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Case Report

Contagious Pustular Dermatitis in a Wild Sheep *(Ovis orientalis)* in Iran

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Abstract: Contagious Ecthyma is an infectious disease of sheep and goats that causes dermatitis primarily on the lips, mouth and muzzle. In this article, we describe a case report of Contagious Ecthyma in a wild sheep *(Ovis orientalis)* in Fars province of Iran. One wild lamb was found in the border of Bamou National Park near human communities. The lamb died during the transfer to the rehabilitation center. Gross lesions were characterized by multifocal scabs, proliferative and crusty wart-like multiple lesions on the muzzle, nose, between the eyes, ears, neck and coronary band. Skin samples were taken from lesions and sent to the collaborator laboratory of Veterinary Organization for DNA extraction and analysis by PCR tests. Laboratory results confirmed *Contagious Ecthyma (Orf) virus* in the wild sheep. This is the first documented report of Orf in wild sheep from Bamou National Park.

Keywords: *Bamou National Park, Contagious Ecthyma, Wild sheep, PCR*

İran'da Bir Yaban Koyununda (*Ovis orientalis)* Bulaşıcı Püstüler Dermatit

Öz: Bulaşıcı Ektima koyun ve keçilerde görülen ve esasen dudaklarda, ağızda ve burunda dermatite neden olan bulaşıcı bir hastalıktır. Bu çalışmada, İran'ın Fars eyaletinde bir yaban koyununda *(Ovis orientalis)* görülen bir Bulaşıcı Ektima vakası bildirilmiştir. Bamou Ulusal Parkı sınırında insan topluluklarının yakınında bir yaban kuzusu bulunmuştur. Kuzu rehabilitasyon merkezine nakli sırasında ölmüştür. Makroskobik lezyonlar, ağız, burun, gözler arası, kulaklar, boyun ve koroner bantta multifokal kabuklanmalar, proliferatif ve kabuklu siğil benzeri çoklu lezyonlar şeklindeydi. Lezyonlardan deri örnekleri alınmış ve DNA ekstraksiyonu ve PCR analizi için Veteriner Teşkilatının ilgili laboratuvarına gönderilmiştir. Laboratuvar sonuçları yabani koyunda *Bulaşıcı Ektima (Orf) virüsünü* doğrulamıştır. Bu, Bamou Ulusal Parkı'ndaki yaban koyunlarında belgelenmiş ilk Orf raporudur.

Anahtar sözcükler: *Bamou Ulusal Parkı, Bulaşıcı Ektima, Yaban koyunu, PCR*

Introduction

Orf (contagious pustular dermatitis or contagious ecthyma) is one of the most widespread, contagious, communicable, zoonotic, economically important viral diseases caused by *Parapoxvirus* that is a genus of virus in the family Poxviridae, in the subfamily Chordopoxvirinae [1]. The disease has been recognized as an entity since the last century and was shown to be caused by a specific virus in 1923 [2]. Orf virus infections in humans typically occur when broken skin comes into contact with the virus from infected animals or contaminated equipment [3].

In general, in domestic animals, the disease is more severe in goat than sheep [4]. Transmission is by contact with affected animals or with contaminated objects or surfaces (fomites) [5]. Transmission probably follows a similar pattern in wild ungulates [3]. This virus primarily causes acute pustular lesion, where the severe oral and facial effects can be seen in goats rather than sheep [6]. Interestingly, the virus can also spread to other parts of the body such as the vulva, udder, under the tail and scrotal sac. In more severe cases, the skin of the eyes and feet also may be affected [7]. During outbreak, morbidity can approach 100% while mortality is usually less than 1%. However, mortality can increase by 20%~50% as a result of secondary bacterial infection, stress, immunosuppression or concomitant disease and may exceed 90% in case of malignant Orf [8].

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Fig 1. The location where the Infected lamb was found (Google Map. 2021)

The 486 km² Bamou (also transliterated as Bamoo or Bamu) National Park is in Fars Province, north-east of Shiraz. Established in 1967 and upgraded to National Park in 1970, it encompasses three parallel mountain ridges extending in an east-west direction and the hilly plains between. The flora comprises 350 vascular plant species, including 51 endemics and the fauna includes 143 species of vertebrates [9]. The western part of Bamu is separated by the Isfahan-Shiraz highway and its large mammalian fauna has been depleted by poaching. Only the eastern part (356 km²) is effectively protected [10].

