

## Research Article

# Respiratory syncytial virus infection in domestic ruminants in Sudan

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## **ABSTRACT**

The existence of respiratory syncytial virus (RSV) infection in domestic ruminants was investigated. A total of 325 lung specimens with respiratory infection lesions were collected from cattle, sheep and goats at slaughter houses in different localities in Sudan. RSV antigen was examined in collected samples using ELISA and Fluorescent antibody test. Twenty three out of 325 samples (7 %) were found to be positive. Within species, observed positive results were 12.6 % of 95 cattle, 4.7 % of 170 sheep and 5% of 60 goat specimens. Positive results were detected in the three studied areas with highest prevalence (50% for cattle and 10.5% overall) in River Nile State at Northern Sudan. The results evidenced the existence of RSV infection in domestic ruminants in different areas in Sudan and its possible association with respiratory infections. This is the first report of RSV antigen detection in ruminants in Sudan.

**Keywords:** RSV, Respiratory infections, Cattle, Sheep, Goat, Sudan.

## **INTRODUCTION**

Respiratory syncytial virus (RSV) is an enveloped non-segmented negative-stranded RNA virus with a helical nucleocapsid, it is classified in the *Pneumovirus* genus of the Paramyxoviridae family. Parainfluenza-3 virus (PI3V) and respiratory syncytial virus (RSV) of the family *Paramyxoviridae*, are main viruses encountered as a cause of the respiratory complex [1]. Bovine respiratory syncytial virus (BRSV) is determined as one of the most important causes of respiratory disease in beef and dairy calves [2]. RSV infection in cattle is known as a disease resulting in significant economic losses due to decreased productivity and increased costs for treatment. RSV is well recognized as a primary pathogen causing serious respiratory disease that predisposes cattle to secondary infection [3]. BRSV infection is worldwide distributed in cattle [4, 5, 6, 3] as well as in sheep and goat [7, 8, 9]. In Sudan, RSV infection has been reported in

camels [10] however no work on the occurrence of the disease in ruminants was published. This work is to explore the existence of RSV in cattle, sheep and goats in Sudan and its possible role in causing respiratory infections.

## **MATERIALS AND METHODS**

### **2.1. Area of study**

Three areas were selected for the study, White Nile State at Central, River Nile at Northern and north Kordofan at Western Sudan.

### **2.2. Collection of samples**

Lung samples (n = 325) with lesions of respiratory infections were collected in the slaughterhouses at the three different areas. Samples were collected from cattle (n = 95), sheep (n = 170) and goat (n = 60). Samples were kept on ice till sent to the Veterinary Research Laboratory at Khartoum where it were kept at – 20°C till examined.

**2.3. Examination for RSV antigen using ELISA:** Collected lung samples were screened for

the detection of RSV antigen using ELISA Kits obtained from BIO X Diagnostics, Jemelle, Belgium. Preparation of samples and the test procedure was applied according to the instructions of the manufacturer.

#### **2.4. RSV antigen Detection using Fluorescent antibody test (FAT)**

Samples tested positive by ELISA were examined for RSV antigen using FAT, the conjugate was obtained from BIO X Diagnostics, Jemelle, Belgium.

### **RESULTS**

#### **3.1. Existence of RSV antigen**

Using ELISA, Twenty three out of 325 tested lung samples (7 %) were found to be positive for RSV antigen. Positive results were detected in samples collected from the three studied areas with overall higher prevalence (10.5%) in River Nile State at Northern Sudan. Cattle samples collected from River Nile State showed the highest prevalence (50%). Observed positive results were 12.6 % of 95 cattle, 4.7 % of 170 sheep and 5% of 60 goat specimens (Table 1 and 2).

#### **3.2. Detection of RSV antigen using Fluorescent antibody test (FAT)**

To confirm ELISA results, all positive (n = 23) as well as doubtful samples for RSV antigen examined positive using FAT.

### **DISCUSSION**

Respiratory infections are considered one of the major health problems facing animal production worldwide. In Sudan, 23.9 % of the total sick animals brought to the clinics during 2005 – 2009 were due to respiratory infections in Gezira State [11] while in North Kordofan State it was 4.2% [12]. The association of RSV with respiratory infection and its role in causing economic losses is well documented [13, 14, 15, 16].

Serological evidence of RSV infection was previously reported, in Saudi Arabia, 75.6% of cattle sera were tested positive [17]. In India, 47% seroprevalence in cattle was detected [18], it was found to be 15% in cattle, and 3 % in goats [19].

Previously in Sudan, 27 % of camel sera tested positive for RSV antibodies, however only 1.4% of tested camel lungs showed positive results for RSV antigen using ELISA [10]. In this study RSV antigen was found to exist in cattle (12.6 %), sheep (4.7%) and goat (5%) in three different localities in Sudan. Existence of RSV antigen in cattle lungs has been reported previously with variable percentages worldwide, in Turkey, 16.6% of tested cattle lungs showed positive results [20], which is almost in line with the results obtained in this work. However the detected prevalence in cattle lungs in River Nile State was the highest (50%). This may reflect the high rate of spread of this viral infection in the State which could be due to the tough weather with very hot summer and very cold winter that predispose animals to respiratory infections. RSV antigen was found to be existing in 10% of tested goat specimens using immunohistochemical test in Nigeria [21].

In this work FAT was used to confirm ELISA results, it was noticed that some ELISA doubtful results tested positive using FAT; this indicates the higher sensitivity of FAT over ELISA. The results were in agreement with published reports; FAT was found to be a good test for diagnosing RSV in tissues [22], the usefulness of FAT for detecting RSV antigen was reported [23]. Using FAT, RSV antigen was detected in 13 of 24 fatal cases of alpacas [24]. FAT detected 6% of tested cattle lungs for RSV [25].

The results obtained in this work reflected the existence of RSV infection in cattle, sheep and goats which indicates its possible role in the causation of respiratory infections. This is the first report of the detection of RSV antigen in cattle, sheep and goat lungs in Sudan.

It is not clear whether the virus is originated in cattle and transmitted to other species or different strains are existing in each species. Detailed study for the molecular characterization of the virus in different species is highly recommended.

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**CONFLICT OF INTEREST:**

The author declares that there is no conflict of interest.

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**Table (1)** Detection of RSV antigen using ELISA in pneumonic cattle lung tissue samples collected from two localities in Sudan during 2010-2013

Area	Total tested	No. positive	% positive
River Nile (Atbara)	22	11	50
Kordofan (AlObied)	73	1	1.7
<b>Total</b>	95	12	12.6

**Table (2)** RSV antigen detection using ELISA in pneumonic sheep and goat lung tissue samples collected from two localities in Sudan during 2010-2013

Area	Total tested			No. positive			% positive		
	Sheep	Goat	Total	Sheep	Goat	Total	Sheep	Goat	Total
River Nile (Atbara)	100	40	140	4	2	6	4	5	4.3
White Nile (Rabak)	70	20	90	4	1	5	5.7	5	5.6
<b>Total</b>	170	60	230	8	3	11	4.7	5	4.8