

An investigation of Visna-Maedi Virus Infection in Şanlıurfa Province, Southeast Anatolia, Turkey

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Abstract

Visna/maedi virus (VMV) infection is a problematic infection in sheep, and presence of the infection has been detected all over Turkey in different proportions. Nearly a quarter of the sheep population are bred in the South-East Anatolia region, and Şanlıurfa is the biggest province in this region. The aim of this study is to investigate VMV infection in both ordinary traditional small enterprises and stud animal flocks. Out of 13 investigated private small enterprises using indirect ELISA, positivity was detected in only 5, with rates between 11.5% and 66.6%. In total, 9.8% (15/153) was found to be positive. In an organised flock where VMV symptoms were observed for one year, all of the animals that were older than 6 months were sampled and 23.2% of them (199/858) tested positive. Positivity proportion showed a regular increase by age. In total, out of 1,011 sheep samples, 214 (21.1%) were found to be positive. As a result, distribution of VMV was determined to be more widespread than expected. Preventive studies were started in the stud flock after the study.

Anahtar Kelimeler: South-East anatolia, Sheep, Visna-Maedi Virus, Turkey

Türkiye’de, Güneydoğu Anadolu Bölgesinde Bulunan, Şanlıurfa İlinde *Visna-Maedi* Virus Üzerine Bir Araştırma

Özet

Visna/maedi virus (VMV) enfeksiyonu koyunların problemleri olan bir enfeksiyondur. Türkiye’de enfeksiyonun varlığı değişik bölgelerde ve değişik oranlarda ortaya konulmuştur. Türkiye’de koyun yetiştiriciliğinin yaklaşık dörtte biri Güneydoğu Anadolu’da yapılmaktadır. Bölgede yetiştiriciliğin yapıldığı en büyük il Şanlıurfa’dır. Araştırmanın amacı, bölgede geleneksel özel küçük işletmeler ve damızlık işletmelerde VMV enfeksiyonunu araştırmaktır. 13 geleneksel özel küçük işletme indirect ELISA test ile incelendi 5 inde %11.5 ile %66.6 arasında değişen oranlarda pozitiflik bulundu. Toplamda %9.8 (15/153) pozitiflik bulundu. Bir yıl VMV semptomları gösteren ve 6 aylıktan büyük hayvanların bulunduğu organize bir sürüden numuneler alındı ve test edildi. %23.2 (199/858) pozitif bulundu. Pozitiflik oranlarının yaşın artmasıyla düzenli olarak arttığı görüldü. Toplamda 1011 koyun numunesinden 214 (%21.1) Bu sonuçlara göre VMV enfeksiyonu umulandan daha yüksek oranda yaygın olduğu ortaya konuldu. Damızlık sürülerde hayvanlar damızlığa ayrıldıktan sonra, koruyucu önlem çalışmaları başlatılmalıdır.

Key Words: Güneydoğu anadolu, Koyun, Visna-Maedi virus, Türkiye

Introduction

Visna-Maedi virus (VMV) infection in sheep has been the cause of important economic loss due to wasting and health disorders (1,2) in many countries of the world, especially where organised dairy breeding is performed (3). Very few countries are free from infection like Australia and New Zealand (4). This fatal infection was first described in 1954 by Bjorn Sigurdsson in Iceland, later Maedi-Visna virus was the first lentivirus to be isolated and characterized,

accomplished in 1957 by Sigurdsson (5). The agent is a lentivirus in the Retroviridae family. VMV and the very similar Caprine arthritis-encephalitis virus (CAEV) are classified as small ruminant lentiviruses (SRLV). Comparison of gag and pol sequences of SRLV has revealed the presence of four new types (A-D). There are at least 7 subtypes in group A, and group B contains two subtypes. Until now, subtypes A5, A7, B1 and groups C and D have been isolated only from goats. Subtypes A1 and A2 have been isolated only from

sheep, while subtypes A3, A4, A6, and B2 have been isolated from both species (6,7).

SRLV leads to persistent infection like all other retroviruses that have many unique features and complex replicative characteristics. They are known to create slow, progressive and fatally lymphoproliferative diseases in target organs, mainly in the joints, lungs, mammary glands and brain (8). Most cells, especially lymphocytes, contain viral genomes but do not produce infectious virus for a long time. Eventually, increased viremia, more severe disease and death are inevitable. The infections are mostly transmitted via lymphocyte transfer. Incubation can be prolonged up to 6-7 years but the main factor determining the incubation period is age. Characteristic clinical signs of the diseases like chronic weight loss and exercise intolerance leading eventually to respiratory distress and death could be seen generally after 2-3 years after the infection of virus (2,9).