In the present paper, described a clinical aspect of Contagious ecthyma infection in a wild sheep *(Ovis orientalis)* that had found by rangers in Bamou National Park.

Case History

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On July, 2021 Bamou National Park rangers, during the daily control of the protected area in one of the border areas of the park in the surrounding of The Bardej village, observed a three-month-old wild sheep lamb that was decubitus and agonized *(Fig.1)*. The rangers transferred the lamb to wildlife rehabilitation center at the entrance of the National Park. Unfortunately, the lamb died before reaching the rehabilitation center. The carcass of the lamb was examined and severe skin lesions including proliferative lesions, severely crusted wart-like multiple

Fig 2. Orf virus infection is evident lik scaby and proliferative lesions on the muzzle of the lamb

lesions and multifocal necrotic scabs on the muzzle, nose, between the eyes, ears, neck and coronary band and also inflammation of three joints in the forelimb and hindlimb were observed *(Fig. 2, Fig. 3, Fig. 4, Fig. 5, Fig. 6)*.

Despite of the daily protection and control of the whole area of Bamou National Park, in order to find more infected individuals and/or carcasses a more extensive surveillance was advised to the rangers of the National Park, especially in the border area of Park and the Bardej village. But during the 15 days of searching in the border areas, no other cases of the infected were found.

Fig 3. Severely crusted wart-like multiple lesions on the muzzle, nostril area and between eyes in the lamb

Fig 4. Proliferative lesions on the coronary bands of the lamb

Initially, several diseases like contagious ecthyma and foot and mouth disease were suspected as the primary possible diagnoses. Therefore, for differential diagnosis and sampling for diagnosis of the causative agent of the disease, the carcass of the lamb was sent to the Iran Veterinary Organization laboratory of Fars province where necropsy was performed and tissue sections were collected: joint fluid was collected aseptically and scabs were taken from lesions of lips and the muzzle of the lamb. For histopathological examination, tissue specimens were taken from the junction between normal skin and the lesions on the lips and muzzle and fixed in 10% buffered formalin. The samples were processed aseptically and then sent to collaborator laboratory of Fars Provincial Office of Veterinary Organization for DNA extraction by PCR tests.

During the necropsy, no specific internal lesions were detected. Standard bacteriological examination on blood agar plates was carried out on samples from joint fluid. The plates were incubated aerobically at 37.8°C and examined after 24-48 h. *Staphylococcus aureus* and *Streptococcus* spp. were isolated from samples of joint fluid.

Electron microscopy analysis from lesions revealed epithelial hyperplasia *(Fig.7)*, necrotic crusts and marked epidermal proliferation with elongated rete ridges covered by a thick crust. The affected epidermis showed multifocal ulcerations, intraepidermal covered by serocellular crust. Furthermore, hyperemia, diffuse infiltration of lymphocytes and variable amounts of neutrophils were found.

Fig 5. Growth of tumor-like lesions on the ear of the lamb

Fig 6. Multiple Arthritis seen in the wild lamb

Envelope membrane glycoprotein (B2L) gene of the orf virus was targeted using PCR assay as per the standard protocol described by Inoshima et al.[11]. The high pure PCR template preparation kit (Roche Company, Germany) was used for extracting DNA from 200 µL samples based on the manufacturer's guidelines. a set of three primer pairs in a semi nested PCR format was used. In the first PCR, a set of pan-parapox primer (PPP-1) and pan-parapox primer (PPP-4) primers was used to generate the product. In the semi nested PCR, a set of PPP-4 and PPP-3 was used. In the result, the analysis of the semi nested PCR revealed the confirmation of the Orf virus only in the scab samples collected from wild sheep.

