

Full Length Research Paper

Seroprevalence of pestivirus in small ruminants in Sudan

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Accepted 22 July, 2013

Pestiviruses are known to exist in ruminants worldwide; however in Sudan, sparse work has been published. This study is aimed at investigating the existence of pestivirus, particularly bovine viral diarrhoea virus (BVDV) in small ruminants in Sudan through the detection of its antibodies in sheep and goat sera. A total of 424 sheep and 209 goat sera were collected from different localities in Sudan representing north, east, west, central and southern parts of the country. Using enzyme-linked immunosorbent assay (ELISA), seroprevalence of pestivirus in sheep was found to be 39.1% while in goats it was 14.8%, in sheep the highest percentage of positives (70.2) was found in Kassala and AlAzazi (47.6%) at the east then Darfur in the west (46.7). In goats highest seroprevalence (28.6) was detected in sera collected from Rabak at the center, then River Nile (23.5) in the northern part of the country. This is the first report on the detection of pestivirus antibodies in small ruminants in Sudan.

Key words: Pestivirus, antibodies, small ruminants, Sudan.

INTRODUCTION

Pestivirus genus belongs to the family, Flaviviridae which includes classical swine fever virus (CSFV), bovine viral diarrhoea virus (BVDV) and border disease virus of sheep (Rice, 1996). Infection with pestiviruses can result in severe economic and reproductive losses. Pestiviruses are not highly host-specific; BVDV can infect not only cattle but also sheep, swine, goat, deer and giraffe; Border disease (BDV) infects sheep, swine and goats (Paton, 1995). BD is a congenital viral disease of sheep, characterized by barren ewes, stillbirths, abortion and delivery of small weak lambs, which may show tremor, abnormal body conformation and hairy fleeces. The disease also occurs in goats (Nettleton, 2004). Serological evidence of pestivirus infections in small

ruminants were previously documented worldwide. Czopowicz et al. (2011) detected antibodies against border disease in goat in Poland; it was also detected in sheep in Spain (Mainar-Jaime and Vazquez-Boland, 1999) and in sheep in Turkey (Yazici et al., 2012) as well as in Austria (Schiefer et al., 2006).

In Sudan, the estimated sheep, cattle and goat population in 2012 was 39,484,000, 29,840,000 and 30,837,000, respectively; most of these animals are kept at western and eastern Sudan (Anon, 2012). The majority of these animals are owned by nomads who are moving freely, very minor farms are found only in large cities. This situation increases the contact between different animal species during pasture and watering, consequently

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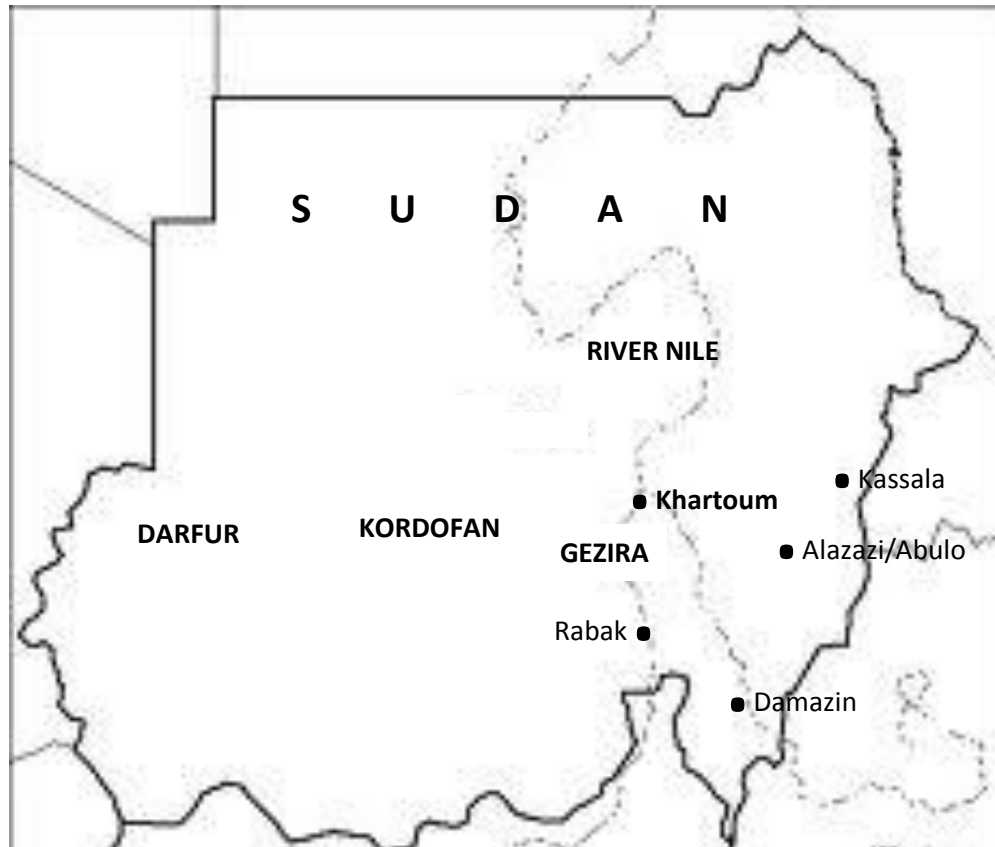


