Outbreak of contagious ecthyma in camels (*Camelus dromedarius* and *Camelus bactrianus*) in Southwest Iran

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Keywords

Camelus dromedarius – *Camelus bactrianus* – Contagious ecthyma virus – *Parapoxvirus* – Epidemic – Iran Islamic Republic.

Summary

Camel contagious ecthyma (CCE) is a highly infectious viral skin disease of sheep, goats, and camels caused by a *Parapoxvirus*. This study reports an outbreak of CCE in a herd of 34 camels/dromedaries, with 24 infected animals. The infected animals exhibited severe papules on the lips and legs, increase in body temperature, profuse salivation, foul mouth smell, and facial edema. *Staphylococcus aureus* was identified in some samples. The morbidity and mortality rates were 70.6 and 6%, respectively. A supportive treatment was administered to the infected camels. Most of the camels recovered within three weeks. Skin analysis by the polymerase chain reaction revealed the presence of the B2L gene of the CE Kerman/2000 strain. This is the second report on the presence of CCE in Iran. As there is no vaccination program for camels against contagious ecthyma virus in Iran, this study may form the basis for establishing such a program.

■ INTRODUCTION

Contagious ecthyma (contagious pustular dermatitis or orf) is a worldwide common viral skin disease of farm and wild animals. It also affects humans where it represents an occupational hazard among people who handle infected animals. The epitheliotropic ecthyma virus infects damaged skin and replicates in epidermal keratinocytes (4, 6).

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Camels are economically important animals that are well adapted to arid climates. Two poxvirus major diseases, camel pox (*Orthopoxvirus*) and camel contagious ecthyma (CCE) (*Parapoxvirus*) can infect camels. These viruses can be differentiated by the polymerase chain reaction (PCR) (7, 8).

CCE has been reported in Mongolia (4), Kenya (10), Kazakhstan and Turkmania (3), Somalia (9), and Western Sudan (1). It is caused by a *Parapoxvirus* of the *Poxviridae* family that mostly affects young animals, but a few mature animals may also be affected (6). The disease is characterized by pustular and scabby lesions on the nostrils and lips; severe facial edema has also been reported. This disease can cause 9% mortality in young camels (7). It can also lead to losses in milk and meat production, labor, and skin quality. Nucleic acid hybridization techniques based on PCR are now widely used for the detection of many viruses, and two PCR assays have been reported to detect parapoxvirus infections (7, 8).

■ MATERIALS AND METHODS

Samples

Twenty-four of the 34 camels in the herd had been infected on May 2013, east of Ahvaz, Khuzestan Province. Skin lesion samples of the 24 camels suspected of CCE were tested with standard bacteriological examination on calf blood agar plates. An Iranian CE Kerman/2000 strain isolated on lamb testis (LT) cell cultures in its 60 passages was used as positive control (11). Uninfected LT cells and skin biopsies of unaffected camels were used as negative controls.

DNA extraction

Infected and uninfected cell suspensions as well as prepared biopsy samples were subjected to DNA extraction using the High Pure Viral Nucleic Acid Kit (Roche Diagnostics GmbH). According to the manufacturer's instructions, DNAs were extracted *via* specific binding on glass fibers in the presence of guanidium-HCl.

PCR

Total extracted DNA was used for PCR to amplify part of B2L gene. The specific oligonucleotide primers used were designed by Inoshima et al. (7). The primer sequences were 5' GTCGTCCACGATGAGCAGCT-3' (forward primer) and 5' TACGTGGGAAGCGCCTCGCT-3' (reverse primer).

One-microliter sample of each prepared genomic DNA was placed in a PCR mixture (25 μl) containing 1.5 mM MgCl2, 10X PCR buffer (2.5 μl), 0.2 μM of each oligonucleotide primer, 0.2 mM of each dNTP (Cinnagen, Iran) and 2 U of Taq DNA polymerase (Fermentas). The amplification reaction was performed in a DNA thermal cycler (Eppendorf). Temperature cycling for PCR was set at 94ºC for 3 min (one cycle), 94ºC for 1 min, 55ºC for 1 min, and 72ºC for 1 min. The whole cycle was repeated 35 times and was followed by setting the temperature at 72ºC for 10 min. Six microliters of the amplified product was electrophoresed in 1.5% agarose gel at 80 volts for 80 min using tris-borate-EDTA buffer. The DNA bands were visualized by ultraviolet transluminator after ethidium bromide (0.5 µl/ml) staining.

