Biology and pathology of caecal nematode *Subulura brumpti* in Japanese quails (*Coturnix coturnix japonica*)

Ponnudurai, G.1*, Velusamy, R.2 and Rani, N.3

1,2,3Department of Veterinary Parasitology, Veterinary College and Research Institute, Namakkal, Tamil Nadu, India

*Corresponding author email: ponnuvet@gmail.com

Received 22 March 2014; received in revised form 26 July 2014; accepted 27 July 2014

**Abstract.** The occurrence of caecal nematode, *Subulura brumpti* has become more common in quails being maintained in commercial farms in Tamil Nadu, India. Two trials were carried out to study the biology and pathology of *S. brumpti* in quails. In the first trial, eight grower quails were divided into two groups (T1 and T2) comprising of four birds each. The birds belonged to the group T1 was infected with 20 cysts collected from beetle and birds of T2 group were kept as control. The beetle was identified as Tenebrionid species. Prevalence of *S. brumpti* in beetle was 89 per cent and intensity ranged from 1–27 cysts. The eggs of *S. brumpti* were observed in droppings on 30–32 DPI. In the second trial, 16 birds were divided to four groups viz., T1, T2, T3 and T4. The birds of T1, T2, and T3 were infected by gelatin capsule method. All the birds were sacrificed on 30 DPI. The caeca from infected group did not show any gross and histopathological changes.

**INTRODUCTION**

Quail production is one of the fast growing alternate poultry industries in India. A steady increase in demand for its delicious meat and eggs, innate disease resistance and less capital investment are attributed to the fast development of this industry. But, in the recent times, probably due to climatic change, number of parasitic problems such as mites and coccidiosis (Anbarasi *et al.*, 2013) and *S. brumpti* infection (Nagarajan *et al.*, 2012) have been frequently recorded in various private and institutional farms, including quail section in Veterinary College and Research Institute, Namakkal, Tamil Nadu. *Subulura brumpti* infection is very common in commercial chicken in Namakkal region (Ponnudurai & Chellappa, 2001), but heavy outbreak among quails these days is a new record from this region. Since information on biology and pathology of *S. brumpti* in quails is scarce, two experimental trials were carried out.

**MATERIALS AND METHODS**

In the first trial, a total of eight 4 weeks grower quails were purchased and divided into two groups comprising of four birds each. The birds were maintained in cage and fed with grower mash and water *ad libitum* during the trial.

Beetles were collected manually from the quail farm that had *S. brumpti* problem. The collected beetles were brought to the laboratory and dissected one by one after elytra and wings were removed. The dissected beetles were doused into an embryo cup containing normal saline and teased gently with needle in order to dislodge cysts, which are usually found attached to the outer surface of the gut and internal tissues in the haemocoel cavity. The number of beetles that had harboured cysts and number of cysts in each beetle was counted to determine prevalence and intensity of infection in beetles. All the collected cysts were pooled in a cup. The cysts were
aliquoted into 4 cups so as to contain 20 cysts each.

The cysts were then carefully pipetted out using disposal pipette (Tarson) and administered orally to the overnight starved birds individually. The faecal droppings were examined from 16 DPI until eggs were observed. After 35 DPI the birds were sacrificed and worms were recovered.

In the second trial, a total of 16 quails were purchased and divided into four groups (T1, T2, T3 and T4) comprising of four birds each. The birds were maintained as that of in the earlier trial. But, the birds were infected by gelatin capsule method. A total of 10 live beetles, presumed to have harboured cysts of *S. brumpti*, were stuffed into each gelatin capsule. The birds belonging to the group T1, T2 and T3, after being starved overnight, were fed with 1, 2 and 3 gelatin capsule respectively, while birds of T4 were kept as uninfected control. All the infected and uninfected birds were slaughtered on 30 DPI and the gross and histopathological changes were studied. The maximum number of worms collected from the birds belonged to the T1, T2 and T3 group were 153, 258 and 390 respectively. In the present study, caeca from infected group did not show any gross pathological changes. Interestingly, even the caeca of the bird that had harboured 390 worms looked apparently normal. Histopathological examination of caeca from infected and control birds did not show any evidence of larval penetration.

**RESULTS**

In this investigation, 89 per cent of beetles were found to have harboured cysts of *S. brumpti* and intensity of infection ranging from 1–27 cysts in a beetle. The beetle species collected in the present study was identified as Tenebrionid species (Figure 1). The mean size of *Subulura* cysts were 26 X 21 µ without capsule while 32 X 27 µ with capsule. Majority of cysts were found singly and enclosed by a thin membranous capsule but in some cases, 2 cysts were found in a capsule (Figure 1). In the first trial, eggs of *S. brumpti* were observed in the droppings on 30- 32 DPI (Figure 2).

In the present study, infected birds appeared healthy and their feed intake was normal. All the infected and uninfected birds were slaughtered on 30 DPI and the gross and histopathological changes were studied. The maximum number of worms collected from the birds belonged to the T1, T2, and T3 group were 153, 258 and 390 respectively. In the present study, caeca from infected group did not show any gross pathological changes. Interestingly, even the caeca of the bird that had harboured 390 worms looked apparently normal. Histopathological examination of caeca from infected and control birds did not show any evidence of larval penetration.

**DISCUSSION**

The morphological characters of beetles collected in the present study are in confirmation with description given by the

---

**Figure 1. Subulura brumpti** cyst recovered from the beetle (400X).

**Figure 2. Egg of Subulura brumpti** containing larva (400X).
Nayar et al. (1986) for Tenebrionid species of beetles. The prevalence and intensity of \textit{S. brumpti} infection observed in the beetle in this study are not in agreement with findings of Karunamoorthy et al. (1994) who recorded \textit{S. brumpti} infection in 40 per cent of \textit{Alphitobius diaperinus} beetle and recovered up to 5 cysts in a single beetle. This marked variation in the prevalence and intensity could be due to the species of beetle involved as intermediate host.

The prepatent period observed in the present study is in corroboration with the observation of Karunamoorthy et al. (1994) who observed eggs in the droppings in 30–35 DPI while studying the life cycle of \textit{S. brumpti} in chicken. It is necessary to mention that though the difference in the host species, the biology of nematode remained same with respect to prepatent period. Ruff, (1984) also noticed eggs of \textit{S. brumpti} in chicken six weeks after infection.

In this investigation, the general health of the birds infected with \textit{S. brumpti} was not affected, which confirms the findings of Ruff (1984) who reported that \textit{S. brumpti} generally non-pathogenic. However, the findings of the present investigation are not in consonance with Nagarajan et al. (2012) who observed the reduction in feed consumption and egg production to be around 10 per cent and blood tinged faecal droppings in affected birds. In addition, the affected birds were dull and depressed with ruffled feathers. In the postmortem examination of dead birds, they observed severe inflammation of caecal mucosa and caecum was filled with haemorrhagic contents, in which thousands of tiny worms were found moving actively. The severe pathogenesis observed in their investigation could be due to extremely heavy infection or it might be due to some other etiological agent.

Cuckler & Alicata (1944) observed no evidence of larval penetration and inflammation in the caeca infected with \textit{S. brumpti}, which supports the findings of the present study. The findings of present and earlier study suggest that larvae of \textit{S. brumpti} do not have histotropic phase, instead all the moulting may take place in the lumen of the caecum and hence pathogenic effect of this caecal nematode may be insignificant.

Acknowledgements. The authors are grateful to the Dean, Veterinary College and Research Institute, Namakkal for the facilities provided.

REFERENCES


