Studies on herpesvirus infections of goats in Turkey: prevalence of antibodies to bovine herpesvirus 1

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SUMMARY

This study was planned to achieve serological evidence and prevalence of bovine herpesvirus 1 (BHV-1) infection in goat flocks in Turkey. A total of 615 adult goats located in 5 different provinces were sampled for serological examinations. Out of 615, 34 (5.52 %) were detected as to be positive for neutralising antibodies against BHV-1 using micro-neutralisation assay. Prevalence of the infection was monitored varying between 2 % to 31.57 % according to provinces. By discussing the results of this study together with the previous data on BHV-1 in cattle, it was concluded that infection of goats with BHV-1 should take into consideration for successful control of the disease in Turkey. It is concluded that latently infected goats can introduce the infection to the virus-free cattle populations.

KEY-WORDS: goat - BHV-1 - seroprevalence - Turkey.

RÉSUMÉ

Recherches sur les infections à herpesvirus dans les populations caprines en Turquie : prévalence des anticorps anti herpesvirus bovin de type 1 chez la chèvre. Par K. YESILBAG, S. BILGE-DAGALP, S. OKUR-GUMUSOVA et B. GUNGOR.

Le but de cette recherche consistait à déterminer la séroprévalence de l’infection par l’herpesvirus bovin de type 1 (BHV-1) chez les populations caprines en Turquie. Au total 615 chèvres adultes, localisées dans 5 différentes provinces, ont été utilisées pour les examens sérologiques. 34 (5.52 %) de ces 615 chèvres, possédaient des anticorps neutralisants le BHV-1, en utilisant le test de micro-neutralisation. Le pourcentage de séroprévalence variait de 2 % à 31.57 % selon la province. En comparant les résultats de cette recherche avec celles réalisées chez les bovins, nous avons conclu que l’infection par le BHV-1 chez les chèvres devrait être pris en considération pour le contrôle efficace de cette maladie en Turquie. Il a été conclu que la chèvre contaminée en phase latente peut transférer l’infection chez les bovins qui ne portent pas l’infection BHV-1.

MOTS-CLÉS: chèvre - herpesvirus bovin-1 - séroprévalence - Turquie.

Introduction

Herpesvirus infections of domestic ruminants are about economic losses due to respiratory and reproductive problems. Bovine herpesvirus 1 (BHV-1) is a major pathogen of bovines world-wide and causes different clinical manifestations including infectious bovine rhinotraceitis (IBR), infectious pustular vulvovaginitis (IPV) / balanopostitis (IPB) and meningoencephalitis [3]. These conditions are related to strains of BHV-1 subtype 1, subtype 2 and subtype 3, respectively [23]. BHV-1 subtype 3 was later classified as BHV-5 [19]. Recently, it have been demonstrated that both BHV-1 and BHV-5 are causative agents of bovine encephalomyelitis [15, 18]. Caprine herpesvirus 1 (CapHV-1) of goats is also distributed worldwide and produce generalised infections, mainly causes digestive distress in young goats and may result in abortion or reproductive failures in adult goats [13]. Both BHV-1 and CapHV-1 are classified in the subfamily Alphaherpesvirinae [19] and show important biological properties of this group such as establishing latency [1, 7]. Cross-species infections of bovine and caprine herpesviruses have been previously demonstrated [21, 24]. The two viruses have capability to infect either host, but pathogenicity is restricted to the original host [10]. Thus, one of those species could be latently infected by the virus of other species without clinical reflection and may act as a reservoir for infection of natural host. This situation may lead creation of critical problems in regard to control programs against BHV-1 infection in cattle.
Although BHV-1 and CapHV-1 share common antigens, these viruses have been reported to be immunologically [4] and genetically distinct [20]. MARTIN et al. [14], which have studied on serological comparison and relationship of herpes viruses from bovine, caprine and deer origin, demonstrated that caprine herpes virus is meaningfully distinct from strains of BHV-1, BHV-4 and herpes virus of red deer. This study [14] also shows a one way cross-neutralisation between the two viruses that antibodies against CapHV-1 fails to neutralise BHV-1 strains, but not vice-versa.

The aim of this study was to determine prevalence of BHV-1 infections amongst goats in Turkey. For this purpose serum neutralisation test which is serotype specific and generally detects low levels of antibodies [6] was employed.

**Materials and methods**

**SERUM SAMPLES**

Blood samples were collected from 615 randomly selected healthy goats from 5 provinces (Edirne, Çanakkale, Balikesir, Denizli, and Isparta) of Turkey. The age of sampled goats were varying between 2 and 3 years old. Genders did not kept in view during sampling activities and it was recorded that vaccination against BHV-1 had never been applied in the sampled populations.

Blood samples were taken into clot activator vacuum tubes (Vacuette, Austria) and quickly transported to the laboratory. Sera were separated after centrifugation at 3000 rpm for 10 minutes, heat-inactivated at 56°C for 30 minutes and stored at -20°C until test application.

**VIRUS AND CELL CULTURE**

Madin Darby Bovine Kidney (MDBK) cells were grown in Eagle’s Minimal Essential Medium (EMEM), with 10 % fetal calf serum (FCS), and were used according to standard methods for virus propagation and serum neutralisation tests. Colorado strain of BHV-1, which used as test virus, was propagated and titrated in MDBK cell cultures.