■ RESULTS

This outbreak of CCE in Khuzestan Province occurred in the only camel herd present there. Twenty-one of the affected animals were young, i.e. one to eight months old, and the remaining three were thus older than eight months. The affected animals had severe papules on the lips and legs, increased body temperature, profuse salivation, foul mouth smell, and facial edema (Figure 1). *Staphylococcus aureus* was identified in all the samples. The morbidity rate was 70.6% and mortality 6%. Lesions were rare in older camels. The two youngest camels died because of maggots of *Chrysomya bezziana*, secondary bacterial infection, and starvation due to mouth lesions.

The B2L gene of CE Kerman/2000 strain was amplified from the DNA sample of camel skin biopsy, generating the expected amplification product of 594 bp. No product was amplified from the DNA samples of the negative control (uninfected LT cell culture and normal skin biopsy; Figure 2).

The animals were treated with ivermectin (antibiotic and anti-inflammatory) to prevent myiasis caused by *C. bezziana* larvae as Gharib Mombeni et al. (5) reported the widespread distribution of this fly in the region. The animals were injected deep into the muscle with Pen-Strep 3+3 (three vials per body per day), Phenylbutazon 20% (dosage 2.5 mg/kg body weight) and 15 cc vitamin AD_3E for three days. Ivermectin 1% was injected 1 cc per 50 kg subcutaneously in one dose on the first day. The hematology showed an increase in the leukocyte count, reflecting the intensity of secondary bacterial infection. This infection was successfully controlled with penicillin/streptomycin.

■ DISCUSSION

The presence of an outbreak of CCE in Qum Province, north of Iran, was confirmed by Barani et al. in October 2009 (2). This is the second report indicating the presence of CCE in Southwest

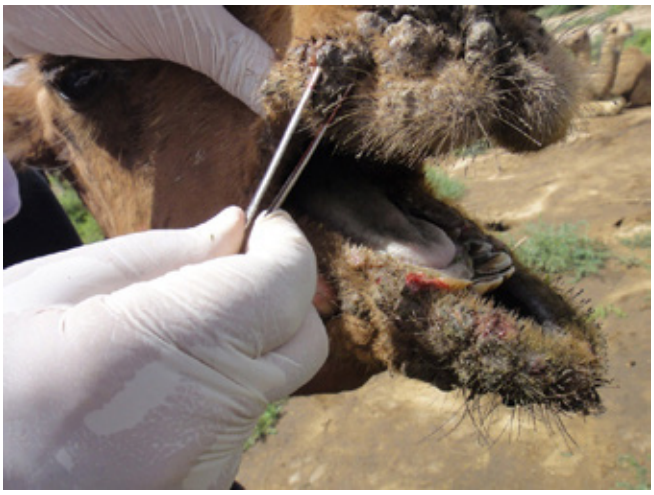

Figure 1: *Papules on the lips and nostrils of a camel due to contagious ecthyma disease.*

