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Slaughterhouse survey for antibodies against selected viruses in ruminant sera in Maiduguri, Borno State, Nigeria

Untersuchung von Wiederkäuern auf das Vorhandensein von Antikörpern gegen ausgewählte Viren am Schlachthof in Maiduguri, Borno Staat Nigeria

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100 animals each of cattle, sheep, and goats from the municipal slaughterhouse at Maiduguri were tested by the complement fixation method for the presence of antibodies against 3 virus antigens: bovine rota virus (BRV), bovine corona virus (BCV), and bovine virus diarrhoea virus (BVDV). 46 (15.3%) of all sera tested contained antibodies against 1 or more virus antigens. The prevalence rate was highest in cattle (27%), among which the BCV and BVDV reactions were significantly higher than those of BRV. Sheep and goat sera did not exhibit any such differences. The sex of the animals had no relation to the prevalence of the reactions, except for sheep, where the ewes had a significantly higher prevalence rate. The infection rate found in the ruminant species tested is relevant for the Public Health Service as well as for the Veterinary Science in Nigeria.

1 Introduction

Bovine diarrhoea viruses (bovine virus diarrhoea virus, bovine corona virus, and bovine rota virus) are the major causes of diarrhoea in cattle, sheep, and goats (MCNULTY 1978, STAIR et al. 1972). Neonatal diarrhoea is caused mainly by these viruses in calves and lambs. Infections due to these viruses have been associated also with great economic losses in both the dairy and beef industries. The economic losses are due,

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not only to mortality, but also to the medical cost and poor growth (OJEH and TAYLOR 1984) . Although complex, the aetiology of this syndrome includes salmonellae (SOJKA and FIELDS 1970), compylobacter (AL-MASHAT and TAYLOR 1980 a, b), cryptosporidia (ANGUS 1983), enterotoxigenic *Escherichia coli* (SHERWOOD et al. 1983). In addition, syndromes with clinical and pathological features caused by these viruses resembling peste-des-petit-ruminant (PPR) in Nigerian sheep and goats have been documented by TAYLOR et al. (1977). They have shown serologically that bovine virus diarrhoea virus is circulating also in local sheep and goats in Nigeria. There is serological evidence also that about 13.4% of the cattle population of the Northern States of Nigeria have neutralizing antibodies against bovine virus diarrhoea virus (OKEKE 1976). FLEWETT and WOODE (1978) also serologically demonstrated a high prevalence of antibodies against rota virus (81%) in Nigerian cattle, sheep, and goats. However, there is a greet dearth of information on the activities of the corona virus in Nigeria. Over the years Nigerians have been finding it increasingly difficult to meet their requirements for animal proteins. This has resulted in the increasing importation of meat and milk products in recent years to supplement the inadequate animal protein consumption of Nigerians (GHAJI and ADEGWA 1986) . The majority of cattle consumed in Nigeria are usually imported from neighbouring countries of Chad, Niger, and countries further afield like Sudan, Central African Republic and Somalia (OKEKE 1976). This has been considered to be of great epidemiological significance. The study was designed to determine the prevalence of antibodies against bovine diarrhoea viruses in sera of slaughtered cattle, sheep, and goats collected from Maiduguri municipal abattoir using the complement fixation test.

2 Material and methods

Serum Samples

A total of 300 blood samples (100 of cattle, 100 of sheep, and 100 of goats) were collected at the Maiduguri municipal abattoir between November and December 1991, which coincided with the latter part of the rainy season and early harmottan period. Sera were separated by centrifugation and stored at -20° C in a deep-freezer until tested.

Virus Antigens

The virus used in the complement fixation test included bovine rota virus (BR), bovine virus diarrhoea virus (BVDV), and bovine corona virus (BCV). They were crude tissue culture antigens of bovine origin, kindly supplied by the Collection of Animal Pathogenic Microorganisms (CAMP) Veterinary Institute, Czechoslovakia. The passage histories of the different viruses used in the test are shown in Table 1.

Complement fixation test

All sera were tested by the complement fixation (CF) test as described by SEVER (1962). The sera were inactivated at 56° C for 30 min and tested in a twofold serial dilution against predetermined optimum antigen dilution. Positive and negative controls were set up in all plates and for each serum sample. The reciprocal of serum dilution giving at least a 3+ fixation was taken as the end point.

The data were analysed using the student t-test and chi-square tests. $P = < 0.05$ level of statistical significance was used.

