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Original Research Article

Ephemeral Fever Outbreak in a Dairy Herd in Adana Region

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ABSTRACT

The aim of the study was to report an unusual outbreak of bovine ephemeral fever with high mortality rate. The study was conducted in a dairy cattle herd in September 2012, around Çukurova region in southern Turkey. The herd was consisting of 550 dairy cattle (n=550). In herd, 95 cattle with different symptoms died within one week. Only 225 sick cows were examined by routine clinical procedure. Necropsy was performed on 3 dead animals with dyspnea score of 3. Following clinical examinations, blood samples were taken from the most severely affected 17 cows. A haemocell counter analyzed hematologic parameters. Clinically, fever, nasal discharge and dyspnea were the common symptoms. The clinical, hematological and pathological findings were comparatively evaluated. Unlike previous reported outbreaks, affected animals had extremely severe respiratory distress caused high mortality rate. At necropsy of 3 dead animals, emphysematous lung tissue, pneumonia and edema as well as petechial hemorrhages on serosal and subendocardial surfaces of the heart were noticed. Emphysema was also identified in the subcutaneous connective tissues. Taking the results of the study into consideration, it has been determined that ephemeral fever in dairy cattle has high mortality rate (over 20%) in Adana region.

Keywords: Ephemeral fever, Mortality rate, Dairy cattle, Adana

Adana Yöresinde Bir Süt Sığırı Sürüsünde Ephemeral Fever Salgını

ÖZET

Bu çalışmanın amacı yüksek mortalite oranıyla seyreden alışılmamış bir bovine ephemeral fever salgınını rapor etmektir. Çalışma Türkiye'nin güneyinde Çukurova bölgesinde, Eylül 2012 de bir süt sığırı sürüsünde yürütüldü. Sürü 550 süt sığırından (n=550) oluşmaktaydı. Sürüde, farklı semptomlar gösteren 95 sığır 1 hafta içinde öldü. Sadece hasta olan 225 inek rutin klinik prosedüre göre muayene edildi. 3 dispne skorlu olup ölen 3 hayvana nekropsi yapıldı. Klinik muayeneleri takiben en şiddetli etkilenen 17 hayvandan kan örneği alındı. Bir kan sayım cihazında hematolojik parametreler analiz edildi. Klinik olarak ateş, burun akıntısı ve dispne genel semptomlardı. Klinik, hematolojik ve patolojik bulgular karşılaştırmalı olarak değerlendirildi. Daha önce rapor edilen salgınlardan farklı olarak, etkilenen hayvanlarda yüksek mortalite oranına neden olan son derece şiddetli solunum güçlüğü mevcuttu. Ölen 3 hayvanın nekropsisinde, kalbin subendokardiyal ve serozal yüzeylerinde peteşiyel kanamaların yanı sıra amfizematöz akciğer dokusu, pneumoni ve ödem de gözlendi. Amfizem aynı zamanda subkutan bağ dokularda da identifiye edildi. Çalışmanın sonuçları göz önünde bulundurulduğunda, ephemeral fever'ın Adana yöresinde yüksek (%20 den fazla) mortalite oranının olduğu belirlendi.

Anahtar Kelimeler: Ephemeral fever, Mortalite oranı, Süt sığırı, Adana

INTRODUCTION

Ephemeral fever is an acute arthropod borne viral infection of cattle that characterized by fever, nasal discharge, dyspnea, lethargy, muscle tremors, recumbency and sometimes cause mortality (Davies *et al.* 1975, Kawther *et al.* 2011). The agent of the disease is an arbovirus from the family of Rhabdoviridae. It could be transmitted by *Culicoides* spp. midges and mosquitoes (Abu-Elzein *et al.* 2006). The disease is endemic in tropical and subtropical areas such as Africa, Australia, Kenya, Saudi Arabia, the Middle East, Asia and Turkey (Davies *et al.* 1975, Farag *et al.* 1998, Nahed *et al.* 2011). Prevalence of the disease in the Jordan Valley in Israel in 1990 and 1999 were 78.5% and 97.7%, respectively (Radostits, *et al.* 2006, Nahed *et al.* 2011). And morbidity rate in outbreaks is usually between 25% and 45%, however, if the population is highly susceptible or the infecting strain virulent, the morbidity rate may reach 100% (Radostits, *et al.* 2006).