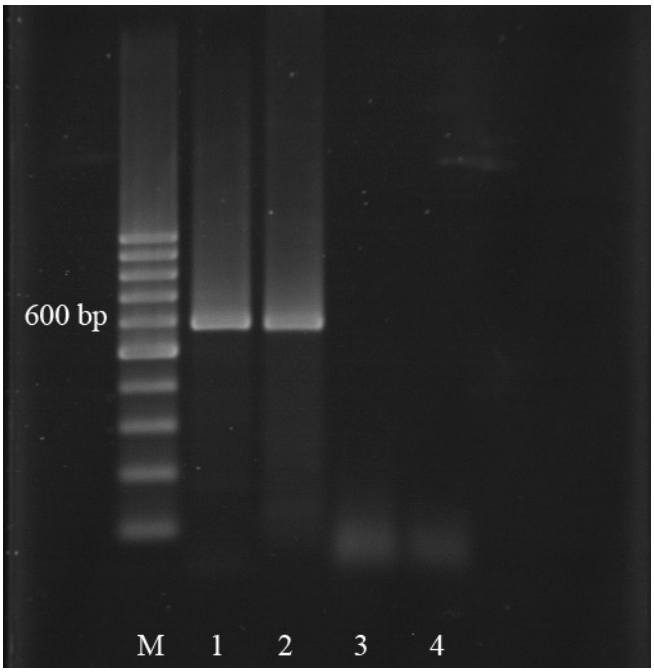

Figure 2: *Identification of camel contagious ecthyma virus. Lane M: 100 bp marker; Lane 1: Amplification of genomic lamb testis (LT) cell DNA infected with contagious ecthyma virus (CEV) Kerman/2000 strain; Lane 2: Amplification performed on skin biopsy of camel infected with CEV; Lane 3: Amplification performed on normal skin biopsy; Lane 4: Amplification performed on uninfected LT cell DNA.*

Iran; Hence, the disease is probably endemic in the country. The presence of sheep and goat herds affected with contagious ecthyma in these areas (6) probably has a strong incidence on the occurrence of CE in these camel herds. As myiasis is endemic in the region because of open wounds, the infected camels were treated with ivermectin to avoid infestation.

In conclusion, as there is no vaccination program against CE virus for camels in Iran, this study may form the basis for establishing such a program.

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REFERENCES

1. ALI O.A., KHEIR S.A.M., ABU DAMIR H.A., BARRI M.E.S., 1991. Camel (*Camelus dromedarius*) contagious ecthyma in the Sudan. A case report. *Rev. Elev. Méd. Vét. Pays Trop.*, **44**: 143-145.

2. BARANI S.M., VARSHOVI H.R., NIKJOU D., NIASARI-NASLAJI A., 2011. An outbreak of contagious camel ecthyma in dromedary and bactrian camel in Qom, Iran. In: 1st Int. Congr. Large animal practitioners, Tehran, Iran, 23-24 Feb. 2011, p. 173.

3. BUCHNEV K.N., TULEPBAEV S.Z., SANSYSBAEV A.R., 1987. Infectious diseases of camels in the USSR. *Rev. Sci. Tech. Off. Int. Epizoot.*, **6**: 487-495.

4. DASHTSEREN T.S., SOLOVYEV B.V., VAREJKA F., KHOKHOO A., 1984. Camel contagious ecthyma (pustular dermatitis). *Acta Virol.*, **28**: 122-127.

5. GHARIB MOMBENI E., MOUSAVI M.B., RANJBARAN I., CHANANI Z., HOSEINI M., DAVOUDI A., RAHNAMA A., SOLTANI SEDEH N., GHARIB MOMBEINI M., 2012. Prevention and treatment of contagious ecthyma in sheep and goat by goat-pox vaccine in Khuzestan Province, Iran. *Bull. Environ. Pharmacol. Life Sci.*, **1**: 69-72.

6. GHARIB MOMBENI E., GHARIB MOMBEINI M., KHALAJ M., MORADI GRAVAND M., REZAEI A.A., LAHIJANZADEH A., KENARKOHI M., MOLA S.A., HOSSEINI S.K., 2014. Management and control of an outbreak of fatal traumatic myiasis due to *Chrysomya bezziana* in a herd of Persian Fallow deer (*Dama dama mesopotamica*). *J. Vet. Sci. Technol.*, **5**: 157-160.

7. INOSHIMA Y., MOROOKA A., SENTSUI H., 2000. Detection and diagnosis of parapoxvirus by the polymerase chain reaction. *J. Virol. Methods*, **84**: 201-208.

8. KHALAFALLA A.I., BUTTNER M., RZIHA H.J., 2005. Polymerase chain reaction (PCR) for rapid diagnosis and differentiation of *Parapoxvirus* and *Orthopoxvirus* infections in camels. In: Makkar Harinder P.S., Viljoen G.J., Eds, Applications of gene-based technologies for improving animal production and health in developing countries. Springer, eBook, p. 735-742.