Tab. 1: Viruses used in complement fixation test

Virus	Virus number	Virus strain	Passage history
Bovine rota virus	CAMPV-177	Lincoln C-197	High passage on MDBK
Bovine corona virus	CAMPV-326	C-197	8th on MDBK
Bovine virus diarrhoea virus	CAMPV-315	Oregon C24V	Unknown number on B/K; 9th on BF/L; 15th on B/T

MDBK: Medin Derby Bovine Kidney Cell line
B/K: Bovine Kidney Cells
BF/L: Bovine Foetal Lung Cells
B/T: Bovine Testis Cells

3 Results

46 (15.3%) of all the sera tested were positive to one or more virus antigens (Table 2). 27% of the cattle, 14% of the sheep, and 5% of the goat sera tested were positive for antibody to one or more virus antigen. The prevalence of antibodies against viruses was significantly highest in cattle. The prevalence of antibodies was significantly ($P < 0.05$) higher for BCV and BVDV when compared with BRV. However, there was no difference in the prevalence of antibodies against different viruses in sheep and goats (Table 2).

Table 3 shows the sex prevalence of antibodies against 3 virus antigens. There was no significant difference in the prevalence between viruses for different sexes of cattle and goats. However, significant antibody prevalence to different viruses was noted in

the sex of sheep. In most cases, the prevalence rate was higher in females than in males (Table 3).

The analysis of the end-point antibody titre against different virus antigens showed that most of the antibody positive sera from different animal species reacted significantly to low titres (Table 4). No significant variation was observed in the degree of mixed infection between sexes and species of animals tested (Table 2). Nevertheless, mixed infection with BCV and BVDV were occasionally observed in cattle sera (Table 5).

Tab. 2: Species prevalence of antibodies to selected viruses in ruminant sera

Species	Total no. tested	No. (%) positive			Total no. no. (%) positive
		BRV	BCV	BVDV	
Bovine	100	3 (3)	12 (12)	12 (12)	27 (27)
Ovine	100	6 (6)	NT	8 (8)	14 (14)
Caprine	100	5 (5)	NT	NT	5 (5)
Total	300	14 (4.7)	12 (4)	20 (6.7)	46 (15.3)

BRV= Bovine rota virus
BCV= Bovine corona virus
BVDV= Bovine virus diarrhoea virus
NT= Not tested

Tab. 3: Sex prevalence of antibodies to selected viruses in ruminant sera

Species	Sex	Total no. tested	No. (%) positive			Total no. (%) positive
			BRV	BCV	BVDV	
Bovine	Male	40	2 (5)	5 (12.5)	5 (12.5)	12 (30)
	Female	60	1 (1.7)	7 (11.7)	7 (11.7)	15 (25)
Ovine	Male	8	0	NT	1 (12.5)	1 (12.5)
	Female	92	6 (6.5)	NT	7 (7.6)	13 (14.1)
Caprine	Male	65	3 (4.5)	NT	NT	3 (4.6)
	Female	35	2 (5.7)	NT	NT	2 (5.7)
Total		300	14 (14.7)	12 (4)	20 (6.7)	46 (15.3)

Tab. 4: Distribution of complement fixing antibody endpoint titres to selected viruses in positive ruminant sera

Reciprocal of antibody endpoint titre	No. (%) positive with that end-point titre								
	Bovine			Ovine			Caprine		
	BRV	BCV	BVDV	BRV	BCV	BVDV	BRV	BCV	BVDV
4	2 (66.7)	12 (100)	12 (100)	0	0	8 (100)	4 (80)	0	0
8	1 (33.3)	0	0	0	0	0	1 (20)	0	0
16	0	0	0	0	0	0	0	0	0
32	0	0	0	3 (50)	0	0	0	0	0
64	0	0	0	3 (50)	0	0	0	0	0
Total	3	12	12	6	0	8	5	0	0

CF = complement fixation
other abbreviations cp. table 2

Tab. 5: Sex distribution of mixed infections in positive ruminant sera

Species	Sex	no. tested	no. (%) Positive		
			BRV+BCV	BRV+BVDV	BCV+BVDV
Bovine	Male	40	1 (2.5)	0	0
	Female	60	0	0	0
Ovine	Male	8	0	0	0
	Female	92	0	2 (2.2)	0
Caprine	Male	65	NT	NT	NT
	Female	35	NT	NT	NT
Total		300	1 (0.3)	2 (0.7)	4 (1.3)

