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Prevalence of *Bunostomum trigonocephalum* infection in sheep and goats in Madhya Pradesh

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Abstract

Bunostomum trigonocephalum is one of the neglected and highly pathogenic nematodes of small ruminants. The accurate prevalence of bunostomosis is under estimated because it is morphologically indistinguishable with another blood sucking nematode, *Gaigeria pachyscelis.* The prime objective of the present study was to estimate the prevalence of *B.trigonocephalum* in different region of Madhya Pradesh and reinforce identification and differentiation characters between *B.trigonocephalum* and *G. pachyscelis*. A total of 52 intestines were screened from different places of Madhya Pradesh and *B. trigonocephalum* and *G. pachyscelis* were identified morphologically. The overall prevalence of *B.trigonocephalum* was 30.76% in Madhya Pradesh. The highest prevalence (85.71 %) was found in the Baghelkhand region (Rewa) is followed by Mahakoshal region (Jabalpur) (83.33%) and Vindhyanchal plateau (Bhopal) (66.66%). Beside *B.trigonocephalum, G. pachyscelis* was also prevalent (57.14%) in Rewa. The characteristic morphological differences between *B.trigonocephalum* and *G. pachyscelis* were discussed.

Introduction

Gastrointestinal nematode infection in sheep and goats is ubiquitous and severely affects small ruminants production, worldwide. In India, the income from small ruminants is major source to the middle and marginal farmers (Bandyopadhyay, 1999). However, gastrointestinal parasitism led by strongyles has detrimental effects on production by reduction in growth and development, and mortality in growing animals. Among strongyles, *Haemonchus contortus*, *Trichostrongylus colubriformis* and *Oesophagostomum columbianum* are well studied and reported from different states of our country (Annual report GIP, 2013, 2014). There are meager reports on prevalence of *Bunostomum trigonocephalum*. Moreover, prevalence of *B. trigonocephalum* is restricted in few pockets of India, mainly from central India, north east and Kashmir valley. The severity of *Bunostomum* infection is mainly due to blood sucking activity of worm as well as frequent changing of biting sites, which will lead to continuous oozing of blood. *B. trigonocephalum* is highly pathogenic and few hundreds of worm can kill an animal (Soulsby, 1982). Despite of high pathogenicity,

few studies were conducted on prevalence of bunostomosis. Therefore, the present study was conducted to estimate the prevalence of *B.trigonocephalum* in different regions of Madhya Pradesh and reestablish identification characters of *B.trigonocephalum* compared with *G. pachyscelis*.

Materials and methods:

Study area and collection of parasites

Adult nematodes were collected from gastrointestinal tract of goats slaughtered at local abattoir at Rewa, Jabalpur, Mhow, Morena, Bhopal districts of Madhya Pradesh. Parasites were washed thoroughly in PBS (pH 7.4) and identified as per the morphological keys (Taylor *et al*., 2015). 12 intestines from Jabalpur and Mhow each, 14 from Rewa, 08 from Morena and 06 from Bhopal were screened for *B.trigonocephalum*.

Results and discussion

The prevalence rate of *B.trigonocephalum* infection from different parts of Madhya Pradesh is summarized in Table 1.

Table 1. Prevalence of *B. trigonocephalum* from different parts of Madhya Pradesh

S. No.	Places of Sampling	Total intestines screened	Number of intestines positives for *B. trigonocephalum*	Prevalence rate (%)
1.	Jabalpur	12	10	83.33
2.	Rewa	14	12*	85.71
3.	Mhow	12	-	-
4.	Morena	08	-	-
5	Bhopal	06	4	66.66
	Total	**52**	**16**	**30.769%**

* Eight intestines are positive for *G. pachyscelis* (57.14%)

B.trigonocephalum was mainly present in the posterior parts of duodenum and jejunum. The number of worms varied from 30-72 per intestine. The maximum prevalence of *B.trigonocephalum* was 83.33% from Mahakoshal region (Jabalpur), followed by 85.71% from Baghelkhand region (Rewa) and 66.66% from Vindhyanchal plateau (Bhopal). *B.trigonocephalum* was not recovered from Morena and Mhow. Moreover, in Rewa along with *B.trigonocephalum*, other hook worm *G. pachyscelis* was also found and the prevalence rate was 57.14% (N=8). The overall prevalence of *B.trigonocephalum* was 30.76% in Madhya Pradesh**.** The earlier coproculture reports on the prevalence of *B.trigonocephalum* in goats from Mahakoshal region of Madhya Pradesh were 4.75 % (Singh *et al.,* 2015) and 3.12 % in Nimar region (Rajpoot *et al*., 2017).

