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Association of Diarrhea with Congenital Toxoplasmosis in Calf-Camels (*Camelus dromedarius*)

[1]Y.I. Manal and [2]A.M. Maijd
[1]Central Veterinary Research Laboratories, Animal Resources Research Corporation,
P.O. Box 8067 Alamarat, Khartoum, Sudan
[2]National Centre for Research, P.O. Box 4102, Khartoum, Sudan

Abstract: Anti-*Toxoplasma gondii* antibodies were detected among diarrheic calf-camels -less than 12 months of age- from a three different locations in the Sudan; Butana (East), Kordofan (West) and River Nile (North). Out of 306 serum sample, 157 serum samples were seropositive by latex agglutination test (51.3%). ELISA test was applied on the sero-reacted sera, IgM and IgG were detected in sera of diarrheic calf camels and sera of recovered ones, respectively. Serum samples from 18 diarrheic calf-camels and their mothers revealed that,12 out of 18 diarrheic calves with their mothers were sero-reacted for *Toxoplasma* antibodies while the remainder 6 calves and their mothers were sero-negative. This study revealed a wide spread of toxoplasmosis among diarrheic calf-camels. The statistical analysis using software analysis programs showed no significant differences between the three surveyed locations $p<0.05$. Statistically there was no significant difference between age groups ($p<0.05$); this may reveal an occurrence of congenital infection. A relationship between congenital toxoplasmosis and diarrhea in calf camels was discussed.

Key words: Anti-*Toxoplasma*, ELISA, calf camels, *camelus dromedarius*

INTRODUCTION

Congenital toxoplasmosis is a result of vertical transmission of *Toxoplasma gondii* tachyzoites-during pregnancy from mothers to their off-spring. Diarrhea was the main clinical sign that appear on all calf-camels which were delivered from mothers experimentally infected with *Toxoplasma* during pregnancy (Manal *et al*., 2005). Cases of calf diarrhea were reported in camel herds in Sudan giving a prevalence of 83% (Ali *et al*., 2005). Thirty three percent of the neonates causing 23% mortality. A mortality of 39.9% was reported in Sudan due to calf-camel diarrhea (Ali *et al*., 2005). Manal *et al*. (2003) reported a widespread prevalence of toxoplasmosis among Sudanese camel, (61.7%). Generally there is a lack of detailed study on the role of *Toxoplasma gondii* in calf-camel diarrhea.

The purpose of the present research is to confirm the relationship between *Toxoplasma* infection and diarrhea in calf-camels.

MATERIALS AND METHODS

Blood samples were obtained in plain vacutainers from diarrheic calf-camels-less than 12 months of age-owned by nomads from a different three locations in Sudan; 92 in Butana (East), 175 in Kordofan (West) and 39 in River Nile (North). Blood samples were left to clot overnight at 4°C; sera decanted into plastic tubes and stored at -20°C until used.

A total of 306 serum samples were tested for anti *Toxoplasma* antibodies by latex agglutination test using Toxolatex kit (Linear Kemical corp. Spain). Serum samples from 18 diarrheic calf-camels with their mothers were tested for detection of anti-*Toxoplasma* antibodies .ELISA test was applied on the sero-reacted sera; IgM and IgG ELISA kits (Linear Kemecals Copm. Spain) were used on the sera of diarrheic calf-camels and on the recovered ones according to the manufacturer instructions.

RESULTS

Out of 306 diarrheic calf-camels sera surveyed for anti-*Toxoplasma* antibodies, 157 serum samples were sero-reacted (51.3%).

Table 1 shows the frequency distribution of anti-*Toxoplasma* antibodies among three surveyed locations. The distribution of positives was 50 out of 92 (54.3%) in Butana, 88 out of 175 (50.2%) in Kordofan and 19 out of 39 (48.7%) in River Nile. Table 1 also shows a sero-reactivity, correlated with significance between the

Corresponding Author: Y.I. Manal, Central Veterinary Research Laboratories, Animal Resources Research Corporation, P.O. Box 8067 Alamarat, Khartoum, Sudan

Table 1: Sero-prevalence of *toxoplasma* in a three locations in Sudan

Location	Sample	Positive	Prevalence %
Butana	92	50	54.3
Kordofan	175	88	50.2
River Nile	39	19	48.7
total	306	157	51.3

Pearson Chi 2(1) = 0.1977, Pr = 0.977

Table 2: Sero-prevalence of *Toxoplasma* in the different age group

Age group location	Sample	Positive	Prevalence %
≤3 months	104	71	68.2
≥4-6 months	33	24	72.7
≥7-9	12	9	75.0
≥10-12	12	9	75.0

Pearson Chi 2(1) = 2.9398, Pr = 0.401

surveyed locations. The statistical analysis using software analysis programs showed no significant differences between the three surveyed locations $p<0.05$. Table 2 shows sero-prevalence of antibodies among different age groups. The overall percentage of positive samples in age groups ≤3, ≥4-6, ≥7-9 and ≥10-12 month of age were 68.2, 72.7, 75 and 75%, respectively. The data analysis revealed no significant difference between age groups $p>0.05$.

Tweleve out of 18 diarrhoeic calves with their mothers were sero-reacted for *Toxoplasma* antibodies while the remainder 6 calves and their mothers were sero-negative.

DISCUSSION

Calf-camel diarrhea is considered one of the main killing signs of diseases among calf camels up to 6 month of age in the Sudan (Ali, 2003). *Toxoplasma gondii* may be one of those diseases.

In this study anti-*Toxoplasma gondii* antibodies were detected among diarrheic calf-camels in a three different locations in the Sudan using latex agglutination test. The sero-reacted sera (157 serum samples) were tested by ELISA-IgM and IgG . The present study revealed detection of anti-*Toxoplasma* antibodies in 51.3% of samples collected from different parts of Sudan with more or less the same prevalence rate, indicating the widespread of *Toxoplasma* infection among calf-camels. Many previous reports a widespread prevalence of toxoplasmosis among Sudanese camel (Manal *et al*., 2005).

Mast cell activation and stimulation may be transitory in response or a stimulus causing reactional mastocytosis. Gastrointestinal mastocytosis associated with toxoplasmosis is reported in a patient, its regression after treatment of Toxoplasmosis; suggest a possible relationship between the mast cell proliferation and the parasitic infection (Koeppel *et al*., 1998).

In camel, Manal *et al*. (2005) reported that all pregnant she-camels which experimentally infected with *T. gondii* oocysts, had delivered calves suffered from diarrhea and died at 6-40 days of age. Microscopic examination of intestines revealed congestion, haemorrhage, infiltration of lymphoid cells and severe damage of the intestinal villi.

The temporary parasitemia in a primarily infected pregnant animal may result in invasion of the placenta by tachyzoites which then multiply within cells of the placenta. Eventually, some of these may cross the placenta and enter the foetal circulation or foetal tissues (Ebbesen, 2000). Detection of anti-*Toxoplasma* antibodies in the sera of 12 out of 18 diarrheic calf-camels with their mothers, reflect the vertical transmission of *Toxoplasma* to the off-spring. Also detection of immunoglobulin IgM and IgG in the sero-reacted sera tested by latex agglutination test confirmed *Toxoplasma* infection.

No significant difference between the seroprevalence in the different age groups in the total sample ($p>0.05$). This result may revealed the congenital toxoplasmosis. The detection of anti-*Toxoplasma* antibodies in the sera of diarrheic calves may initiate further research work to elucidate the possible role of toxoplasmosis in the pathogenesis of calf-camel diarrhea diagnosis and control.

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