

GENERALIZED MUSCULAR COENUROSIS AND CONCURRENT COCCIDIOSIS IN A YOUNG KID: A CASE REPORT

S. SARAVANAN*, T. MOHANAPRIYA and R. RAMPRABHU

Department of Veterinary Medicine, Veterinary College and Research Institute,
Tamil Nadu Veterinary Animal Sciences University, Tirunelveli-627 358, India

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SUMMARY

A four months old kid exhibited the signs of puffed appearance throughout the body, lethargy and mild diarrhoea. Examination of fluid from the swellings confirmed coenurosis in several muscular regions and the faecal examination revealed *Eimeria* spp. Haemato-biochemical analysis revealed mild anaemia, haemoglobinemia, lymphopenia, leukocytosis associated with neutrophilia, increased blood urea nitrogen and hypophosphatemia. The case was treated with fenbendazole and sulphadimidine and completely recovered from intestinal coccidiosis. However, the kid didn't respond to the anthelmintic and succumbed to severe coenurosis.

Keywords: Coccidiosis, Fatal outcome, Goat, Muscular coenurosis

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Coenurosis is a parasitic disease of economic significance in livestock especially small ruminants. Non-cerebral or muscular coenurosis is caused by *Coenurus gaigeri*, the larval stage of the tapeworm, *Taenia gaigeri* (Schuster *et al.*, 2010 and Sharma *et al.*, 2020) and is frequently reported in musculature of sheep and goats and rarely in visceral organs like lungs (Sami *et al.*, 2014 and Christodouloupoulos *et al.*, 2015). These extra-cerebral forms are mostly asymptomatic being detected only at slaughter (Oryan *et al.*, 2015).

Coccidiosis in small ruminants is an important clinical or subclinical disease associated with significant economic losses. The most pathogenic species of *Eimeria* in goats are *E. christenseni*, *E. arloingi*, *E. caprina*, and *E. ninakohlyakimovae*, which can cause anaemia, diarrhoea, rough hair coat, poor weight gain and weakness (Khodakaram-Tafti and Hashemnia, 2017).

In previous report, non-cerebral coenurosis was recorded mostly in two to three muscular regions without seriously affecting the life of the animals and death was rarely recorded, unless there has been concurrent involvement of visceral organs like brain (Godara *et al.*, 2011). Hence, the present study reports a case of generalized muscular coenurosis and concurrent clinical coccidiosis in a goat with fatal outcome.

A four month old non-descriptive kid was presented to Veterinary Clinical Complex, Veterinary College and Research Institute, Tirunelveli with the signs of lethargy, puffed appearance or large swellings throughout the body and semi-solid faeces. However, the case had a history of partial inappetence with no other clinical signs and no anthelmintic treatment. Careful observation revealed

palpable diffuse swellings of variable sizes with approximately 2×4 cm in head and 5×10 cm in body and limbs (Fig. 1a, 1b and 1c). All the vital parameters were within range. The fluid from the cutaneous swellings was carefully aspirated for microscopic examination. Faecal and blood samples were collected for parasitic examination and haemato-biochemical analysis, respectively.

Macroscopic appearance of cystic fluid revealed presence of white scolices and microscopic examination revealed multiple scolices which had four suckers and a rostellum armed with characteristic taenid hooks (nearly 24) arranged concentrically (Fig. 2a and 2b). The handle of the small hooks was straight but with a slight convexity on the dorsal side in the non-cerebral parasitic stages (Fig. 2c). The cyst could be identified as *C. gaigeri* as the morphological findings are in accordance with that of Oge *et al.* (2012) and Christodouloupoulos *et al.* (2016). Microscopic examination of the faeces revealed oocysts of *Eimeria* spp. (++) which was identified based on the morphological characters (Soulsby, 1982).

In this study, coenurosis was observed in muscles of several regions which involved periorbital region, below the ears, cheek, neck, prescapular, shoulder, dorsum, hip, femoral, sternum, lower abdomen, inner thigh muscles. Previously, Saravanan and Kumar (2016) observed multiple muscular coenurosis in other body regions like submandibular, thoracic, behind the sternum, prescapular and intercostal muscles in a goat. Mostly non-cerebral coenurosis was recorded by previous authors in muscles and subcutaneous tissues of two or three sites involving head, neck, thoraco-lumbar muscles or thigh muscles in goats (Sami *et al.*, 2014, Rao *et al.*, 2018 and Rashmi *et al.*, 2018). Occasionally, a fatal case of non-cerebral coenurosis

*Corresponding author: sarvet.25@gmail.com



Fig. 1. (a, b & c) Localization of cysts on various parts of the skeletal muscles with puffed-up appearance in the affected kid and semisolid consistency of the voided dung



Fig. 2. (a & b) Multiple scolices of *C. gaigeri* which had four suckers and a rostellum armed with taeniid hooks under microscopic examination of the cystic fluid (40X); (c) Small hooks with straight handle and a slight convexity on the dorsal side in the non-cerebral coenuri caused by *C. gaigeri*, under microscopic examination of the cystic fluid (40X)

caused by *T. gaigeri* was reported in an Anglonubian goat in Oman, with the involvement of muscles and visceral organs like parotid salivary gland, pancreas and adrenal gland (El Sinnary *et al.*, 1999).

