

Wound and gastric myiasis due to *Chrysomya bezziana* and *Cobboldia elephantis* and its pathological lesions in wild elephants in the Nilgiris hills of Tamil Nadu

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Abstract Thirty-five years old female and 12 years old male wild elephant were found dead at Seviyodu and Cherangode of Cherambadi range at Nilgiris district, Tamil Nadu state. On post mortem examination, maggots were recovered from palate of oral cavity and gastric mucosa of the stomach and identified as *Chrysomya bezziana* and *Cobboldia elephantis*, respectively. Histopathology of oral tissue specimen revealed myonecrosis of soft palate due to myiasis and cross section of encysted larvae surrounded by fibrous capsule and inflammatory cells. This study reports the mixed infection of wound and gastric myiasis due to *C. bezziana* and *C. elephantis* and its histopathological lesions in wild elephants.

Keywords Wild elephant · Myiasis · *Chrysomya bezziana* · *Cobboldia elephantis* · Gross · Histopathology

Introduction

Myiasis is a condition caused by laying of eggs by dipteran flies (Zumpt 1965; Hall and Wall 1995). In Elephants, gastric myiasis is caused by *Cobboldia elephantis* which is responsible for causing severe gastritis (Fowler and Mikota 2006). *Chrysomya bezziana* is an obligate parasite of

mammals which causes wound myiasis (Urech et al. 2012). In India, *C. elephantis* was reported in Tamil Nadu (Joseph et al. 1987), Assam (Raquib 1970; Datta et al. 1972; Chakraborty et al. 1994), Orissa (Panda et al. 2005), Kerala (Kakkassery et al. 2011), Andhra Pradesh (Venu et al. 2013) and Karnataka (Ananda et al. 2017). In Abroad, Matsuo and Suprahman (1997) and Sanyathitserree et al. (2009) reported in Indonesia and Kanchanaburi Province, respectively. This paper reports the wound and gastric myiasis due to *C. bezziana* and *C. elephantis* and its pathological lesions in wild elephants in the Nilgiris hills of Tamil Nadu.

Materials and methods

Two wild elephants (25 years old female and 12 years old male) were found dead at Seviyodu and Cherangode of Cherambadi Range, Nilgiris district, Tamil Nadu state. In both the cases, maggots were observed in the oral cavity (palate area) and also in the gastric mucosa of the stomach. The maggots were collected and preserved in 10% formalin. The maggots were boiled in 10% sodium hydroxide and then dehydrated in ascending grades of alcohol, cleared in carbolic acid and then mounted in Canada balsam for identification (Zumpt 1965; Soulsby 1982).

Tissues from oral wound were collected in 10% formal saline and were kept for 24 h for proper fixation. The fixed samples were dehydrated in ascending grades of alcohol, hardened, cleared, embedded in paraffin and sectioned at 5 µm thicknesses for light microscopy and stained with haematoxylin and eosin (H&E) following standard histopathological procedures (Stevens and Wilson 1996).

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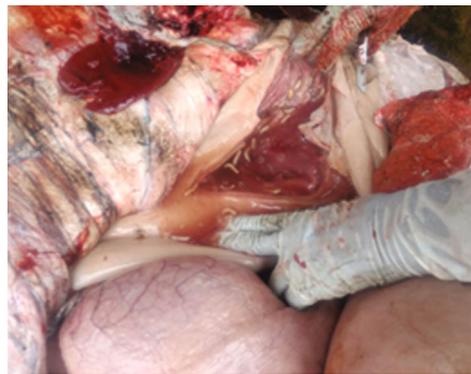
Results and discussion

On post mortem examination of female elephant showed wound and severe damage on hard and soft palate, fracture of mandible bone and sloughed off tooth (last two molar) while handling due to decaying. Pus was found to be filled up to head and sinus cantor. Left tush found to be missing t and only cavity was noticed. Similarly, male elephant showed complete fracture of mandible and detached easily while handling. Wound and severe tissue damage were observed in the palate. Both male and female elephant carcasses showed huge

number of maggots in palates of oral cavity and in the gastric mucosa (Figs. 1a, 2a).

The larvae from the oral cavity and stomach were identified as *C. bezziana* and *C. elephantis*, respectively. An average of 127 *C. bezziana* from oral cavity and 322 *C. elephantis* from stomach were collected from the elephant carcass. In the present study both *C. bezziana* and *C. elephantis* were observed in free range wild elephant. Whereas, Panda et al. (2005), Sanyathitiseree et al. (2009), Venu et al. (2013) and Ananda et al. (2017) also reported the larvae of *C. elephantis* from the stomach of a free range wild elephant from various parts of country.

