VETERINARSKI ARHIV 74 (6), 459-465, 2004

Serosurveillance for peste des petits ruminants (PPR) and rinderpest antibodies in naturally exposed Saudi sheep and goats

Adel AL-Afaleq*[1], ElTayb Abu-Elzein[1], Abdul-Muhsin Al-Naeem[1], and Mahmoud Amin[2]

[1]*College of Veterinary Medicine and Animal Resources, King Faisal University, Alhasa, Saudi Arabia*
[2]*Faculty of Veterinary Medicine, Cairo University, Egypt*

AL-AFALEQ, A., E. ABU-ELZEIN, A. AL-NAEEM, M. AMIN: Serosurveillance for PPR and rinderpest antibodies in naturally exposed Saudi sheep and goats. Vet. arhiv 74, 459-465, 2004.

ABSTRACT

This study represents the first survey for serum antibodies against peste des petits ruminants (PPR) and rinderpest (RP) viruses, in sheep and goats in the Kingdom of Saudi Arabia. The study involved the Eastern region of the country. A total of 1035 serum samples were examined (750 sheep and 285 goats). In order to obtain a genuine insight into the activity of the two viruses as reflected by seroconversion, serum samples were collected only from sedentary, locally-bred, non-vaccinated sheep and goats that were more than one year old. The number of samples collected followed standard epidemiological criteria in similar situations. The prevalence of PPR virus antibodies was 3.1% in sheep and 0.6% in goats, while that of RPV antibodies was 3.6% in sheep and 5.7% in goats. Generally speaking, the prevalence of PPRV antibodies in both species was 2.3%, while that of RPV was 4.3%.The mono-specific reactivity in both species was 93.2 % for rinderpest and 66.7 % for PPR.

Key words: peste des petits ruminants, rinderpest, sheep, goats, serosurveillance, monospecificity, Saudi Arabia

Introduction

Sheep and goats are two main sources of meat production in Saudi Arabia with estimated populations of about 3.8 and 2.4 million, respectively (ANON, 1992; CANNON and ROE, 1982). Both animal species are raised under traditional extensive systems, although intensive husbandry systems have recently been established.

* Contact address:
Dr. Adel AL-Afaleq, College of Veterinary Medicine and Animal Resources, King Faisal University, Hofuf P.O.Box 1757, Al-Ahsa 31982, Saudi Arabia, Phone: +03 5942 724; + 054 828 824

ISSN 0372-5480
Printed in Croatia

In Saudi Arabia, PPR was suspected clinically in sheep (ASMAR et al., 1980) and in gazelles and deer (HAFEZ et al., 1987). However, in both cases no virus could be isolated. ABU ELZEIN et al. (1990) successfully isolated the PPR virus during an outbreak in indigenous goats. However, there is presently no published data concerning the epidemiology of PPR in the country. The present study was designed to gain an insight into the spread of PPR and RP as reflected by seroconversion.

Materials and methods

Between January and July, 1994, a total of 1035 blood samples were collected from sedentary non-vaccinated sheep and goats (above one year old) in the Eastern Province of Saudi Arabia. The sample size was determined according to CANNON and ROE (1982) as modified by THRUSTFIELD (1986). The samples were taken from six different locations representing the southern, middle and the northern parts of the Eastern Province (Fig. 1).

The sera were separated, clarified by centrifugation at 3000 r.p.m. for l0 min, inactivated at 56 °C for 30 min. and stored at -20 °C until used.