**SEROLOGICAL EXAMINATION**

Serum neutralisation test (SNT) was used to detect neutralising antibodies against BHV-1 as described by FREY and LIESS [11]. For this purpose, 50 µl of each serum was put into wells as duplicates and mixed with an equal volume of the test virus, that diluted to be 100TCID50. Two wells were used as virus control by adding 100 µl of 100TCID50 diluted virus and two other as blank by adding 100 µl of EMEM. Thereafter all of test plates were incubated at 37°C for 1 hour. MDBK cells were distributed into microtitration plate wells used as 15,000 cells per well, and incubated at 37°C in a 5 % CO2 atmosphere for 3 days before evaluation of the results. Samples which inhibited viral growth were evaluated to be positive for anti-BHV-1 antibodies.

**STATISTICAL ANALYSIS**

Chi-square test [16] were employed to analyse statistical significance (P < 0.05) of differences amongst seroprevalence values.

**Results**

**SEROLOGICAL EXAMINATION**

The results taken from serological examinations were summarised in Table 1. Overall percentage of BHV-1 antibodies in goats tested was 5.52 % (34/615). The positives were distributed to all provinces in which animals sampled. The rates of seroprevalence were 2 % (1/50), 3.80 % (16/420), 23.33 % (9/39) in Edirne, 23.33 % (9/39) in Canakkale, 23.33 % (9/39) in Canakkale-Geilibolu, 23.33 % (9/39) in Canakkale-Biga, 23.33 % (9/39) in Canakkale, 23.33 % (9/39) in Canakkale-Bayramiç, 23.33 % (9/39) in Balikesir, 23.33 % (9/39) in Denizli, and 23.33 % (9/39) in Isparta. The total number of positives was 34 (5.52 %) of 615 goats sampled.

**Table 1.** — Prevalence of neutralising antibodies against BHV-1 in the locations of the study.

<table>
<thead>
<tr>
<th>Location</th>
<th>Number of goats sampled</th>
<th>Number of positives (%)</th>
<th>Significance of differences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Edirne</td>
<td>50</td>
<td>1 (2.0)</td>
<td>b,c*</td>
</tr>
<tr>
<td>Canakkale-Ezine</td>
<td>50</td>
<td>1 (2.0)</td>
<td>b,c</td>
</tr>
<tr>
<td>Canakkale-Geilibolu</td>
<td>50</td>
<td>3 (6.0)</td>
<td>b</td>
</tr>
<tr>
<td>Canakkale-Biga</td>
<td>50</td>
<td>3 (6.0)</td>
<td>b</td>
</tr>
<tr>
<td>Canakkale</td>
<td>70</td>
<td>-</td>
<td>c</td>
</tr>
<tr>
<td>Canakkale-Bayramic</td>
<td>150</td>
<td>9 (6.0)</td>
<td>b</td>
</tr>
<tr>
<td>Canakkale-Lapseki</td>
<td>50</td>
<td>-</td>
<td>c</td>
</tr>
<tr>
<td>Balikesir</td>
<td>30</td>
<td>7 (23.33)</td>
<td>a</td>
</tr>
<tr>
<td>Denizli</td>
<td>96</td>
<td>4 (4.16)</td>
<td>b,c</td>
</tr>
<tr>
<td>Isparta</td>
<td>19</td>
<td>6 (31.57)</td>
<td>a</td>
</tr>
</tbody>
</table>

TOTAL 615 34 (5.52)

* Difference between the values, signed with the same letter, is not significant (P < 0.05)
Revue Méd. Vét., BHV-1 infection in goats in Turkey have been proved. free or eradicated cattle populations could be primary or re-approaches for BHV-1 in bovines. On the other hand IBR-pastured and/or housed together, and may interfere control tance need to be given to this situation. Unapparent latently relatively lower in goats, it is concluded that a great impor-However the prevalence of the viral antibodies was detected virus is more likely to be done between bovines and goats.

dies [2, 5, 8] that BHV-1 infections are prevalent amongst conditions etc.)

dynamics (e.g. frequency of contact with bovines, breedingrences of seroprevalence values could be related to local

Discussion

There are some studies on BHV-1 infection in goats descri-bing natural or experimental infections and serosurveys for antibiotics against BHV-1. MOHANTY et al. [17] have reported isolation of BHV-1 from 2 clinically suspected goats. Although experimentally infected goats may exhibit none or mild respiratory symptoms [10, 24], the virus could be re-isolated from the goats and transmitted to the bovines being in close contact [24]. As described by SIX et al. [21] BHV-1 can establish latent infection in goats and latent virus could be reactivated. In present study, virus isolation studies were not performed because there was no goat with clinical signs suggesting BHV-1 during sampling activities.

In previous studies serological evidence of BHV-1 in goats has been pointed out. TAYLOR et al. [22] reported that prevalence of infection amongst Nigerian goats was 11.2 %. ELAZHARY et al. [9] reported 6.9 % of the goats tested have had antibody for BHV-1 in Quebec, Canada, while FULTON et al. [12] detected that 13.2 % of tested goats were positive in Louisiana, US. Antibody prevalence detected in this study is comparable to that of previous studies. Regional differences of seroprevalence values could be related to local dynamics (e.g. frequency of contact with bovines, breeding conditions etc.)

It can be discussed according to data from numerous stud-ies [2, 5, 8] that BHV-1 infections are prevalent amongst bovines in Turkey. Under well-known breeding conditions in large capacity dairy herds, inter-species transmission of the virus is more likely to be done between bovines and goats. However the prevalence of the viral antibodies was detected relatively lower in goats, it is concluded that a great importance need to be given to this situation. Unapparent latently infected goats may act as a source of the infection for bovines pastured and/or housed together, and may interfere control approaches for BHV-1 in bovines. On the other hand IBR-free or eradicated cattle populations could be primary or re-introduced with the virus by newly purchased latently infected goats.

By this research serological evidence for the presence of BHV-1 infection in goats in Turkey have been proved.

References


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