VMV is a prevalent disease in many parts of the world (3,10,11,12,13).

Presence of VMV has been known since the mid 1970's in Turkey (14). In the latest studies VMV presence has been reported to be 26.7% (168/628) in different locations in Anatolia (15), 23.5% (137/583) in northern Turkey (16) and 15.3% in Istanbul province (17).

The South-east Anatolia region is one of the prominent places in terms of sheep breeding due to its geographical features. The aim of this study was to investigate the VMV infection in private small-medium scale farms in the Şanlıurfa, which is one of the provinces with intensive sheep farming in South-east Anatolia, Turkey.

Materials and Methods

Sampled Animals

To determine the prevalence of the Visna-Maedi virus infection in private flocks, blood serum samples were collected from 13 different small-medium scale sheep flocks and 1 stud flock. In family type flocks, the numbers of breeding sheep were between 4 and 150 in the sampled flocks, and in total 153 sheep were sampled in summer 2010. All the sheep were clinically normal at the time of sampling. According to the information obtained from the flock owners, VMV infection-related symptoms had not been observed before.

VM-related typical symptoms were detected from the largest flock investigated in this study. Health records for this flock were kept for last one and half years. According to the records, 4 to 6 sheep died every month for nearly the last one year. Progressive weakness, coordination disorders, cough, fur loss and

weakness in the back legs were clearly observed in the affected sheep of every age, and particularly the 6-month-old and 3-year-old ones. Animals were died after 2-3 days up to nearly 1 month after showing the symptoms. Post-mortem macroscopic examination had previously been applied to some sheep and the prominent affected organ was the lungs. The colour of the lung had become grey-black and mostly only one lobe was affected. VM-related clinical findings were observed in some sheep during sampling. All of the 6-month-old and above sheep were sampled in this flock (n=858).

The body condition scores (BCS) of the sampled sheep were not recorded individually in this flock but nearly 10-15% of the sheep were at lower levels which were clinically normal. All sampled sheep from the small flock's BCS values were within normal measurements.

Totally, 1011 sheep were sampled during this study.

Serological test

A commercial indirect ELISA kit for Maedi-Visna/CAEV Sero-diagnosis (anti-p28 protein) (Institut Pourquier, France) was utilized for to test the serum samples. The test was performed according to the manufacturer's instructions and plates were read with an ELISA reader (ELX800 Absorbance Microplate Reader Bio-Tek) at 450 nm. The results were calculated according to the instructions.

Results

According to the results of the serological tests of 13 private small flocks, positivity was detected in only 5, at rates between 11.5% and 66.6%. In total, a 9.8% (15/153) value was detected.

Table 1. Test results for Visna-Maedi Virus infection in small private enterprises

Table 1. Küçük işletmelerdeki Visna-Maedi enfeksiyonu test sonuçları

Flock No	Sheep number in the herds	Tested animal	Visna-Maedi Virus Ab (+)/(%)
1	150	54	8 (%14.8)
2	120	22	-
3	100	22	-
4	70	10	-
5	40	26	3 (%11.5)
6	15	7	1 (%14.2)
7	10	2	1 (%50)
8	5	3	2 (%66.6)
9	5	2	-
10	5	1	-
11	5	2	-
12	5	1	-
13	4	1	-
Total	534	153	15 (%9.8)

In the only organised flock, out of 858 sheep samples 199 (23.2%) were determined as positive. As

can be seen in Table 2, positivity distribution according to the age group shows dramatic changes. While a value of only 3.5% (14/395) was observed in the first group (6 mo.- 1 years old), the proportion reached 21.4% (21/98) in the sheep nearly 2 years old. As can be expected, the proportion was highest (44.9%) in the oldest group of sheep.

Table 2. Test results for Visna-Maedi Virus infection in the organised flock

Tablo 2. Organize sürüde Visna-Maedi enfeksiyonu test sonuçları

Flock No	Age groups	Animal no	Visna-Maedi Virus Ab (+)(%)
1	6 month – 1 year	395	14 (%3.5)
2	2 year	98	21 (%21.4)
3	3 years and above	365	164 (%44.9)
Total		858	199 (%23.2)

Statistical analysis

The test results of the animals from organised farms were statistically analysed. According to the chi-square method, differences between sheep under 1 years old and those above were found to be significant ($\chi^2 = 158.65$; $p < 0.001$, 95% CL). Another data evaluation was made for 3 groups (6 mo-1 year old, nearly 2 years old, and 3 year old and above). Significant differences was also determined among these 3 groups (Table 2) ($\chi^2 = 182.60$; $p < 0.001$, 95% CL). These results show that VMV positivity increased with age.

