحرارة ومعدل التنفس، وقد تبين من فحص عينات الدم ارتفاع مستوى خلايا الدم المتراسة (PCV)، والخلايا البيضاء للعدلة (neutrophils, leukocyte) في الحيران المصابة بالإسهال مقارنة بالأخرى السليمة. أظهرت اختبارات الدم الكيميائية للحيران المصابة بالإسهال انخفاض مستوى الصوديوم والبوتاسيوم مع ارتفاع مستوى الكرياتينين و اليوريا عند فحص وظائف الكلي وارتفاع بمستوى إنزيمات الكبد مثل الانين امينو ترانسفيريز، الاسبارتيتامينو ترانسفيريز والالكينفوسفاتيز (ALT,AST,AP) عند فحص وظائف الكبد مقارنة بالحيران السليمة.