In this study, haematological examination revealed a reduction in red blood cells (4.25 million/cmm), haemoglobin (6.9g/dl), and increase in white blood cells (50,800/cmm), lymphocytes (26%) and neutrophils (68%). Whereas, packed cell volume (25.2%), monocytes (1%), eosinophils (5%), and platelets (3.87 lakh/cmm) counts were found to be within normal range. Ghanem and Abd El-Raof (2005) and Anumol *et al.* (2012) also recorded a significant reduction in erythrocyte count and haemoglobin level, and a significant increase in leucocyte count in caprine and ovine coccidiosis. However, the leukocytosis was reported to be associated with lymphocytosis in caprine coccidiosis (Anumol *et al.*, 2012) and neutrophilia in ovine coccidiosis (Ghanem and Abd El-Raof, 2005). Anaemia and low haemoglobin level could be attributed to loss of epithelial cells, erosion and ulceration caused by first generation meronts (Ghanem and Abd El-Raof, 2005). Neutrophilia and thereby leukocytosis might be due to the cell mediated immune response associated with epithelial invasion of *Eimeria* spp. (Rakhshandehroo *et al.*, 2013). The lymphocytopenia observed in this study might be due to lymphocyte depletion and atrophy of the Peyer's

patch follicles (Aleksandersen *et al.*, 2002).

Serum biochemical analysis showed increased blood urea nitrogen (66 mg/dl) and decreased phosphorous (3.1 mmol/dl) levels. These changes could be due to the malnutrition (Saravanan *et al.*, 2019) or poor absorption of nutrients, associated with intestinal coccidiosis. Whereas, creatinine (0.9 mg/dl), glucose (68 mg/dl), total proteins (6.6 g/dl), albumin (3.8 g/dl), SGOT (68.0 IU/dl), SGPT (15.0 IU/dl), alkaline phosphatase (60.0 IU/dl), calcium (9.2 mmol/dl), magnesium (3.4 mmol/dl), sodium (132.5 mmol/dl) and chloride (97.0 mmol/dl) levels remained within normal range. In contrast, Ghanem and Abd El-Raof (2005) recorded a significant increase in serum ALT, AST and ALP concentrations associated with liver involvement in caprine coccidiosis. Previous authors reported no significant difference in the values of biochemical values in goats affected with non cerebral coenurosis when compared to uninfected (Christodoulopoulos *et al.*, 2015).

Surgical removal was not attempted due to localization of the cysts in several muscular regions. Hence, the case was treated with fenbendazole (Fentas plus® containing fenbendazole and praziquantel) @ 50 mg/kg b.wt. once orally. Previous authors also suggested fenbendazole or albendazole @ 50mg/kg for non-cerebral coenurosis (Constable *et al.*, 2017) though no specific

therapeutic strategies have been recommended yet (Oryan *et al.*, 2014) and fenbendazole @ 50mg/kg with praziquantel @ 50-500mg/kg as effective regimen for cerebral coenurosis (Gazaei, 2007).

For coccidiosis, sulphadimidine @ 140mg/kg BW, I/V (Constable *et al.*, 2017), intravenous fluids and oral haematinics were administered for 5 days. The faecal sample when examined on day 5 post treatment, appeared to be with normal consistency and microscopic examination revealed no oocysts of *Eimeria* spp. However, no recovery was noticed and the kid still appeared lethargic due to the pain in most of the skeletal muscles. The kid was reported to be in recumbency and died within few days, which might presumably be due to muscular degeneration, necrosis and pain with lameness, paresis and paralysis or atrophy and impaired function of any organs like lungs, kidney or diaphragm (Oryan *et al.*, 2014).

In conclusion, in non-cerebral coenurosis, clinical signs are not generally observed during antemortem examination and there could be a fatal outcome associated with spread of coenuri in various muscular regions due to severe infections. Hence, as a measure of prevention of coenurosis, goats should be prevented from access to the pasture contaminated with faeces of stray dogs or untreated dogs and the offals of sheep/goat should not be made available for dogs. Further, strategic anthelmintic treatment of dogs might definitely break the life cycle of the taeniid worms, aiding in control.

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