Discussion

The South-East Anatolia region has been one of the prominent are as for small ruminant breeding, especially sheep farming for centuries. Nearly a quarter of the sheep flocks are in this region. Climatic-topographical features and the presence of large rural areas render the region very suitable for sheep breeding, as do consumption trends in this area as well. Şanlıurfa province is the largest province in this region. In this study, VMV infection was investigated both in small family type flocks and an organised enterprise in Şanlıurfa province. For this purpose, 153 blood serum samples were obtained from 13 randomly selected small private sheep flocks and 1 organised farm with typical VMV symptoms observed for nearly one year period. According to the results of the indirect ELISA test, out of 13 small farms, 5 were found to be positive with rates between 11.5% (3/26) and 66.6% (2/3). Totally 15 (9.8%) were detected to be positive. All animals were clinically normal at the time of sampling, despite the absence of regular health records. According to information received from the flock owners, VMV-

related disorders had not been observed in these animals before.

The infection was also investigated in terms of typical VMV symptoms observed in an organised stud animal breeding flock. All animals above 6 months old were sampled for serological screening and 23.2% (199/858) positivity was detected. Proportions were shown to increase relative to age, 3.5% was determined in the animals between 6 months old and 1 year old, 21.4% in the 2-year-old group, and 44.9% in the 3-years-old and above group. This dramatic distribution was also supported by statistical analysis. Maternal antibody presence creates false results so test results of these animals were accepted as unreliable. Therefore animals younger than 6 months old were not tested in this flock.

Flock records were retrospectively investigated; all animals from a bigger stud flock which had been positive were collected and no any other sheep entered the flock later on. The source of the infection was clarified and eradication was proposed for these flocks.

Many European countries have reported the infection with different proportions. Presence of SRLV has been known since 1862 in the Netherlands (12). VMV has been quite prevalent in North America. According to a survey conducted in the United States and Canada, seropositivity was determined in 61% of a flock of 575. Out of 46,817 tested sheep, 27% were reported to be positive (3). In Germany, in total 2,229 blood samples from 70 farms were tested and 28.8% of the animals and 51.2% of the herds were reported as positive (11). There is quite limited information for the neighbouring countries of Turkey. The infection has been reported in Iran (13). In Syria, 6% of 1,445 sheep were detected to be positive (10).

There is no definite information about the first entrance of the VMV infection into Turkey but the first report refers to 1975 (14). Virus isolation and classification have not been reported so far in Turkey but the latest reports show that the infection is widespread in nearly the whole country even though proportions are not very high. Albayrak et al. (16) tested a total of 583 samples in the northern provinces. Positivity rates were 19.4% in Samsun, 15.4% in Sinop, 25.8% in Ordu, 26.7% in Trabzon, 36.7% in Rize, 69.0% in Amasya, 35.0% in Tokat, while all of the samples (n=153) were negative from Giresun province. A total rate of 23.5% (137/583) was detected. In another study carried out in Central Anatolia (18), out of 279 sheep, 54 (19.4%) were found to be positive, while 5 sheep were also detected as being antigen-positive. Preziuso et al. (17) reported a VMV infection rate of 15.3% in Istanbul province, and the positivity proportion in adult sheep ($1 \geq$) was found to be 5 time

shigher than in young animals. Karaoglu et al. (15) checked 825 sheep samples from small private enterprises in 8 provinces in Anatolia and VMV positivity was detected in 5 provinces, in total 2.6% of the samples were positive.

Eradication programs have been established in many countries of the world (19,20) . A national eradication program has not been implemented in the countries like Turkey; herd- based control studies have emerged as the only option. Understanding the transmission dynamics is crucial in order to implement control strategies (19). VMV is mainly transmitted from mother to offspring through milk. It has also been suggested that prolonged contact between adult animals facilitates VMV transmission. Two-meter separation between animal pens is sufficient to prevent SRLV transmission in goats (21). In addition, fomite exposure through the oronasal cavity during feeding and drinking water also carries risks (9,22) . All of the studied flocks had been grazing in the field virtually all years so contact transmission also creates a contamination risk. Furthermore, uncontrolled animal participation in the flocks is an almost routine practice in non-organized flocks. If these two conditions are ignored, flock-based eradication will not get very far. There is no vaccine or fully successful treatment against infection. The most important point is to give necessary information and extensive support to herd owners. There are many small family type flocks in the region. It seems that the control of the VMV infection in the region cannot be accomplished without countrywide eradication actions. However, especially considering especially the mid- and long-term future economic losses, getting VMV under control is an obligation.

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