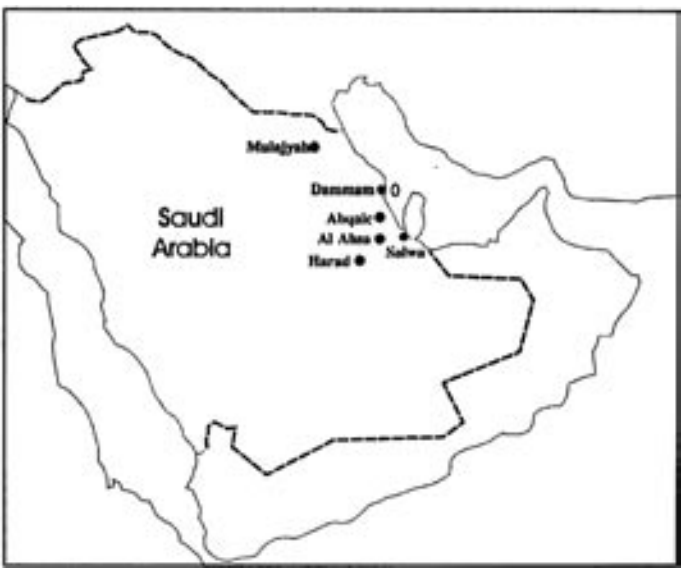

Fig.1. Map of Saudi Arabia showing the sampling localities

Standard techniques were used to propagate and titrate both PPRV (TAYLOR, 1979) and RPV (PLOWRIGHT and FERRIS, 1959). The tissue culture infective dose 50 ($TCID_{50}$) was calculated as described by REED and MUENCH (1938).

The basic microtiter serum neutralization test (SNT) technique of ROSSITTER et al. (1985) was followed. Antibody levels at 1/20 or greater were considered positive.

Results

Interpretation of the serum neutralization test (SNT) results was based on the criteria of TAYLOR (1979). If an animal is infected with RP virus it produces antibodies against the homologous virus. However, lower titres of cross-reacting antibodies directed against the hetrologous virus (PPRV) appear infrequently. Similarly, if an animal is infected with PPR virus it always produced cross-neutralizing antibodies against the hetrologous virus (RPV), although it is always below the homologous level.

Table 1. Overall results of the serological survey in sheep and goat in the Eastern region for rinderpest and pest des petits ruminants antibodies

Species	Total tested	RP + ve	PPR + ve
Sheep	701	25 (3.6%)	22 (3.1%)
Goats	334	19 (5.7%)	2 (0.6%)
Total	1035	44 (4.3%)	24 (2.3%)

Table 1. shows that of a total number of 1035 sera examined, 44 (4.3%) were found positive for RPV antibodies, while 24 (2.3%) were positive for PPRV antibodies. It also shows that of the 701 tested sheep sera, 25 (3.6%) were found positive for RP antibodies, and 22 (3.1%) were found positive for PPR virus antibodies. Of the 334 tested goat sera, 19 were found positive for RP antibodies (5.7%), while 0.6% were found positive for PPRV antibodies.

Table 2. shows the distribution of RP and PPR serum antibodies in the different age groups of the examined animals. Results indicated that out of 218 sheep and 94 goat sera obtained from animals aged one to two years, 1.4% of the sheep and 2.1 %of the goats in this group were found positive for RP antibodies, while l.4% of the sheep were found positive for PPR antibodies. Of 532 sheep and 191 goat

sera obtained from sheep and goats aged >3 years, 22 (4.1%) sheep and 17 goats (8.9%) were found positive for RP antibodies, while 19 (3.6%) sheep and 2 (1.1%) goats were found positive for PPR antibodies.

Table 2. Distribution of rinderpest and peste des petits ruminants serum antibodies in the different age groups of the examined animals

Species	1-2 years			Above two years		
	Nº tested	RP + ve	PPR + ve	Nº tested	RP + ve	PPR + ve
Sheep	218	3 (1.4%)	3 (1.4%)	532	22 (4.1%)	19 (3.6%)
Goats	94	2 (2.1%)	0 (0.0%)	191	17 (8.9%)	2 (1.1%)
Total	312	5 (1.6%)	3 (1%)	723	39 (5.4%)	21 (2.9%)

Table 3. Mono-specific neutralizing antibody reactivity against each virus

PPR		Rinderpest	
Total Nº + ve	Nº with mono-specificity	Total Nº + ve	Nº with mono-specificity
24	16 (66.7%)	44	41 (93.2%)

The antibody titres for RP ranged from 1/20 to >1/640. Twenty-five samples (57%) had titres that ranged from 1/20 to 1/80, and 19 samples (43%) had titres that ranged from 1/160 to >1/ 640. The PPR antibody titres ranged from 1/20 to >1/640. Five samples (21%) had an antibody titre of 1/20, and 19 samples (79%) had antibody titres ranging from 1/160 to >1/640.