Fig. 1 Plate 1



a *Cobaldia elephantis* larvae in the stomach of wild elephant



b *Cobaldia elephantis* larvae



c *Cobaldia elephantis*-cuticle of larva



d *Cobaldia elephantis* larva - anterior end



e *Cobaldia elephantis* larva - anterior end



f *Cobaldia elephantis* larva - posterior spiracle

Fig. 2 Plate 2



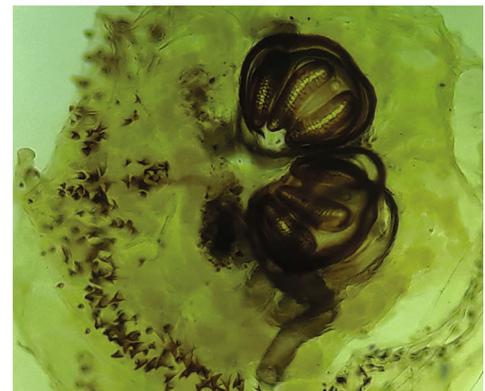
a *Crysomia bezziana* larvae in the oral cavity - soft palate region



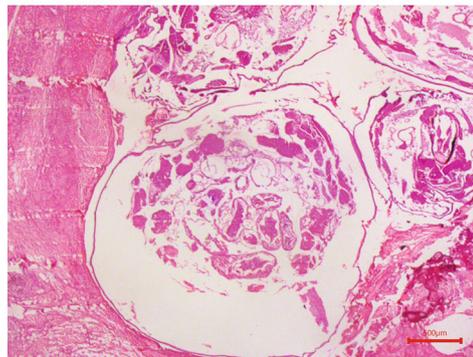
b *Crysomia bezziana* larvae



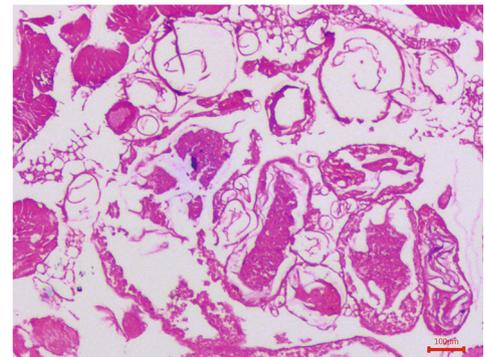
c *Crysomia bezziana* larva - anterior end



d *Crysomia bezziana* larva - posterior spiracle



e Myonecrosis due to myiasis-softpalate-cross section of larvae encysted by fibrous capsule and inflammatory cells.



f Myonecrosis due to myiasis-softpalate-cross section - magnified view of larval internal organs

Cobboldia elephantis larvae were identified with presence of triangular shaped spines on the abdominal segments and powerful two oral hooks with cephalopharyngeal skeleton at the anterior end. Anterior spiracle has 13 fingers like projection and the posterior spiracle has three longitudinal parallel slits with oval shaped spiracle (Fig. 1b–f). *Chrysomya bezziana* larvae were identified based on the presence of oral hooks with cephalopharyngeal skeleton at anterior end. It has 13 numbers of fingers like projections at

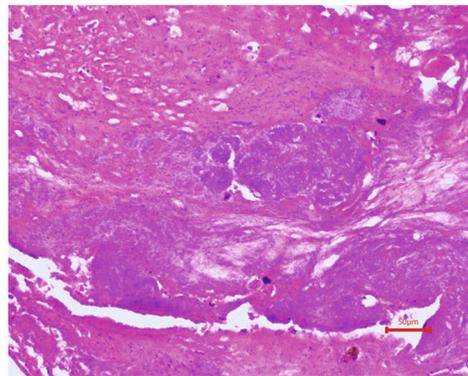
anterior spiracle. The abdominal segments covered with hooks. Posterior spiracle has incomplete peritreme and indistinct button (Fig. 2b–d).

Tissue infected with *C. bezziana* showed severe necrosis whereas, the stomach infected with *C. elephantis* showed severe congestion which was similar to that of Ananda et al. (2017) who reported severe congestion of stomach due to *C. elephantis*.

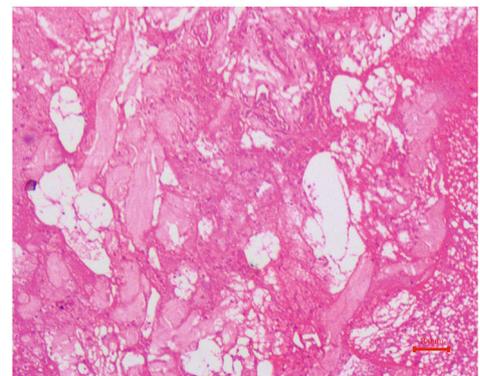
Affected male and female elephants showed off feed and roaming without taking feed due to presence of painful necrotic oral myiasis wound for more than 15 days and then laid down on the floor and died before attempting treatment. In the present study, the presence of oral wound was due to fire crackers (landmine) kept to control wild pig which was accidentally eaten by the wild elephants.

