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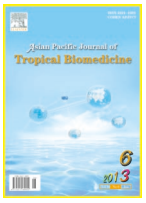

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Seroepidemiology of bluetongue disease in small ruminants of north-east of Iran

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PEER REVIEW

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Comments

This is a good study with a significant number of serum samples compared with similar works in other regions. The results are interesting and suggested that bluetongue can be one of the causes of abortion in small ruminants of the region.
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ABSTRACT

Objective: To estimate the prevalence and distribution of bluetongue virus antibody in sheep and goats in 25 townships of Khorasan Razavi. Bluetongue is an infectious, non-contagious, arthropod born viral disease of ruminants and has been reported from most of the tropical and subtropical regions of the world. **Methods:** A total number of 1 034 serum samples from sheep and goats were collected and transmitted to Serological Laboratory of Veterinary Council of Khorasan Razavi. Serums were screened for the presence of group-specific bluetongue virus antibody using competitive Enzyme Linked Immuno Sorbent Assay (c-ELISA). **Results:** The seropositivity of sheep and goats for bluetongue was found to be 89.2%. The highest prevalence rate was seen in Taybad, Khalil-abad and Torbat-jam (100%) and the least prevalence rate was seen in Jovein (55%). **Conclusions:** The results showed that the majority of animals in the north-east of Iran are infected with bluetongue virus. High correlation between abortion history and seroposivity emphasize the economical importance of bluetongue virus in the sheep herds of the region.

KEYWORDS

Khorasan Razavi, Seroepidemiology, Bluetongue, Sheep, Goat

1. Introduction

Bluetongue is an infectious, non-contagious, arthropod borne, viral disease of domesticated and wild ruminants. Bluetongue virus (BTV) is the type specific of the genus *Orbivirus* in the family Reoviridae. Twenty-four antigenically distinct serotypes of BTV have been identified worldwide[1]. The BTV are transmitted between ruminants by the bite of certain vector species of *Culicoides midges*[2]. Venereal transmission between ruminants has been recorded but occurs very rarely and it is not considered to be of epidemiological significance[3]. Among the animals, clinical signs occur most often in sheep and certain species of deer with significant morbidity[4], although cattle and goat may be affected[5]. Affected sheep may have erosion and/or ulcer on the mucous membranes and inflammation of the coronary band. Other clinical signs include fever, depression, excessive salivation, nasal discharge, facial edema, hyperaemia, lameness and death[6]. Older animals tend to be more susceptible to disease than younger ones and the severity of clinical signs seem to vary with the breed of the animal, the serotype and strain of the infecting

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virus and with certain rather ill-defined interactions with the environment[7,8]. Bluetongue typically occurs when susceptible animal species are introduced into areas with circulating virulent BTV strains, or when virulent BTV strains extend their range to previously unexposed populations of ruminants[9]. Some strains of the virus can result in mortality rates as high as 70% in highly susceptible sheep[1,10]. The exact worldwide economic losses due to bluetongue have not been expressed, but it estimated as 3 billion US dollar a year due to death, abortions, weight loss, reduced milk yield, meat efficiency, export restrictions for live animals, their semen and some products such as fetal bovine serum[11]. The costs of preventive and control measures should also be taken into the account[12,13]. Various techniques have been used to detect antibodies against BTV. Agar gel immuno diffusion and competitive enzyme linked immuno sorbent assay (c-ELISA) are recommended as prescribed tests for International Trade in the OIE Manual of Standards for Diagnostic Test and Vaccines[1].

Khorasan-Razavi province is located at the north-east Iran between latitudes 30°24′-38°17′ N and between longitudes 55°17′-61°15′ E. It has more than 8 000 000 small ruminants which represents an important source of income for rural areas. At present, no information is available concerning on the seroprevalence of bluetongue disease in the sheep and goats in Khorasan Razavi province. Thus, the present study was conducted to clarify different aspects of the bluetongue disease in the sheep and goats population of the region.

2. Materials and methods

A total number of 1 034 serum samples were collected from apparently healthy sheep and goats of different age and sex from different herds of 22 townships of Khorasan Razavi. All the serum samples were submitted to Serological Laboratory of Veterinary Council of Khorasan Razavi and stored at -20 °C until examined. Serums were screened for the presence of group-specific BTV antibody by competitive enzyme linked immunosorbent assay[14], using the c-ELISA IDEXX Bluetongue Competition® assay (IDEXX BT, Netherland). The optic density of each sample was read by an ELISA micro plate reader (BioTek, power wave XS2, USA) at 450 nm. Results are expressed as percentage of negativity (PN) compared with the kit control and designated as positive, doubtful or negative according to the cut-off values recommended by the manufacturer (PN≤70 is positive; 70<PN<80 is doubtful; PN≥80 is negative).

2.1. Statistical analysis

Statistical analyses were performed using SPSS software version 11.5 (SPSS Inc., Chicago, IL, USA). Chi-square test and fisher exact tests were applied to analyze the association between seroprevalence status, age, sex and abortion. quantitative variables were subjected to two independent *t*-tests. Values of $P<0.05$ were considered to be significant.

3. Results

The results of seroprevalence bluetongue among sheep and goats in Khorasan Razavi are summarized in Table 1. In the present study, the seropositivity of sheep and goats for bluetongue was found to be 89.2% (922 out of 1 034). The rate of positivity in sheep and goats was 90.0% and 87.6% respectively. Comparison of age in positive and negative groups showed that the age of positive group was significantly more than that of negative group ($P<0.05$). Regarding abortion history in the herd, the results showed that ewes with abortion history had 92.9% and those without abortion history had 85.1% seropositivity. Goats with and without abortion history had 91.0% and 82.4% seropositivity, respectively (Table 2). Concerning the disease agent with abortion history, in Chi-square test, P value for sheep and goats was 0.001 and 0.012, respectively. Sex didn't affect the rate of seropositivity ($P=0.75$).