Figure 1. Sudan map showing areas of sample collection.

leading to the spread of infectious diseases. Many outbreaks of respiratory, infertility and weak newborn are recorded annually in different areas of Sudan. However, the main viruses suspected to cause such manifestations are Peste des petits ruminants virus and blue tongue virus, no investigations are routinely done for pestivirus particularly BVD and BD infection but not CSF as swine are very rare to be reared in Sudan.

Work on pestivirus of ruminants in Sudan is very scarce, El Hag Ali and El Amin (1982) reported the detection of BVDV antibodies in 71.9% of tested bovine sera. However, high seroprevalence (84.6%) of pestivirus in camels has been recently detected (Intisar et al., 2010). No work on pestivirus seroprevalence in sheep and goats was published in Sudan; this study is intended to investigate the existence of BVDV infection in sheep and goats through the detection of its antibodies in sera of small ruminants.

MATERIALS AND METHODS

Sample collection

Sheep sera (no. = 424) were collected randomly from clinically healthy sheep at different areas of Sudan: Khartoum, River Nile

(north), Gezira, Rabak, Damazin (centre, south), AlAzazi, Kassala (east), Kordofan and Darfur (west). Goat sera (no. = 209) were collected from clinically healthy goats at Khartoum, River Nile (north), Rabak, Damazin (centre, south) (Figure 1). Sera were kept at - 20°C till examined.

Detection of pestivirus antibodies

All collected sera (no. = 633) were tested for pestivirus antibodies using ELISA obtained from Bio X Diagnostics, Belgium. The test is based on the sensitization of 96-well microtitration plates by monoclonal antibody specific to NS3 protein from BVD virus (P80). After adding and washing of tested sera, the conjugate, which is a specific monoclonal antibody against BVDV NS3 protein coupled to peroxidase is then used. The test was performed according to the manufacturer instructions.

RESULTS

Seroprevalence of pestivirus in sheep

Using ELISA in 424 tested sheep sera, the overall detected seroprevalence of pestivirus was 39.15%, highest seroprevalence was detected in sera collected from two localities at eastern Sudan, Kassala (70.3%) and AlAzazi (47.6%) then in sera collected from Darfur (46.7%). The details are presented in Table 1.

Table 1. Detection of antibodies against pestivirus using ELISA in sheep sera collected from different areas in Sudan.

Area	Number tested	Positive	Negative	Positive (%)
Khartoum	11	5	6	45
River Nile	9	4	5	44
Gezira	17	2	15	11.76
Rabak	80	23	57	28.75
Damazin	100	30	70	30
AlAzazi/ Abulo	63	30	33	47.61
Kassala	37	26	11	70.27
Kordofan	77	32	45	41.55
Darfur	30	14	16	46.66
Total	424	166	258	39.15

Table 2. Seroprevalence of pestivirus in goat sera collected from different areas in Sudan detected using ELISA.

Area	No. tested	Positive	Negative	Positive (%)
Khartoum (Saaneen)	80	2	78	2.5
River Nile	34	8	26	23.52
Rabak	49	14	35	28.57
Damazin	46	7	39	15.21
Total	209	31	178	14.83

Seroprevalence of pestivirus in goats

Out of 209 tested goat sera, antibodies against pestivirus were detected in 31 sera (14.8%). Highest seroprevalence of pestivirus (28.6%) was detected in sera collected from Rabak at the center of Sudan, then (23.5%) in sera collected from River Nile state at northern Sudan (Table 2).