Together with the low mortality rate, it can cause significant economic loss due to reduced milk production and treatment costs (Nahed *et al.* 2011). Furthermore, ephemeral fever causes serious production loss

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in cattle. Different sources regarding ephemeral fever outbreak point out the mortality rate over the 30% (Radostits *et al.*, 2006; Roya 2008). In the Çukurova region, although prevalence of the disease is around 60-80%, the reported mortality rates were about 15–20% (Tonbak *et al.* 2012). This outbreak in Adana region has the highest mortality rate of ephemeral fever ever seen in Turkey.

MATERIALS AND METHODS

In July 2012, a clinical manifestation of the disease was firstly observed in several dairy farms around Adana. A herd had 550 cattle, and 225 cattle of the herd were affected from ephemeral fever disease and 95 of the affected animals (between 1 and 4 years old) were dead. The younger animals (about 6 months old) had no clinical symptoms. All affected animals were examined clinically.

For hematology, blood samples of the affected cattle were collected for serum and plasma. Hematocrit (HCT), hemoglobin (HGB), erythrocyte (RBC), total white blood cell (WBC), platelet (PLT) values, creatin kinase (CK) and aspartate aminotrasferase (AST) were analyzed in analyzer tools (Reflotron®, Vet-Scan HM5, Abaxis, Germany). Serum samples were analyzed by blocking enzyme linked immunosorbent assay (ELISA) kits (EMAI®, Camden NSW, Australia), and specific IgG antibodies of the bovine ephemeral fever were detected from these samples.

All animals showing signs of the disease (n=225) were treated with a single dose of meloxicam (Metacam®, Boehringer - Ingelheim Inc, Germany) 0.5 mg/kg intramuscular (im); acetylcystein (Asist®, Husnu Arsan, Turkey) 3000 mg for each cow, 5 days im; ascorbic acid (Injacom-C® 200 mg, DSM, Inc, Turkey) 25-40 cc intravenous (iv) 3 days. Selenium (E-Sevil®, Vilsan Inc, Turkey) 10 cc im was administered to recumbent animals.

RESULTS

Body condition scores (BCS) of the affected animals were between 2.75 and 4.25. Clinical symptoms were more severe in old animals with higher than average BCS. Clinical aspects of acute respiratory distress among the animals resting were considered to the main cause of dead 95 animals (42.2%). Affected animals also had high body temperature (mean: 41.2±3 ˚C; min. 40.5˚C, max. 42˚C) (Fig. 1). Dyspnea scores were estimated as previously reported (Table 1) (9). The scores of 35 animals (15.5 %), 85 animals (37.7 %) and 105 animals (46.8 %) were 1, 2 and 3, respectively. Due to the medical treatment, 22 cows with dyspnea score of 2 and 73 cows with dyspnea score of 3, died respectively. Respiration rate of the affected cattle was between 60 and 104 per minute (mean: 82±8 /min), and all animals in the herd had tachycardia. The heart rate of the cattle was between 88 and 128 (mean: 96±9) per minute. The thoracic percussion revealed emphysematous voices particularly on dorsal site of the thorax. Emphysematous findings were distinctive in auscultation and whistling like breathing noises were notable during respiration. Auscultated scrunch like alveolar voices and pleural friction noises were typical for lung emphysema. Lameness in herd was observed in 76 out of the affected 225 cattle (33.7%). They were in standing position but were walking difficultly, as well.

Table 1. Pneumonia scoring used in cattle herds (Şentürk, 2014).

Clinical parameters	Score
Body temperature	
39,3 – 39,5 °C	1
39,6 – 40,5 °C	2
40,6 – 42 °C or < 37 °C (hypothermia)	3
Severity of coughing	
Mild	1
Moderate	2
Severe	3
Dyspnea	
Mild	1
Moderate	2
Severe	3
Severity of depression	
Mild	1
Moderate	2
Severe	3

Figure 1. Pulmonary emphysema, interlobular septal connective tissue is significantly distinct.

The reasons of the high mortality rate (42.2 %) (95 of the 225 animals), due to medical management, was severe lung emphysema and its complications. The other cattle recovered completely within two weeks.

Hematologically, varying degrees of leukocytosis (13.4-18.1x 10^9/L; mean: 16.6±3 x10^9/L), neutrophilia (62-81%), lymphopenia (18-39%), increased hematocrit values (mean: 50.3±5; min. 44%, max. 52%) were determined. Platelet count values were in normal ranges. Significant increases were determined in CK (min.128, max. 552 mean: 246±10 I.U.) and AST (min. 144, max. 459; mean: 218 ± 7 I.U.) enzyme values.

