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Short Communication

Determination of antibodies to Caprine arthritis encephalitis virus in goats and sheep in some localities in Sudan

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ABSTRACT

Objective: Caprine arthritis encephalitis (CAE) infection is existing worldwide causing economic loss in goat production. This work was conducted to investigate the prevalence of CAE in local and foreign goat breeds and sheep in different localities in Sudan.

Materials and methods: A total of 368 sera samples were prepared; among these, 112 were collected from cross (n=39) and foreign (n=73) breeds of goat in Khartoum state, equal number of sera (n=23) were collected from goats and sheep from each of River Nile, Gedarif, Sinnar and North Kordofan states. Eighteen cross bred goats were tested from River Nile state. From foreign bred goats, 28 and 26 sera were collected from Gazira and Northern states, respectively. The collected sera were examined for the presence of antibodies to CAE virus using Enzymed-Linked Immunosorbent Assay (ELISA).

Results: The overall seroprevalence of CAE was 2.99% (n=11/368). Positive results were found only in 11 of foreign breed of goats (*Cyprus shami*) collected from Gazira (39.29%; n=11/28). Statistically, there was an association between breed and location (P=0.001 and P=0.671, respectively).

Conclusion: The CAE virus infection exists only in foreign goat breeds. Gazira state showed the highest seroprevalence as compared to other states considered in this study. Strict hygienic measures should be adopted to control the disease and to prevent its spread to local breeds.

KEYWORDS

Antibodies, CAE, Goat, Sheep, Sudan

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INTRODUCTION

Caprine arthritis encephalitis (CAE) is an important chronic viral disease of goats caused by caprine arthritis-encephalitis virus (CAEV), a lentivirus of the family Retroviridae (Ceciliani et al., 2009). The genus *Lentivirus,* includes several important pathogens, such as human immunodeficiency viruses 1 and 2, several simian immunodeficiency viruses, equine infectious anemia virus, maedi/visna virus, CAEV, feline immunodeficiency virus, and bovine immunodeficiency virus (Murphy et al., 1999). The disease is characterized by polyarthritis, interstitial pneumonia, mastitis, and progressive weight loss in adult goats and encephalitis in kids (Rodriguez et al., 2005). The disease causes considerable economic losses in goat production (Pisoni et al., 2007) and infects goats at various stages of age development, regardless of sex and production system (Lara et al., 2005). CAEV infection is distributed worldwide with high prevalence especially in industrialized countries (Gufler et al., 2007). In the Middle East, CAEV has been detected in Saudi Arabia, Syria, Jordan, and Lebanon and also in Turkey, with prevalences of between 0.8% and 12.5% (Alluwaimi et al., 1990; Giangaspero et al., 1992; Al-Qudah et al., 2006; Tabet et al., 2015; Burgu et al., 1994). In Sudan until the last decade the disease was not reported, the first report of the disease was in 2010, where antibodies to the virus were detected in foreign goat breeds in Khartoum State (Elfahal et al., 2010). Few years later, a serological study revealed the spread of the disease to other four states of the country only in foreign breeds (Elfahal et al., 2013). More recently seroprevalence of the disease was reported also in foreign breeds in three different states (Halfawi, 2014). This study was designed to elucidate the current seroprevalence of CAEV in different states including areas which were not examined before and to explore the spread of the infection to local goat breeds.

MATERIALS AND METHODS

Ethical approval: The investigation was carried out according to the animal welfare code in Sudan.

Collection of samples: A total of 368 sera were collected. Of which, 184 sera were collected from local breeds of goats and sheep, equal number of sera (n=23) were collected from goats and sheep from each of River Nile, Gedarif, Sinnar and North Kordofan state. Sera collected from foreign breeds of goats were 127; these included 73 from Khartoum, 28 from Gazira and 26 from Northern State (**Figure 1**). Sera collected from cross breeds of goat were from Khartoum (n=39) and River Nile (n=18). Collected sera were kept at -20°C untill examined. The sera were examined for the presence of antibodies to CAEV using ELISA.

Detection of CAEV antibodies using ELISA: Collected sera (n=368) were screened for the detection of CAEV antibodies using competitive ELISA kits (VMRD, USA), the test was applied as instructed by the manufacturer. Results were statistically analyzed using Statistical Packages for Social Science (SPSS) version 16, Software.

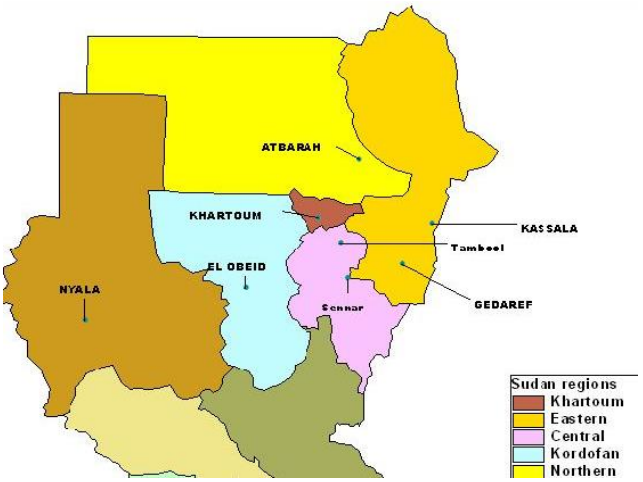

Figure 1: Locations of sera collection in Sudan; Khartoum, River Nile (Atbara), Eastern (Gedarif), Central Sudan (Gazira), Central to South (Sinnar), Western (North Kordofan, El Obaid).

