Serological survey for caprine arthritis-encephalitis virus in Damascus and Kilis goats in Hatay, Turkey

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SUMMARY

A total of 675 goat sera from six different provinces in Hatay region were examined using agar gel immunodiffusion test (AGIDT) and competitive enzyme linked immunosorbent assay (cELISA) to determine the prevalence of caprine arthritis-encephalitis virus (CAEV) infection. Seropositivity with cELISA was 1.03 % in two provinces. The results indicate a low prevalence for CAEV infection in Hatay region, in agreement with the previous studies in Turkey.

Keywords : goat - CAEV - seroprevalence - Hatay - Turkey.

Introduction

Caprine arthritis-encephalitis virus (CAEV) infection is an important lentiviral disease of goats characterised by chronic arthritis, pneumonia and mastitis in adult animals and encephalomyelitis in young animals [2, 28]. CAEV is genetically and antigenically related to visna-maedi virus of sheep and exhibits affinity for monocyte/macrophage lineage [21, 29]. Infection is persistent despite generation of immune response by the host [3].

CAEV infection causes economic losses due to reproductive failure, lowered milk production, reduction in lactation length and an increased incidence of inter-current diseases [11]. Transmission is primarily by ingestion of colostrum or milk containing infected cells from dam [2]. Horizontal transmission is possible by prolonged contact with infected goats [24]. Control involves serotesting and segregation, isolation of new-borns at birth and feeding heat-treated milk and colostrum [2, 19]. Infected goats are carriers without showing clinical signs and delayed seroconversion are impediment in control and eradication programs [23, 25].

High and widespread prevalence of CAEV infection was reported in many parts of the world, and economic losses due to the disease are largest in countries with intensive husbandry. While results from Kenya and Mexico showed that 4-5% of the goats were infected [1], higher seroprevalence rates were recorded in the USA [6] and Australia [12], where intensive husbandry is generally practised.

A limited number of studies is available on the prevalence of CAEV infection among goat populations in Turkey. BURGU et al. [4] reported a prevalence of 1.9 % by AGID test for three state farms and seven private flocks in different parts of Turkey. YAVRU et al. [27] reported a prevalence of 6.34 % and 13.05 % by AGID and ELISA, respectively, in Konya province located in Central Anatolia. No report is available on the prevalence of CAEV infection among goat populations in Hatay. In this region, goats are the most important source of meat and milk for the rural population, and Damascus goat and Kilis goat are two indigenous breeds reared in the region.

In order to analyse the epidemiological status of CAEV in the region of Hatay (Turkey), the seroprevalence of CAEV between Damascus goat and Kilis goat herds was studied using AGIDT and cELISA.

Materials and Methods

SERUM SAMPLES

Blood samples were collected from 675 randomly selected goats from different farms in Hatay region of Turkey. The age, sex and breed of sampled goats were recorded (Table I).

Blood samples were taken into clot activator vacuum tubes (Vacuette, Austria) and quickly transported to the laboratory. Sera were separated after centrifugation at 1000 g for 10 minutes and stored at - 20°C until examined.
CLINICAL EXAMINATION

Goats were examined for encephalitis, mastitis and arthritis, which could suggest the infection.

SEROLOGICAL EXAMINATION

Agar Gel Immunodiffusion Test (AGIDT) was performed as for CUTLIP et al. [7] using a commercially available kit (Capriclear, Weybridge, England) and test was read after 2 days incubation at room temperature.

Competitive Enzyme Linked Immunosorbent Immunoassay (cELISA) was performed using a commercial CAEV cELISA test kit (VMRD, Inc. USA) as per HERRMANN et al. [13].

These two different tests were chosen as they are used routinely in serosurveys of CAEV infection world-wide, and because of their different sensitivity and specificity.

STATISTICAL ANALYSIS

Chi-square test [17] was used to detect significant differences between proportions and a probability of less than 0.05 was considered statistically significant.

Results

None of the 675 goats sampled in this study showed a sign of clinical disease. Seven (1.03 %) of the 675 goats sampled were positive for CAEV antibodies with cELISA, but no seropositivity was detected with AGID. The rates of seroprevalence were 1.1 % (6/540) for Kilis goats and 0.7 % (6/130) for Damascus goats (Table II). Six of the 605 females (0.99 %) and 1 of the 70 males (1.42 %) were positive, respectively (Table II). Seropositive goats came only from two provinces: the rates of seroprevalence were 3.77 % (6/159) for Kirikhan province and 0.76 % (1/130) for Altinözü province. Statistical analyses revealed no significant difference (P>0.05) in seropositivity between breeds, sexes or ages (Table II).

Discussion

Caprine arthritis-encephalitis virus (CAEV) infects mostly goats and has a global distribution in the world [1]. Serosurveys conducted in Australia [12], USA [6], Norway [18], Brazil [10], UK [8], Switzerland [16] and Mexico [26] have revealed prevalence rates of 82 %, 73 %, 49.5 %, 36.5 %, 4.3 %, 2 %, and 0.4 %, respectively. In this study, the seroprevalence of CAEV infection was detected to be 1.03 % with cELISA, which is similar to those found in Switzerland (2 %) and in Mexico (0.4 %). When compared with other studies carried out in Turkey, the seroprevalence rate recorded in present study is similar to that reported by BURGU et al. [4], but lower than that of YAVRU et al. [27].