Macroscopically, the lesions mainly observed in the lungs were full of air (emphysema) and pneumonia characterized by congestion and edema (Figure 1). Petechial hemorrhages were found on serosal and subendocardial surfaces of the heart (Figure 2). Emphysema was also identified subcutaneous connective tissues of the skin. Microscopically, emphysema was intensive and diffused extending to bronchioles and bronchus in

which inflammatory cells were pictured (Figure 3). Hemorrhages were found on the subserosal surface of liver and inter lobular septa of the lungs. The vacuolar degeneration was detected in hepatocytes.

Figure 2. Petechial subserosal hemorrhages on the heart surface.

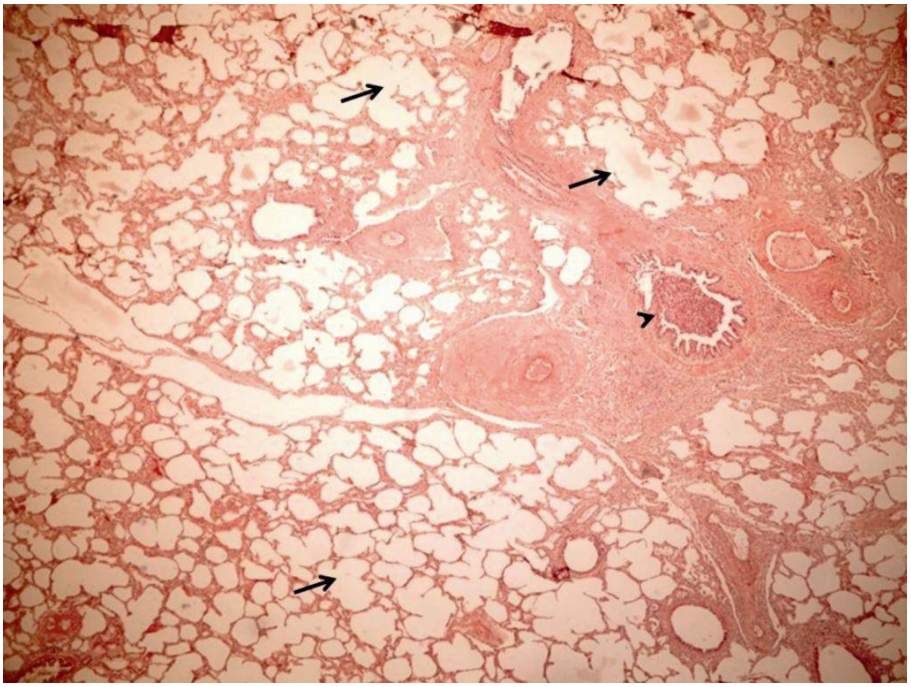

Figure 3. Diffuse and intensive emphysema areas (arrows) and polymorphonuclear cells in a bronchioles lumen (arrow head)

DISCUSSION

It has been well known that the mortality rate of the ephemeral fever is usually low. Yeruham *et al.* (2002) reported the mortality rate between 2.0% and 8.6% in 1990 and 1999, respectively (Yeruham *et al.* 2002). The mortality rate of ephemeral fever in cattle with low body condition is usually low (1-2%), although mortality rates could reach up to 30% in obese animals (Momtaz *et al*. 2012). Laminitis and lameness is a common complication of ephemeral fever (Asi *et al.* 1999). The respective highest morbidity and mortality rates in the Jordan Valley were 20% and 2% in 1990, 38.6% and 8.6% in 1999, and 22.25 and 5.45 in 2004. The morbidity and mortality in 1999 outbreak were higher than Saudi Arabian and Australian outbreaks (Abu Elzein *et al.* 1997, George 1988, Newton *et al.* 1970, Yeruham *et al.* 2005). The mortality rate of Saudi Arabia was changed from 0.3% to 0.6%, in 1990-1996 (Abu Elzein *et al.* 1997). In another report, it is noted that mortality rate due to the ephemeral fever could reach up to 30% in obese cattle (Momtaz *et al.* 2012, Roya 2008). The presented study indicated both cattle with high BCS and with lower BCS that they were severely affected from the ephemeral fever as reported previously (Archbold *et al.* 2012). In the outbreak that determined by us, mortality rate of the ephemeral fever was determined to be 42.2% (95 of the 225 animals). The respiratory distress caused by possibly pulmonary emphysema, which was the main cause of death in cattle suffering from ephemeral fever. In previous years, ephemeral fever is encountered at certain time of the year, and they are not resulting in death due to severe respiratory distress (Tonbak *et al.* 2012, Yeruham *et al.* 2002).