The distribution of *Bunostomum* spp. is worldwide but it is more abundant in warm and moist regions with humid weather prevails (William *et al.,* 1983). In temperate region of Uttarakhand, the overall prevalence was 4-7% (Annual report GIP, 2013, 2014). The north-east, Shillong, Meghalaya, have the prevalence rates of 41.7% (Yadav and Tondon, 1989) and 22.40 % (Bandyopadhyay *et al.,* 2010) in goats. *B. trigonocephalum* has a high prevalence in Kashmir valley, where sheep and goat were harboured 37.7% and 30.1%, respectively (Tariq *et al*., 2008, 2010). The rate of prevalence in the Western and high altitude of Tamilnadu was 2.7% (Arunachalam *et al.,* 2013) and in plains of Tamilnadu varies from 2.15% to 4.72% (Varadharajan and Vijayalakshmi, 2015; Rajarajan *et al*., 2017). Normally, coproculture studies do not reveal real prevalence of strongyles. In the present study, gastrointestinal tracts were screened for actual prevalence of *B.trigonocephalum* and *G. pachyscelis.* The prevalence of *B.trigonocephalum* was very high but the number of parasites per intestines were low to medium.

Morphologically, the hook worms are off-white in colour. The anterior end was bent in a dorsal direction.. Both *B.trigonocephalum* and *G. pachyscelis* look more or less same, macroscopically. Microscopically, the buccal capsule of *B.trigonocephalum* open in antero-dorsal direction and bear a large dorsal tooth and two short ventral teeth (Fig.1). The mouth cavity has two sub-ventral cutting plates and pair of small dorsal plates. (Fig.1). The major difference in dorsal cone of *G. pachyscelis* and *B. trigonocephalum* was that it reach 2/3rd of the brim of buccal capsule in the *B.trigonocephalum* while short dorsal cone was found in *G.pachyscelis* without dorsal tooth (Fig.2).

The bursa of male *B.trigonocephalum* has two lateral lobes and a small asymmetrical dorsal lobe (Fig.3). The right externo-dorsal ray arise

Fig. 1 : Anterior end of *B.trigonocephalum*; **arrow** showing well developed dorsal cone upto 2/3rd brim of buccal capsule.

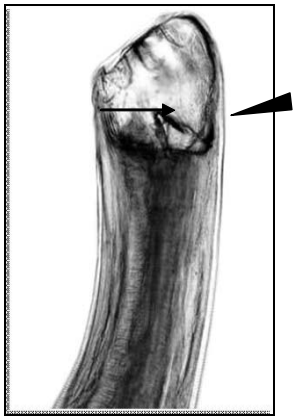

Fig. 2 : Anterior end of *G.pachyscelis;* **arrow** showing short dorsal cone and reaching up **arrow head** indicate subventral lancet containing several cusps each.

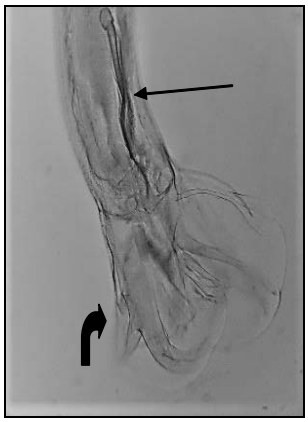

Fig. 3 : Posterior end of *B.trigonocepahlum*; **arrow** showing characteristic spicules united together posteriorly; **bent arrow** showing showing well developed lateral lobe.

Fig. 4 : Posterior end of *G.pachyscelis*; **arrow** showing the characteristic recurved spicules divergent posteriorly & **arrow head** showing well developed dorsal lobe and **bent arrow** indicate lateral lobes joined together ventrally.

from dorsal stem much before than left externo-dorsal ray, which arise almost near the bifurcation of the dorsal rays. The dorsal ray was divided in to two tridigitate branches in the extremities. The spicules were slender, alate, spirally twisted and united posteriorly (Fig.3). In *G.pachyscelis,* the dorsal lobe was large and both the lateral lobe joined in ventral side. The spicules of *G.pachyscelis* were larger than *B. trigonocephalum.* The spicules diverge at extremities but were united in middle and their tips were recurved (Fig.4.). In *Bunostomum* the tips of the spicules were not recurved .

This seems to be first report of *G.pachyscelis* from goats in Baghelkhand region (Rewa). The present observations may help in planning chemotherapeutic and control strategies against these parasites in the study area.

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Conflict of Interest

All authors declare no conflict of interest.

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