RESULTS AND DISCUSSION

The overall detected seroprevalence of caprine arthritis encephalitis in sheep and goats was 2.99% (n=11/368) (**Table 1**). Positive results were seen only in 11 of foreign breed of goat (*Cyprus shami*) collected from Gazira (39.29%; n=11/28). Statistically there was a significant difference in prevalence rate between locations (*P*=0.001) and breed (*P*=0.671).

Variable seroprevalence of CAE in goats and sheep was detected worldwide where high prevalence is usually reported in industrialized countries (Gufler et al., 2007). It was 42% in goats in Norway (Nord et al., 1998), 8.0% in goats in Spain, 15% in Japan (Konishi et al., 2015). In India twelve goats out of 360 (3.3%) were found seropositive to CAEV antibodies (Waseem et al., 2015), 12.5% in Syria (Giangaspero et al., 1992). 0.6% in foreign goat breed in Tanzania (Max et al., 2013). 8.2%, in goats in Brazil (Bandeira et.al, 2009). 13.1% in Lebanon, local breed were found to be more tolerant to the infection than foreign breed (Tabet et al., 2015).

Table 1: Detection of antibodies to caprine arthritis encephalitis virus in goat and sheep sera using ELISA.

Location	Sheep		Local goat		Cross bred goat		Foreign goat		Total	
	Tested	+ve	Tested	+ve	Tested	+ve	Tested	+ve	Tested	%
Khartoum	-	-	-	-	39	0	73	0	112	0
River Nile	23	0	23	0	18	0	-	-	64	0
Gedarif	23	0	23	0	-	-	-	-	46	0
Sinnar	23	0	23	0	-	-	-	-	46	0
North Kordofan	23	0	23	0	-	-	-	-	46	0
Gazira	-	-	-	-	-	-	28	11	28	**39.29**
Northern State	-	-	-	-	-	-	26	0	26	0
Total	**96**	**0**	**96**	**0**	**57**	**0**	**127**	**11**	**368**	**3**

In this study, antibodies to CAEV were found only in foreign goat breed (*Cyprus shami*) in Gazira State. Statistically there was a significant difference in prevalence rate between locations, breed and species (P=0.001 and P=0.671, respectively).

Detected seroprevalence (39.29%; n=11/28) was far higher than that previously reported in Khartoum State (7.3%) in foreign and crossbreed (Elfahal et al., 2010) and in other countries, 1.03% in Turkey (Aslantas et al., 2005), 16.02% in Egypt (Ghanem et al., 2009). In other study in Sudan, the highest prevalence was recorded also in Gazira State (19%), whereas it was 10.7% in Kassala, 0.9% in Khartoum State and no positive was found in Northern and River Nile States (Elfahal et al., 2013). More recently, similar result of higher seroprevalence was detected also in Gazira State (19%), while it was 1.1% in Khartoum state and 10.7% in Kassala (Halfawi, 2014).

The results of this study beside the confirmation of higher existence of CAEV infection in Gazira State it points to the higher seroprevalence in *Cyprus shami* goat breed where much lower seroprevalence was detected previously in Saanen (4.5%) and (19.1%) in shami breed (Elfahal et al., 2010; Halfawi, 2014). Anti CAEV antibodies were not detected in local breed of goats as previously reported in Sudan (Elfahal et al., 2010; Elfahal et al., 2013; Halfawi, 2014), similar results were reported in Nigeria where none of 1000 local breeds of goats and sheep were positive (Baba et al., 2000). This supports the findings about the more prevalence of CAEV infection in foreign breeds; it was detected in 19% in Saanen, 8% in Damascus and only 4% in indigenous Aardi goat breeds in Saudi Arabia (Abo El-hassan, 2013). Low seroprevalence is usually detected in local goat breeds, 5.1% in Oman (Tageldin et al., 2012), 6% in Somalia (Ghanem et al., 2009), it was found to be 8.9% in local and foreign breeds in Jordan (Al-Qudah et al., 2006). In the present study CAEV antibodies was not detected in sheep, unlike reports in sheep in other countries, 65.5% in Spain (Barquero et al., 2013), 34.5% in Iran (Behnaz et al., 2015); however, low prevalence (1.9%) was found in sheep in Saudi Arabia (Alluwaimi et al., 1990). Despite this study, no study was carried out to investigate CAEV antibodies in sheep in Sudan. Surveillance of CAEV antibodies in sheep in other areas of Sudan is recommended.

CONCLUSION

Among the seven States (Khartoum, River Nile, Gedarif, Sinnar, North Kordofan, Gazira and Northern), CAEV infection exists only in foreign goat breed of Gazira State, Sudan. Strict hygienic measures should be adopted to control the disease and to prevent its spread to local breeds.

CONFLICT OF INTEREST

Nothing to declare.

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