A varying degree of leukocytosis was observed in this study. The cattle had also neutrophilia and lymphopenia. In severely affected cattle, the cause of the increased hematocrit values could be stress (stress leukogram). These results were complied with the previous studies in cattle with ephemeral fever (Uren *et al.* 1985, Radostits *et al.* 2006). Increased in CK and AST values could be reflection of downer cow in recumbent cattle (Uren *et al.* 1985, Radostits *et al.* 2006).

In conclusion, It has been implied that outbreak of the ephemeral fever detected in South Turkey is characterized with severe respiratory distress and has high mortality rates. Deaths are usually the result of the secondary complication such as pneumonia. Therefore, it is important to perform virus isolation or serological tests or molecular diagnosis that should be performed with the other studies.

REFERENCES

Abu Elzein EM, Gameel AA, Al Afaleq AI, Al Gundi O and Bukhari A (1997). Bovine ephemeral fever in Saudi Arabia.Vet. Rec., 140: 630–631.

Archbold H, Shalloo L, Kennedy E, Pierce KM and Buckley F (2012). Influence of age, body weight and body condition score before mating start date on the pubertal rate of maiden Holstein–Friesian heifers and implications for subsequent cow performance and profitability. The Animal Consortium, 6:1143–1151.

Asi MN, Muhammad G, Saqib M and Inayat AA (1999). Preliminary Clinical Report on the Occurence of Bovine Ephemeral Fever among Crossbred Cattle in Pakistan Pak Vet J.,19:98-100.

Davies FG, Shaw T and Ochieng P (1975). Observations on the epidemiology of ephemeral fever in Kenya. J. Hyg., 75: 231 – 235.

Farag MA, Al-sukayran A, Mazloum KS and Al-bukomy AM (1998). Epizootics of bovine ephemeral feveron dairy farms in Saudi Arabia.Review of Scientific and Technical OIE., 17: 713 – 722.

George TD (1988). Bovine ephemeral fever: a review.Trop Anim Health Prod., 20: 194–202.

Kawther SZ and Wahid MA (2011). Investigations on Bovine Ephemeral Virus in Egyptian Cows and Buffaloes with Emphasis on Isolation and Identification of a Field Strain. Global Veterinaria, 6: 447 – 452.

Momtaz H, Nejat S, Moezani M and Riahi M (2012). Molecular epidemiology of Bovine Ephemeral Virus in cattle and buffaloes in Iran. Rev Med Vet., 163: 415- 418.

Nahed ST, Emad WG, Mohamed AN and Mohamed AE (2011). Molecular and biochemical studies on bovine ephemeral fever.ROAVS., 1: 269-275.

Newton LG and Wheatley CH (1970). The occurrence and spread of ephemeral fever of cattle in Queensland. Aust Vet J., 46:561–568.

Radostits OM, Gay CC, Hinchcliff KW and Constable PD (2006). Veterinary medicine: a text book of the diseases of cattle, sheep, pigs, goats and horses, (10th Edn.), Baillière Tindall, London, Philadelphia, Sydney, Tokyo, Toronto, pp: 1177 – 1179.

Roya S. (2008). Survey on serological diagnosis of Bovine Ephemoral Fever (BEF) by IR-BK and Vero cell lines in Southern provinces of Iran by in vitro methods', In: 15th congress of FAVA, Bangkok, Thailand 267 – 268.

Şentürk S (2014). Sığırların Solunum Sistemi Hastalıkları. F. Özsan Matbaacılık San. ve Tic. Ltd. Şti., Bursa, pp: 91 – 95.

Tonbak S, Berber E, Deniz M, Yoruk A, Azkur K, Pestil Z and Bulut H (2012). A Large-Scale Outbreak of Bovine Ephemeral Fever in Turkey', J Vet Med Sci., 75:1511–1514.

Uren MF and Murphy GM (1985). Studies on the pathogenesis of bovine ephemeral feverin sentinel cattle. II. Haematological and biochemical data. Vet. Microbiol.10: 505-515.

Yeruham I, Braverman Y, Yadin H, Van Ham M, Chai D, Timokin D and Frank, D (2002). Epidemiological investigations of outbreaks of bovine ephemeral fever in Israel. Vet Rec., 151: 117 – 121.

Yeruham I, Yadin H and Abramovitch I (2005). Bovine ephemeral fever in a dairy cattle herd in the Jordan Valley Shama.Vet Rec., 156: 284 – 286.