Abbreviations see table 2

4 Discussion

The results of this study are in agreement with the reports of previous workers on the prevalence of antibodies against diarrhoea viruses in Nigeria. OKEKE (1976) demonstrated the high prevalence of neutralizing antibody against BVDV in cattle populations in different locations in Northern Nigeria. Similarly, FLEWETT and WOODE (1978) and MCNULTY (1978) in related studies recorded a high prevalence of neutralizing antibody to rota virus in the faeces of several animal species in Nigeria. In this study, a relatively lower prevalence of antibody was observed among animal species. This

could be attributed to the relatively low sensitivity of the CF test employed in the analysis of sera. It has been observed that the CF test has low sensitivity but high group specificity (FENNER et al. 1987). This could be related also to the low titre of antibody recorded in this study. Furthermore, it has been reported by previous workers that the prevalence of these viruses is best demonstrated. using faecal materials rather than any other laboratory specimen including serum (MCNULTY 1978, FLEWETT and WOODE 1978). This results of the present study also confirm the wide endemicity of these viruses in Nigeria and other countries exporting ruminants to Nigeria. Information on the activities of BCV in Nigeria is very scanty. In this study, the BCV virus had a prevalence rate comparable to the bovine diarrhoea virus which has been found to be endemic in Nigeria (OKEKE 1976). It is possible that BCV is of great economic and public health importance in Nigeria. This study has also demonstrated the possibility of mixed infections by viruses. Mixed infections were occasionally demonstrated with BCV and BCDV in all animal species of both sexes. This finding is important in mapping out control and preventive campaigns against the outbreak of diseases due to these viruses. The demonstration of the significant prevalence of antibodies against these viruses in sheep and goat populations may influence the epidemiology of these virus diseases in Nigeria.

Zusammenfassung

An je 100 Rindern, Schafen und Ziegen des Städtischen Schlachthofes von Maiduguri wurden KBR-Untersuchungen auf das Vorhandensein von Antikörpern gegen 3 Virusantigene vorgenommen: Boviner Rotavirus (BRV), Boviner Coronavirus (BCV) und Boviner Virusdiarrhoe-Virus (BVDV). 46 oder 15,3% aller untersuchten Seren enthielten Antikörper gegen einen oder alle 3 Virusantigene. Am häufigsten reagierten die Rinderseren positiv (27%), unter denen jedoch BCV- und BVDV- Reaktionen signifikant zahlreicher waren. Schaf- und Ziegenseren zeigten keine solchen Unterschiede. Das Geschlecht der Probanten hatte keine Beziehung zur Häufigkeit der Reaktionen, außer bei Schafen, wo Muttertiere signifikant größere Positivzahlen zeigten. Die aufgedeckte Infektionslage bei den untersuchten Wiederkäuerspezies ist sowohl für das Öffentliche Gesundheits- als auch Veterinarwesen Nigerias bedeutsam.

S.S. Baba, A.G. Bobbo, M.B. Akoma, T.I.O. Osiyemi: L'examen des sérums de ruminants en vue la présence d'anticorps destinés à des virus choisis dans l'abattoir de Maiduguri, Etat de Borno / Nigéria

100 bovins, moutons et chèvres de l'Abattoir urbain de Maiduguri ont été examinés en vue de la présence d'anticorps contre 3 antigènes viraux: Rotavirus bivin (BRV), Coronavirus bovin (BCV) et Virus de diarrhée virale (BVDV). Les 46 ou 15,3% de tous les sérums examinés ont contenu des anticorps contre un on tous les 3 antigènes

viraux. Le plus souvent c'étaient les sérums bovins qui réagissaient positivement (27%), parmi lesquels les reáctions BCV et BVDV étaient cependant nettement plus nombreuses. Les sérums ovins et caprins n'avaient pas de telles différences. Le sexe des animaux d'essai n'avait aucun rapport a la frequence des reactions, excepte les mountons ou les meres avaient des chiffres positifs remarquablement plus hauts. La situation d'infection constatee chez les especes examines des ruminants est significative aussi bien pour la Sante publique que pour les institutions veterinaires du Nigeria.

S.S. Baba, A.G. Bobbo, M.B. Akoma, T.I.O. Osiyemi: Investigacion de sueros de ruminantes en relacion a la presencia de anticuerpos contra algunos virus seleccionados, en el matadero de Maiduguri en el estudo de Borno, en Nigeria

100 bovinos, 100 ovinos y 100 caprinos fueron examinados en el matadero municipal de Maiduguri por medio de teste KBR en relacion a la presencia de anticuerpos contra 3 virus antigenos: Boviner Rotavirus (BRV), Boviner Coronavirus (BCV) y Boviner VirusdiarrhoeVirus (BVDV). 46 o 15,3% de todos los sueros examinados presentaron anticuerpos contra uno o contra todos los virus antigenos. Los sueros de vacunos reaccionaron positivamente en la forma mas frecuente (27%) y entre ellos las recciones BCV y BVDV fueron las mas comunes. Los caprinos y ovnos no mostraron tales diferencias. El sexo de los animales examinados no tuvo ninguna influencia en relacion a la frecuencia de la reaccion, salvo en el caso de los ovinos, donde las hembras mostraron cifras positivas significativamente mayores. La situacin infecciosa descubierta en el caso de los ruminantes examinados es de valor significativo para el Servicio de Salubridad Publico y para el Servicio de Medicina Veterinaria en Nigeria.

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