On histopathological examination of oral tissue specimen revealed myonecrosis of soft palate due to myiasis and cross section of encysted larvae surrounded by fibrous capsule and inflammatory cells were noticed (Fig. 1e, f). Colonies of bacteria in clumps among the necrosed tissue, diffuse necrosis, serofibrinous exudate and massive infiltration of inflammatory cells in between the myofibrils were noticed. Few of the sections revealed granulomatous

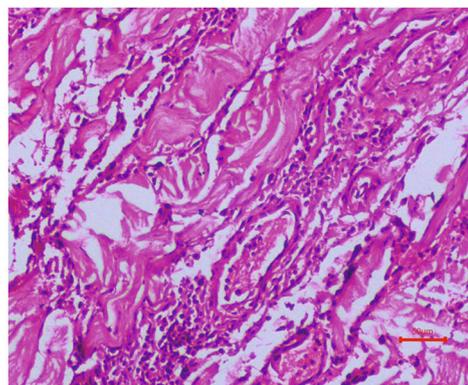
Fig. 3 Plate 3



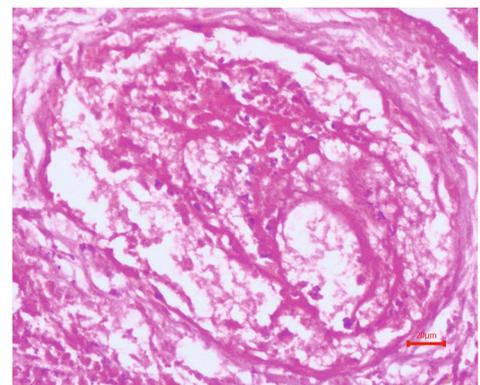
a Myonecrosis due to myiasis-softpalate-colonies of bacteria in clumps among the necrosed tissue



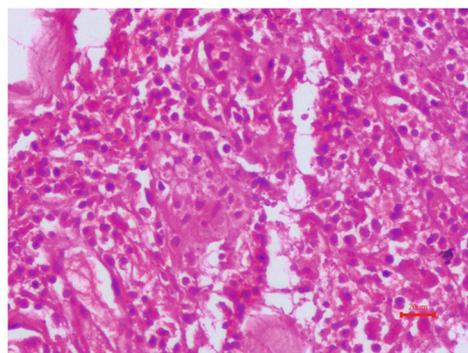
b Myonecrosis due to myiasis-softpalate-diffuse necrosis and serofibrinous exudate and massive infiltration of inflammatory cells



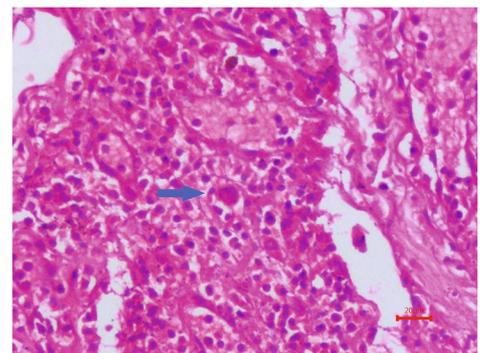
c Myonecrosis due to myiasis-softpalate-infiltration of inflammatory cells in between the myofibrils



d Myonecrosis due to myiasis-softpalate-phlebitis - infiltration of inflammatory cells



e Granulomatous myonecrosis due to myiasis-softpalate-infiltration of mononuclear cells and epithelioid cells



f Granulomatous myonecrosis due to myiasis-softpalate-infiltration of mononuclear cells, epithelioid cells and giant cell formation (arrow)

myonecrosis with infiltration of mononuclear cells, epithelioid cells and giant cell formation (Fig. 3a–f).

Conclusion

Mixed infection of wound and gastric myiasis due to *C. bezziana* and *C. elephantis* and its pathological lesions in wild elephants in the Nilgiris hills of Tamil Nadu was found to be the first report.

Author's contribution C. Soundararajan: Processing of samples, literature collection, typing and preparation of manuscript; K. P. Prabhu: Collection of clinical samples; K. Nagarajan: Processing of tissue samples, literature collection, typing and preparation of manuscript; T. Divya: Assistance in literature collection.

Compliance with ethical standards

Conflict of interest All authors declare that they have no conflicts of interest.

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