Table 3. shows that out of 24 PPRV positive sera, 16 (66.7%) reacted mono-specifically against the PPR virus, while the remaining 8 sera showed a low level of cross-reactivity with the RPV. On the other hand, of the 44 RPPV positive sera, 41 (93.2%) reacted mono-specificically against the RPV virus; the remaining 3 sera showed a low level of cross–reactivity with the PPRV.

Table 4. depicts the results of the surveyed sheep and goats for RP AND PPR in the different localities of the Eastern region.

Table 4. Results of the survey in sheep and goats for PPR and RP in different localities of the Eastern region of Saudi Arabia

Locality	Nº examined	PPR (Nº + ve)	RP (Nº + ve)
Harad	193*	20 (10.4%)	4 (2.1%)
Dammam	100	2 (2%)	6 (6%)
Al-Ahsa	606	2 (0.3%)	28 (4.6%)
Mulajyah	83	0 (0%)	6 (7.2%)
Abqaic	27	0 (0%)	0 (0%)
Salwa	26	0 (0%)	0 (0%)
Total	1035	24 (2.3%)	44 (4.3%)

* = Mixed sheep and goats

Discussion

Great efforts are being made in Saudi Arabia to improve sheep and goat production. To that end, disease control and eradication have always been priority considerations.

With the exception of the report of the first successful isolation of PPRV in Saudi Arabia (ABU ELZEIN et al., 1990), the PPR situation in the Kingdom is somewhat obscure. Based on clinical signs alone there is a general belief that PPRV infection does exist in some parts of the country.

The present study is the first serological survey for PPR and RP antibodies in sheep and goats in Saudi Arabia. Involving the Eastern region of the country, results showed that 6.6% of the total number of sheep and goats examined had antibodies against the two morbilliviruses (PPRV and RPV). Of these, 3.3% were sheep and 2.9% were goats, which indicates that PPR and RP are present in sheep and goats in the Eastern region of Saudi Arabia. The results also indicated that some sera gave monospecific reactivity with the homologous virus without any cross-reaction against the heterologous virus. This meant that the involved animals had been exposed solely to that particular virus. Other sera reacted with both viruses but with higher amplitude against the homologous virus and low cross-reactivity with the heterologous virus. Such cross-reactivity between PPRV and RPV is well documented in the literature (TAYLOR, 1979). However, it was always possible to distinguish the primary infection for both PPR and RP by parallel assays of the sera

against both viruses, as was done in the present study. DIALLO et al. (1987) attributed this cross-reactivity to common antigens shared by the two viruses.

Observing the results of the survey in each locality (Table 4) we can see that the highest prevalence of antibodies to PPRV was seen in the Haradh area (10.4%) followed by Dammam (2%) and Al-Ahsa (0.3%). No PPR antibodies were detected at Mulayjah, Abqaic or Salwa. These results confirm the observations of field veterinarians who suspected cases of clinical PPR involving sheep at Harad. The results also indicate that the localities of Salwa, Abqaic and Mulayjah remained free from PPR infection and that Al-Ahsa had very low level of PPR virus activity. All the above results provide strong evidence that PPR virus infection is not endemic in the Eastern region of the Kingdom.

The RP results (Table 4) indicate that the highest positive rate was seen at Mulayjah (7.2%) followed by Dammam (6%), Alhasa (4.6%), and Harad (2.1%), while no antibodies were detected at Abqaic nor at Salwa. From the RP results it is noticeable that sheep and goats at Mulayjah, Al-Ahsa and Harad were in close contact with cattle. Thus, they showed comparatively higher positive rates for RP antibodies than those in the other localities. On the other hand, Dammam sheep and goats seemed to have been exposed to RP virus.

The prevalence of both PPR and RP antibodies in the tested animals appeared to increase with age. This indicates that exposure to these viruses had been present in the Eastern Province for some time.

