Contagious ecthyma outbreak among goats at Nilgiri hills

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ABSTRACT
Contagious ecthyma is a highly contagious viral disease of sheep and goats, caused by *Parapoxvirus*. In the present outbreak over a range of 3 km radius in a hamlet near Ooty town in the Nilgiris hills, a total of 174 out of 194 non-descript goats were clinically affected with the symptoms of pyrexia (40°C), anorexia, depression, proliferative scab lesions on the skin around the mouth, oral commissures and nostrils. The morbidity rate was 89.7% without mortality. The symptoms were suggestive of contagious ecthyma. The disease was confirmed by agar gel immunodiffusion test, counter immunoelectrophoresis, and by polymerase chain reaction. Affected goats were treated with antibiotics, anti-pyretic, anti-inflammatory and vitamin B complex injections parenterally. Commercially available herbal topical spray (Topicure®) and/or neem leaf and turmeric paste was applied to alleviate the skin lesions. Affected goats were recovered in 4 to 5 weeks. This paper reports the first incidence of contagious ecthyma outbreak in goats during rainy season of the year in high altitude (the Nilgiri hills), Tamil Nadu.

Key words: Contagious ecthyma, Goats, High altitude, Polymerase chain reaction.

Contagious ecthyma virus (CEV) or Orf disease virus, a member of the genus *Parapoxvirus*, family *Poxviridae* produces proliferative ulcerative stomatitis mainly in sheep and goats. CEV causes specific infectious disease of skin and stratified epithelium for which the sheep is the usual host, but it also produces natural infection in goats and accidental infections in man (Garrido-Farina et al., 2008). The disease is prevalent worldwide, causing high morbidity (80%) and low mortality (5-10%) with massive economic loss to sheep and goat farming (Gokce et al., 2005; Vikoren et al., 2008). This disease is enzootic in India, causing high morbidity in sheep and goats. Though it is easy to diagnose, the lesions and symptoms confounding with other skin diseases require laboratory confirmation, which includes serological and nucleic acid-based techniques (Venkatesan et al., 2012). The disease had zoonotic significance and causes contagious pustular dermatitis in humans (Garrido-Farina et al., 2008; Tryland et al., 2013), usually most common among people who are in close contact with affected animals, such as herdsmen, veterinarians, butchers and abattoir workers, particularly those who handle hides and wool (Centre for Food Security and Public Health, 2007). This paper describes an outbreak of contagious ecthyma among non descriptive goats at Nilgiri hills of Tamilnadu.

Geographical location of the outbreak: The present outbreak was seen in a hamlet of colony, 7 km from Ooty town, The Nilagiri hill, Tamil Nadu, India. A total of 174 out of 194 non-descript goats with the symptoms of pyrexia (40°C), anorexia, depression, proliferative scab lesions on the skin around the mouth, oral commissures and nostrils (Fig 1) observed during the rainy season (June-July, 2014). In a flock, all age include kid to older one and both sexes were affected. Affected goats were treated with antibiotics, anti-pyretic, anti-inflammatory and vitamin B complex injections parenterally. Commercially available herbal topical spray (Topicure®) and/or neem leaf and turmeric paste was applied to alleviate the skin condition.

Collection of samples: Clinically affected goats (n=25) were randomly selected, from which scab materials in 10% glycerol saline and blood samples collected. Blood samples were also collected 30 days after the outbreak from the same goats. Samples were transported on ice to the Vaccine Research Centre-Viral Vaccines (VRC-VV), Centre for Animal Health Studies (CAHS), Tamil Nadu Veterinary and Animal Sciences University (TANUVAS), Chennai and stored at -20°C until use.

Serology: The scab material was washed thrice in sterile phosphate buffered saline (PBS, pH 7.2), minced and triturated in sterile PBS and made into 10 per cent (w/v) suspension and screened by counter immunoelectrophoresis (CIE) for the detection of CEV using known serum for contagious ecthyma.
Sera (paired) sample were subjected to quantitative agar gel immunodiffusion test (QAGID) using known contagious ecthyma antigen available at VRC-VV, CAHS, TANUVAS, Chennai, to confirm rise of antibody titre in the recovered goats.

**Polymerase chain reaction:** Viral DNA was extracted from 10% suspension of scab materials by phenol-chloroform method as described by Ramesh et al. (2008).

Polymerase chain reaction (PCR) was performed following Ramesh et al. (2009). The extracted DNA was subjected to PCR using CEV specific primers which flanks a 140bp sequence (forward primer: 5’ CGC AGA CGT GGC TGA CGT 3’ and reverse primer: 5’ TGA GCT GGT TGG CGC TGT CCT 3’). The PCR cycling condition was one cycle of 94°C for 12 minutes followed by 40 cycles of 94°C for 30 seconds and 68°C for 45 seconds and final soaking at 4°C in a thermal cycler (Eppendorf Master cycler). The PCR amplified products were examined 2% agarose gel containing ethidium bromide.

**Clinical disease:** During the outbreak, non-descriptive goats (174 out of 194) were affected irrespective of their age and sex with high morbidity (89.7%) without mortality (Table 1), with the symptoms of pyrexia (40°C), anorexia, depression, proliferative scab lesions on the skin around the mouth and nostrils (Fig 1).

**Detection of the disease by CIE/AGID test:** Although scab samples were found positive using known positive CEV antiserum but it was not considered as confirmatory diagnosis, because some poxviruses may show share antigenicity with *Parapoxvirus* (Parimal Roy et al., 2008). Serum samples collected during the viraemic stage of infection showed no antibodies by AGID test. However, second collection of serum samples (one month after the outbreak) from the same goats showed the presence of antibodies against *Parapoxvirus* with mean QAGID titre of $2^4$.