9. MOALLIN A.S.M., ZESSIN K.H., 1988. Outbreak of camel contagious ecthyma in Central Somalia. *Trop. Anim. Health Prod.*, **20**: 185-186.

10. MUNZ E., SCHILLINGER D., REIMAN M., MAHNEL H., 1986. Electron microscopical diagnosis of ecthyma contagious in camels (*Camelus dromedarius*). First Report of the disease in Kenya. *J. Vet. Med.*, **33**: 73-77.

11. VARSHOVI H.R., GHORASHI S.A., HAGHIGHI S., HEDAYATI Z., SARMAST R., AGHAEBRAHIMIAN M., 2005. Isolation and identification of contagious ecthyma (orf) in Iran. In: Int. Symp. World Association of Veterinary Laboratory Diagnosticians, 16-19 Nov. 2005, Montevideo, Uruguay.

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Résumé

Gharib Mombeni E., Gharib Mombeini M., Varshovi H.R., Khalaj M., Kenarkohi M., Goudarzi M., Mousavi Nasab S.M.
Foyer d'ecthyma contagieux chez le chameau (*Camelus dromedarius*) et le dromadaire (*Camelus bactrianus*) dans le sud-ouest de l'Iran

L'ecthyma contagieux du chameau (ECC) est une maladie de peau très contagieuse des ovins, des caprins et des chameaux causée par un *Parapoxvirus*. Cette étude rapporte une épidémie d'ECC dans un troupeau de 34 chameaux/dromadaires, dont 24 étaient infectés. Les animaux malades ont présenté des lésions papuleuses importantes sur les lèvres et les pattes, une augmentation de la température corporelle, un ptyalisme, une halitose et un œdème facial. *Staphylococcus aureus* a été identifié dans certains échantillons. Les taux de morbidité et de mortalité ont été respectivement de 70,6 et de 6 p. 100. Les chameaux infectés ont reçu un traitement de soutien. La plupart des chameaux se sont rétablis dans les trois semaines. L'analyse de la peau par la réaction de polymérisation en chaîne a mis en évidence la présence du gène B2L de la souche CE Kerman/2000. Il s'agit de la deuxième mention de la présence d'ECC en Iran. Comme il n'y a pas de program de vaccination pour les chameaux contre le virus de l'ecthyma contagieux en Iran, cette étude pourrait servir de base pour établir ce type de programme.

Mots-clés : *Camelus dromedarius* – *Camelus bactrianus* – Virus ecthyma contagieux – *Parapoxvirus* – Epidémie – Iran République islamique.

Resumen

Gharib Mombeni E., Gharib Mombeini M., Varshovi H.R., Khalaj M., Kenarkohi M., Goudarzi M., Mousavi Nasab S.M.
Brote de ectima contagioso en camellos (*Camelus dromedarius* y *Camelus bactrianus*) en el sur oeste de Irán

Ectima contagioso en camellos (ECC) es una enfermedad viral de la piel altamente contagiosa en ovejas, cabras y camellos, causada por un *Parapoxvirus*. El presente estudio reporta un brote de ECC en un hato de 34 camellos/dromedarios, con 24 animales infectados. Los animales infectados presentaron pápulas severas en los labios y patas, aumento de la temperatura corporal, salivación profusa, mal aliento y edema facial. *Staphylococcus aureus* fue identificado en algunas muestras. Las tasas de morbilidad y mortalidad fueron de 70,6 y 6% respectivamente. Un tratamiento de soporte se administró a los camellos afectados. La mayoría de los camellos se recuperaron en tres semanas. El análisis de la piel mediante reacción de polimerasa en cadena reveló la presencia del gen B2L de la cepa CE Kerman/2000. Este es el segundo reporte sobre la presencia de ECC en Irán. Dado que no hay programa de vacunación para camellos contra el virus de ectima contagioso en Irán, el presente estudio puede servir como base para establecer dicho programa.

Palabras clave: *Camelus dromedarius* – *Camelus bactrianus* – Virus ectima contagioso – *Parapoxvirus* – Epidemia – Iran República islámica.