DISCUSSION

Bovine viral diarrhoea (BVD) is one of the systemic diseases that have effect on many body systems (Murphy et al., 1999). Detection of antibodies against viruses is routinely used to investigate its existence in animals. In this study, antibodies against pestivirus were detected in 39.15% of tested sheep sera; this is considered slightly higher than the previously published work in India, where it was found to be 23.4% (Mishra et al., 2009) but lower than that reported by Shapouri et al. (2007) in Iran (46.62%). However, higher seroprevalence of pestivirus in sheep were detected in many countries; highest reported ones were in Turkey: 90.27 (Ozan et al., 2012) and 74.51% (Azkur et al., 2011). In 4931 sheep sera tested in Austria, the mean flock prevalence was 62.9% and the mean individual prevalence was 29.4% (Krametter-Frötscher et al., 2007). This variable seroprevalence could be attributed to many factors, the most

crucial one is the management systems adopted, generally in Europe, strict hygienic measures are followed in introducing new animals to farms; seromonitoring and replacement of affected animals are practiced. For this, the seroprevalence of pestivirus is almost low.

Our results for pestivirus seroprevalence are in line with this suggestion, it was far high than those reported by O'Neil et al. (2004) in Ireland which were only 5.6% of 1,448 sheep. In England and Wales, pestivirus antibodies were detected in 10.8% (Sands and Harkness, 1978) while it was 8.3% in Danish sheep (Tegtmeier et al., 2000) and 4.5% in Norwegian sheep (Loken et al., 1991). In Sudan, no work on pestivirus in sheep has been published; however, El Hag and El Amin (1982) reported the detection of BVDV antibodies in 71.9% of tested bovine sera; a recent published work was carried out on camels (Intisar et al., 2010), pestivirus antibodies were detected in 84.6% of 260 tested sera. These results are far higher than the results of this work which is most probably due to the fact that unlike camels and cattle, sheep turnover is much shorter and they are sold for meat consumption as well as export rather than been kept for long time in farms.

In the present study, geographical variation in pestivirus seroprevalence in sheep was observed, highest seroprevalence was observed in sera collected from Eastern Sudan (70 and 47.6%) then in western Sudan, although it is comparable to the figures reported

by Intisar et al. (2010) for camel sera (81.7%), western Sudan showed the highest seroprevalence (92%) while eastern Sudan came third. It was concluded from both studies that pestivirus is circulating all over the country with the highest seroprevalence in eastern and western parts; this is expected as most of animal population is kept in these regions and the management system is almost the same.

Seroprevalence of pestivirus in goats (14.8%) detected in this study was lower than that of sheep; this is not unusual as most of the previously published studies showed similar results. Mishra et al. (2009) reported 16.9% seroprevalence in goats compared to 23.4% in sheep in India; where in Iran it was 46.6 and 32.9% (Seyfiabad Shapouri et al., 2007); 90 and only 10% in Turkey (Ozan et al., 2012). In 672 goats screened, antibodies against pestivirus were detected in only 1.5% in Korea (Oem et al., 2012). In Austria, out of 1196 goat sera tested for pestivirus antibodies, only 5.6% were positive (Preyler-Theiner et al., 2009). In Africa, the picture is almost the same; in Namibia, only 4.6% of 1118 goat sera were found to be positive for pestivirus antibodies (Depner et al., 1991); however, Zaghawa (1998) reported the existence of pestivirus antibodies in 31.4% of tested goats in Egypt. Goats do not seem to be an efficient host for ruminant pestiviruses; persistent infections, which are vital for virus survival in cattle and sheep, have been rarely reported in goats (Løken and Bjerkås, 1991; Wohlsein et al., 1992).

In this study, variable seroprevalence of pestivirus in goats were observed in different localities, unlike sheep results, the highest percentage (28.6) was detected in sera collected from Rabak at Center of Sudan, and then in River Nile at the north (23.5 %), lowest seroprevalence (2.5%) was detected in sera collected from Khartoum. This could be due to the difference in management system as goats are usually kept apart of sheep and cattle in a very small flocks in Khartoum and other big cities while in most of rural areas in Sudan, it shares pasture and water with sheep and sometimes cattle.

It is concluded from this preliminary study that BVDV is wide spread in sheep and goats in different areas of Sudan; this has to draw attention on further work to investigate the role of pestiviruses in reproductive as well as respiratory problems of sheep and goats in Sudan.

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