**Polymerase chain reaction:** Pooled scab materials when screened with CEV specific primers there was specific amplification of target gene of expected size 140bp (Fig 2).

![MW - 100bp Molecular weight marker; L1 - CEV negative control; L2 - CEV suspected scab sample; L3 - CEV positive control](image)

**Fig 2:** Agarose gel electrophoresis showing PCR amplicon of CEV from suspected scab sample

Contagious ecthyma virus infection and disease was observed among non-descriptive goats reared near Ooty of Nilgiri hills in India. Although climatic temperature was cold but the disease appeared resulting in 98% morbidity but no mortality. *Parapoxvirus* causes proliferative skin lesions in progression from papules to pustules and then thick scab or crust in the mucous membranes of lips, muzzle and nostrils (Sivaseelan et al., 2005; Ramesh et al., 2009). The symptom observed during present outbreak was suggestive of contagious ecthyma. The prevalence of the disease was detected by CIE test and further confirmed by PCR. There was certain increase in specific antibody titre which indicated...

**Fig 1:** Proliferative scab lesions on the skin of lips, muzzle and nostrils

**Table 1:** Morbidity (%) of contagious ecthyma in non-descript goats at high altitude (Nilgiri hills, Tamil Nadu)

<table>
<thead>
<tr>
<th>Age</th>
<th>Area of skin affected</th>
<th>Secondary bacterial infection</th>
<th>Number</th>
<th>% Morbidity</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;6 months (n=27)</td>
<td>mouth, oral commissures and nostrils</td>
<td>Mild in few cases</td>
<td>27</td>
<td>100</td>
</tr>
<tr>
<td>6 months – 1 year (n=123)</td>
<td>mouth, oral commissures, nostrils, ears and neck</td>
<td>Severe</td>
<td>107</td>
<td>87</td>
</tr>
<tr>
<td>&gt;1 year (n=44)</td>
<td>mouth, oral commissures, nostrils, ears and neck</td>
<td>Severe</td>
<td>40</td>
<td>91</td>
</tr>
<tr>
<td>Total (n=194)</td>
<td></td>
<td></td>
<td>174</td>
<td>89.7</td>
</tr>
</tbody>
</table>
that animals were susceptible and evoked immune response following infection. This result warrants vaccination to protect the animals in endemic areas.

Contagious ecthyma is a disease of sheep and goats maintained in tropical regions of hot and humid climate but in the present study the disease was recorded in a small village near Ooty, a town located 2400m above mean sea level at the meeting point of Western and Eastern Ghats in the southern peninsula of India. The town Ooty extends over an area of 2545.4sq.km on the Nilgiris hills and the highest peak measures 2892 m above mean sea level. The total annual rain fall in the region has been recorded is 1155.5mm and the mean temperature ranges from a minimum of 6.5°C to a maximum of 20.9°C (Venkataramanan and Vasu, 1982). The outbreak was observed in rainy season when climatic temperature was cold.

Earlier CE was recorded in small flocks (Hosamani et al., 2007; Dey and Kundu, 2009) and impact of the disease could not be studied well. In the present study, 194 goats out of 197 goats were (98%) affected. The high morbidity might be due to close confinement and grazing over the same pasture land, contagious nature and air-borne spread of the virus. This observation underscores the infectious nature of the virus and its impact in goat heath as it leads to great economic loss to the farming community due to debilitation and loss of body weight, and deprived quality of the skin.

Most uncomplicated infections resolve in 1 to 4 weeks. In the present outbreak, all age group goats were affected. But, no death was recorded, because the symptomatic treatment was given at the correct time with antibiotic, anti-pyretic, anti-inflammatory and vitamin B injections parenterally. Complete recovery was reported in 30 days. The spread of infection was controlled by advising to isolate the unaffected goats from affected goats, and providing symptomatic treatment to the affected goats. Only goat in the close confined area were affected, but not spread to neighbouring areas. Usually it spreads and occurs during summer season, but in this report it occurred during rainy season. From where the goats picked up the infection was not clearly known, but air-borne transmission of this infection was restricted and foci of infection was only over the range of 3 km radius, because of the rainy season. Animal handlers were also advised to handle with protective measures, because contagious ecthyma is one of the zoonotic diseases. Fortunately no human case was reported though more number of goats was affected in that area.

CONCLUSIONS

In summary, goats of all ages include kid to older one and both sexes were affected with the symptoms of pyrexia (40°C), anorexia, depression, proliferative scab lesions on the skin around the mouth and nostrils with 89.7% morbidity. Secondary bacterial infection was prevented by providing symptomatic treatment with anti-pyretic, anti-inflammatory and vitamin B injections parenterally, and applied commercially available herbal topical spray (Topicure®) and/or neem and turmeric paste over the skin lesions to alleviate skin condition. Affected goats were recovered in 4 weeks without any mortality. It was identified through rise in antibodies in paired sera by QAGID and detection of CEV in scab materials by CIE. It was confirmed by PCR using specific primer which flanks a 140bp sequence gene of CEV. Prevention of CE in domestic goats in this geographical location has to be initiated to prevent the spread of CEV to wild Nilgiri tahr in future.

It is concluded that occurrence of contagious diseases is very rare and not commonly reported at high altitude. An outbreak of contagious ecthyma in indigenous non-descript goats is reported in high altitude (Nilgiri hills) during rainy season of the year (June-July, 2013) for the first time in Tamil Nadu.

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