Table 1
The result of ELISA for bluetongue antibodies in small ruminants of different areas of north-east of Iran.

City	Sheep		Goat		Seropositivity
	Positive	Negative	Positive	Negative	%
Kalat	12	2	-	-	85.7
Kashmar	20	1	15	1	94.6
Khaf	30	2	30	1	95.2
Mashad	41	9	18	2	84.3
Ghuchan	10	1	12	4	81.5
Mahvelat	11	2	7	-	90.0
Jovein	11	9	-	-	55.0
Roshtkhar	28	2	5	-	94.3
Kalat	19	5	15	7	73.9
Sarakhs	56	1	-	-	98.2
Taybad	23	-	15	-	100.0
Bajestan	13	-	13	1	96.3
Khalil-abad	15	-	-	-	100.0
Torbat-heydarie	28	1	25	2	94.6
Bardaskan	30	5	12	2	85.7
Chenaran	15	5	15	6	73.2
Dargaz	23	5	10	3	80.5
Sabzevar	44	6	20	5	85.3
Gonabad	10	2	13	4	79.3
Nishaboor	62	7	40	4	90.3
Fariman	50	2	14	3	92.8
Torbat-jam	52	-	40	-	100.0
Total	603	69	319	45	89.2

Table 2
The percentage of bluetongue antibody positive sheep and goats with and without abortion.

Species				Abortion		Total
				yes	no	
Sheep	ELIZA	Pos	Count	392	211	603
			% within abortion	92.9	85.1	90.0
		Neg	Count	30	37	67
			% within abortion	7.1	14.9	10.0
		Total	Count	422	248	670
			% within abortion	100.0	100.0	100.0
Goat	ELIZA	Pos	Count	202	117	319
			% within abortion	91.0	82.4	87.6
		Neg	Count	20	25	45
			% within abortion	9.0	17.6	12.4
		Total	Count	222	142	364
			% within abortion	100.0	100.0	100.0

4. Discussion

In the present study, the seropositivity of sheep and goat for bluetongue was found to be 89.2% (922 out of 1 034) which is higher than the reported seroprevalence of 6.57% in south-east of Iran[15], 51.6% in Isfahan[16], 34.7% in west Azerbaijan[17] and 73.5% in Shiraz[18]. Other studies have shown that bluetongue disease occurs worldwide and lead to significant losses in the small ruminant population[10,17]. In Thailand, a serological study was carried out and demonstrated 39.4% and 73.0% seropositive rates in indigenous sheep and goats respectively[19]. Seroprevalence rates up to 90% were detected in some regions of European Turkey[20]. Bluetongue was confirmed in sheep herds located in Germany. The overall herd seroprevalences were estimated at 37.5% in 2006 and 41.5% in 2007[21]. Since vaccination against BT is not done in Iran, antibody indicated direct exposure to the *Orbivirus*. The distribution of infected animals in Khorasan Razavi province showed the highest prevalence rate in cities near Afghanistan border. Unfortunately no information is available regarding bluetongue disease in Afghanistan. Movements of infected animals have been thought to be a source of infection of blue tongue in new areas[22]. Despite the high seroprivalence of bluetongue in Khorasan Razavi there is no clinical report of the disease in this region. Clinical recognition of the disease depends largely on the presence of highly susceptible sheep breeds, which invariably act as indicator[1,23].

It is reported that BTV can cause 25% abortion and 50% decrease in fertility in sheep[24]. In the present study there was a significant relation between seroprevalence rate and abortion history. Hence it emphasizes the importance of the BTV in the herd.

There are differences in age susceptibility to clinical disease which, inexplicably vary with different outbreaks. With Australian serotypes, disease occurs in sheep only at the age of 3 years or older[25]. Seroprevalence increases with age, probably a reflection of increased duration of exposure[10]. In the present study the seroprivalence rates were increased with increase of age in sheep and goats. It could be a reason for the disease to be endemic, because newborn lambs could be protected by maternal immunity. Also, Taylor and Mellor (1994) reported that after bluetongue epidemic in Turkey, the disease became endemic and probability of infection was much less in sheep up to 2 years old[20]. However, in a seroprevalence study in the south-east of Iran the results showed that seroprevalence rates were decreased with the increasing of age in sheep[15].

This study showed that the majority of animals in the north-east of Iran were infected with BTV. High correlation between abortion history and seroposivity, emphasized the economical importance of BTV in the sheep herds of the region.

Conflict of interest statement

We declare that we have no conflict of interest.

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Comments

Background

There is some information about the sero-epidemiological statues of bluetongue disease in various parts of the world and Iran including West Azerbaijan (northwest of Iran), Shiraz (central part of Iran) and Kerman (Southeast of Iran). But there is no information of that in northeast of Iran.

Research frontiers

In this study the authors have studied seroepidemiological statue of bluetongue disease in Khorasan Razavi province (northeast of Iran). In this study, the relationships between abortion, age, sex and seropositivity of bluetongue disease have been investigated.

Related reports

There are some similar seroepidemiological reports of bluetongue disease from other regions of Iran which is mentioned in the manuscript. The results of similar studies in other countries are mentioned too.

Innovations and breakthroughs

This is the first report that describes the seroprevalence rates of BTV in sheep and goat flocks in northeast of Iran.

Applications

The result of this study can be very important for other neighbor countries. According to high sero-positivity of bluetongue disease in the region, a good control program of bluetongue disease should be investigated.

Peer review

This is a good study with a significant number of serum samples compared with similar works in other regions. The results are interesting and suggested that bluetongue can be one of the causes of abortion in small ruminants of the region.

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