References

ABU ELZEIN, E. M. E., M. M. HASSANIEN, A. I. AL-AFALEQ, F. M. ABDLHADI, F. M. T HOUSAWI (1990): Isolation of peste des petits ruminant from goats in Saudi Arabia. Vet. Rec. 127, 309-310.

ANONYMOUS (1992): FAO STATISTICS SERIES Nº112.

ASMAR, J. A., A. I. RADWAN, N. ABI ASSI, A. A. AI-RASHIED (1980): PPR like disease in sheep of central Saudi Arabia: Evidence of its immunological relation to rinderpest; prospects for a control method. Proceedings of the Saudi Biological Society, King Saud University Press, Riyadh, Saudi Arabia.

CANNON, R. M., R. T. ROE (1982): Livestock disease surveys: a field manual for veterinarians. Australian Government publishing Services, Canberra.

DIALLO, A., T. BARRETT, M. BARBRON, S. M. SUBBARAO, W. P. TAYLOR (1987): Differentiation of rinderpest and peste des pestits ruminant viruses using specific cDNA clones. J. Virol. Meth. 23, 127-136.

HAFEZ, S. M., A. AL SUKAYRAN, D. D. CRUZ, S. I. BAKAIRI, A. I. RADWAN (1987): An outbreak of rinderpest-like disease in gazelles in Saudi Arabia. Symp. on the potentional of wildlife conservation in Saudi Arabia. (Abstract), King Saud University Press, Riyadh, Saudi Arabia.

PLOWRIGHT, W., R. D. FERRIS (1959): Studies with rinderpest virus in tissue culture. II. Pathogenicity for cattle of culture-passaged virus. J. Comp. Path. 69, 173-184.

REED, I. I., H. MUENCH (1938): A simple method of estimating 50% end points. Am. J. Hyg. 27, 493-497.

ROSSITTER, P. B., D. M. IESSETT, W. P. TAYLOR (1985): Microneutralisation systems for use with different strains of peste des petits ruminants virus and rinderpest virus. Trop. Anim. Hlth. Prod. 17, 75-81.

TAYLOR, W. P. (1979): Protection of goats against peste des petits ruminants with attenuated rinderpest virus. Res. Vet. Sci. 27, 321-324.

THRUSTFIELD, A. (1986): Veterinary Epidemiology. 2nd ed., Blackwell Science, London

Received: 4 February 2004
Accepted: 8 November 2004

AL-AFALEQ, A. E. ABU-ELZEIN, A. AL-NAEEM, M. AMIN: Dokaz protutijela za kugu malih preživača i goveđu kugu u saudijskih ovaca i koza u prirodnim uvjetima. Vet. arhiv 74, 459-465, 2004.

SAŽETAK

Rad iznosi prve rezultate istraživanja protutijela za virus kuge malih preživača (KMP) i virus goveđe kuge (GK) u ovaca i koza u Saudijskoj Arabiji. Istraživanjem je bilo obuhvaćeno istočno područje zemlje. Pretraženo je ukupno 1035 uzoraka seruma (750 ovčjih i 285 kozjih). Radi dobivanja stvarne slike aktivnosti ovih dvaju virusa, uzorci seruma bili su sakupljani samo od domaćih, lokalno rasplođivanih, nevakciniranih ovaca i koza starijih od godinu dana. Broj sakupljenih uzoraka bio je u skladu sa standardnim epidemiološkim kriterijima. Proširenost protutijela za virus KMP iznosila je 3,1% u ovaca i 0,6% u koza, dok je proširenost protutijela za virus GK bila 3,6% u ovaca i 5,7% u koza. Općenito prikazana, proširenost KMP u obje vrste iznosila je 2,3%, dok je za GK iznosila 4,3%. Monospecifična reaktivnost u obje vrste bila je 93,2% za GK i 66,7% za KMP.

Ključne riječi: kuga malih preživača, goveđa kuga, ovce, koze, serološki dokaz, monospecifičnost, Saudijska Arabija