Discussion

Since secondary bacterial contamination in Orf virus infection is common [12], some secondary bacterial infections like staphylococci, streptococci, fusobacterium, cornyebacterium and less often dermatophilius have been also recorded along with Contagious ecthyma on sheep and goats [13]. Therefore, isolation of *Staphylococcus aureus* and *Streptococcus* spp. from joint fluid of this case can be considered as a secondary infection and probably had happened due to the weakness of immune system of the lamb and also the long period of the virus infection.

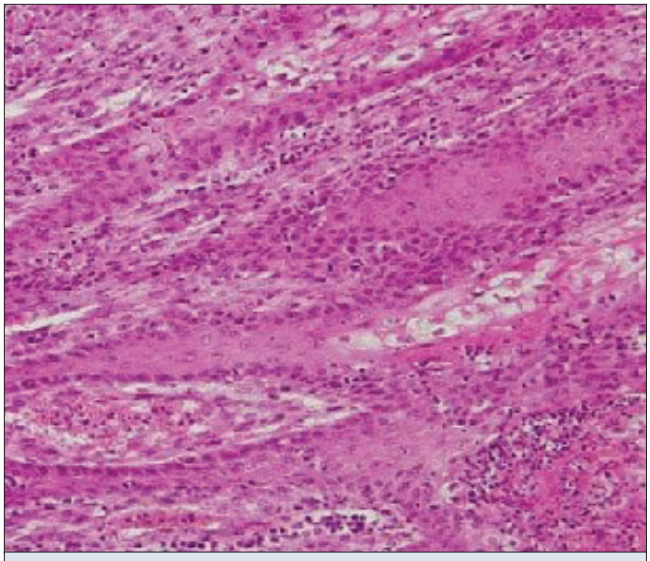

Fig 7. Histological appearance of Orf virus disease with epithelial hyperplasia

The disease is widespread in variety species of artiodactyls like alpacas, reindeer *(Rangifer tarandus),* Japanese serows *(Capricornis crispus),* musk oxen *(Ovibos moschatus),* bighorn sheep *(Ovis canadensis),* Sichuan takin *(Budorcas taxicolor tibetana),* deer, pronghorn *(Antilocapra americana)* and wapiti/elk *(Cervus canadensis),* and it is suspected to occur in some wild chamois *(Rupicapra rupicapra)* [3].

Contagious ecthyma infects a broad range of wild artiodactyls. The total confirmed species from order of artiodactyla in Fars Province of Iran comprises 6 species in 5 genera of 3 families living in different habitats that 4 out of these 6 species are present in Bamou National Park [14].

The virus is very resistant in the environment, particularly in dry atmosphere areas where the virus has been shown to be infective for up to 17 years [15], and no clinical disease in persistently Orf virus infected animals have also been described, and it is possible that such animals contribute to inter-epidemic survival of the virus. The lesions on such persistently infected animals may not be readily detected. Thus, apparently normal animals may have trivial lesions that are capable of being a source of infection for other fully susceptible animals [1]. Therefore, there are concerns about the possibility of disease transmission to susceptible species of the park.

Based on a research, fifty suspected clinical samples were analyzed in Fars province for the Orf DNA presence using PCR technique, and 50% positivity was shown [16]. Furthermore, one of the old problems in the way of protecting Bamou National Park that has never solved is the illegal grazing of livestock inside the protected area especially in areas where there are the borders of Park with human communities. To investigate the possibility of disease transmission from livestock to wild species, through a letter, we asked the Iran Veterinary Organization

of Fars province if there are any reports of this disease in the livestock of Bardej village or not and realized during last six months there were two reports of infected livestock by Contagious ecthyma in that village. So as a result, it can be said the presumption of disease transmission from livestock animals to the wildlife of Bamou National Park is high.

In conclusion, the domestic animals/wildlife interface is an important global problem and solving this requires to expansion studies on different aspect of interactions between wild and domestic animals. The transmission of infectious or some zoonotic diseases like contagious ecthyma due to frequent contact between humans, domestic and wild animals is becoming an issue of major interest. Reducing and eliminating the direct and indirect contact of domestic animals with wildlife species is probably the most effective and important way to prevent the transmission of infectious diseases.

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Conflict of Interest

The authors declared that there is no conflict of interest.

Ethical Approval

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