ROWE and EAST [27] reported that animal density increased close contact with other animals and caused horizontal transmission of CAEV infection, which could explain the higher seroprevalence rate detected in Kirikhan (3.77 %), where intensive goat husbandry practices exist. Lower seroprevalence detected in Altinözü (0.76 %), and no seropositivity in other provinces may be due to presence of smaller and separate goat herds.

Although it was not statistically significant, higher seropositivity was detected in Kilis goats than in Damascus goats. The higher seroprevalence rate found in Kilis goats might be due to larger population density of this goat breed in the regions.

Correlation between CAEV infection, and breed, age and breeding methods has been reported [6, 9, 18, 20]. However, in this study, the numbers of seropositive animals were insufficient to achieve any meaningful statistical conclusions.

Diagnosis of CAEV infection is based on the specific antibody detection [5, 14, 15, 22, 30]. AGIDT and ELISA are routinely used tests [4, 10, 27]. Sensitivity and specificity of

<table>
<thead>
<tr>
<th>Location</th>
<th>Sample numbers</th>
<th>Sex</th>
<th>Age (years)</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>≥5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kirikhan</td>
<td>159</td>
<td>145</td>
<td>14</td>
<td>5</td>
<td>33</td>
<td>40</td>
<td>36</td>
<td>45</td>
</tr>
<tr>
<td>Serinyol</td>
<td>60</td>
<td>55</td>
<td>5</td>
<td>26</td>
<td>18</td>
<td>7</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>Reyhanili</td>
<td>92</td>
<td>91</td>
<td>1</td>
<td>13</td>
<td>46</td>
<td>21</td>
<td>1</td>
<td>11</td>
</tr>
<tr>
<td>Yayladag</td>
<td>94</td>
<td>91</td>
<td>3</td>
<td>15</td>
<td>48</td>
<td>20</td>
<td>1</td>
<td>10</td>
</tr>
<tr>
<td>Altinözü</td>
<td>130</td>
<td>111</td>
<td>19</td>
<td>36</td>
<td>34</td>
<td>44</td>
<td>13</td>
<td>3</td>
</tr>
<tr>
<td>Hassa</td>
<td>140</td>
<td>112</td>
<td>28</td>
<td>50</td>
<td>59</td>
<td>22</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>TOTAL</td>
<td>675</td>
<td>605</td>
<td>70</td>
<td>145</td>
<td>238</td>
<td>154</td>
<td>60</td>
<td>78</td>
</tr>
</tbody>
</table>

Table I. — Distribution of goat sera according to location, sex and age.

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Sex</th>
<th>Kilis Goats</th>
<th>Damascus Goats</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Number of goats</td>
<td>Number of positives</td>
</tr>
<tr>
<td>1</td>
<td>M</td>
<td>35</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>74</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>M</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>200</td>
<td>1 (0.5%)</td>
</tr>
<tr>
<td>3</td>
<td>M</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>108</td>
<td>3 (2.7%)</td>
</tr>
<tr>
<td>4</td>
<td>M</td>
<td>3</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>44</td>
<td>1 (2.2%)</td>
</tr>
<tr>
<td>≥5</td>
<td>M</td>
<td>7</td>
<td>1 (14.2%)</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>68</td>
<td>-</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td>545</td>
<td>6 (1.1%)</td>
</tr>
</tbody>
</table>

Table II. — The prevalence of anti-CAEV antibodies detected by cELISA according to sex, breed and age. M : male - F : Female.
AGIDT have been shown to be 92.6 % and 98.6 %, respectively, when compared with immunoperoxidase test (IP) as the reference test. However, the major limitation of AGIDT test is its subjective interpretation [13]. No seropositivity was evidenced by AGIDT: a delayed seroconversion and an insufficient sensitivity of this test can explain this result.

cELISA detects CAEV antibodies and it is based on the serum inhibition of the monoclonal antibody binding to the CAEV gp135 SU glycoprotein. However, other ELISA tests detect goat antibodies able to bind to the whole virus lysate or to recombinant CAEV antigens and the anti-goat immunoglobulin G reagents reveal the formed immune complexes. The ability to detect positive sera with low anti-CAEV gp135 SU antibody titres is a major advantage of the cELISA over indirect ELISA, which requires the dilution of the tested sera [13]. The detection of seropositive serum samples with cELISA but not with AGIDT could be explained by the higher sensitivity of cELISA.

The previous studies and this study indicate that CAEV has a low prevalence in Turkey in contrast to European Union Countries and the USA. However, more studies with larger animal size using different methods such as cELISA may be required to assess the true distribution of CAEV in Turkey. Control and eradication programs against CAEV have not been implemented in Turkey. However, it is important to establish measures to prevent the entrance of positive reactors to local goat breeds for genetic improvement and rural development programs. Furthermore, continuous monitoring should be carried out for local goat populations in Turkey.

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References