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# Prevalence of Gastrointestinal Protozoan Infections in Pigs of Dimapur District (Nagaland) and Its Treatment

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### ABSTRACT

Rearing of pigs is one of the ways of livelihood of tribal population of north eastern region of India. But one of the major constraints of rearing of pigs is the gastro intestinal (GI) parasitic infections and pigs of different states of north eastern region have been found to be infected with high percentage of various GI parasites. Among GI parasites, GI protozoan infections cause reduced body weight gain and decreased haemoglobin concentration in infected pigs, that have generally received little attention. Some of the GI protozoan parasites of pigs have zoonotic significance also. Keeping in view of importance of GI protozoan infections of pigs, a study was undertaken to know the prevalence of GI protozoan infections in pigs of Dimapur District of the state Nagaland and to treat such infections. For this, a total of 142 numbers of faecal samples of pigs, maintained in both organized and unorganized ways, were collected. These faecal samples were examined microscopically to observe the presence of protozoan infections by direct and indirect methods. Among GI protozoan infections, overall 58.45% pigs were found as positive for *Balantidium coli* infections and 42.95% pigs were found as positive for *Eimeria* spp. infections. A combination of Metronidazole (@20 mg/kg. b.wt.) and Furazolidone (@10 mg/kg. b.wt.) or single Oxytetracycline @10 mg/kg. b.wt. orally consecutive for 4 days were found 100% effective for the treatment of *B. coli* infections in pigs. Amprolium (@ 45 mg/kg b.wt.) orally, for consecutive four days were found 100% effective for the treatment of *Eimeria* spp. infections in pigs. It can be concluded that GI protozoan parasitic infections particularly *B.coli* and *Eimeria* spp. are very much prevalent in pigs of Dimapur District of Nagaland and a combination of Metronidazole and Furazolidone or single Oxytetracycline orally consecutive for 4 days are very much effective for the treatment of *B. coli* infections in pigs. For the treatment of *Eimeria* spp. infections in pigs, use of Amprolium for consecutive four days are very much effective.

### 1. Introduction

Agriculture is the main source of income to majority of rural people of north eastern states of India, but rearing of livestock as an alternative source of income as well as an important component of mixed farming system, is significant (Kumar *et al.*, 2007).

Among livestock, rearing of pigs is one of the ways of livelihood of tribal population of north eastern region of India. But one of the major constraints of rearing of pigs is the gastro intestinal (GI) parasitic infections and pigs of north eastern region of India have been found to be infected with high percentage of various GI parasites (Yadav and

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Tandon 1989; Ebibeni *et al.*,2013). GI parasitism in pigs affects its performance in terms of poor growth rate, reduced weight gain, reduced feed conversion and condemnation of affected organs (Nsoso *et al.*,2000). Among GI parasites, GI protozoan infections has been reported to cause reduced body weight gain and decreased haemoglobin concentration in infected pigs (Bauri *et al.*, 2012) that have generally received little attention. Some of the GI protozoan parasites of pigs like *Balantidium coli* and *Cryptosporidium* spp. have zoonotic significance also. A large numbers of population of India lives in close proximity to cattle and pigs and in such a situation *B. coli* can emerge as a significant pathogen in cases of dysentery, especially in the immunocompromised population (Parija and Giri 2012). *Balantidium coli* are generally harmless for pigs, but sometimes it may produce clinical symptoms and fatal disease. The infected pigs may show moderate to severe diarrhea or may not show any clinical sign. *Balantidium coli* is reported to infect large intestine of human that causes a type of colitis very similar to that caused by *Entamoeba histolytica* and produce liver abscess also (Kapur *et al.*, 2016). In human being, hyaluronidase enzyme is secreted by *Balantidium coli* that helps the parasite to invade mucosa and form lesions like amoebiasis (Umesh 2007). Coccidiosis in pigs causes diarrhea (may be bloody), dehydration, loss of appetite, poor growth and occasional mortality in piglets and has been reported to have negative impact on growth rate of pigs. In one way rearing of pigs is one of the ways of livelihood but simultaneously it is also important that rarer of pigs should not suffer from any zoonotic infections. There are few reports on GI protozoan infections in pigs of Nagaland (Ebibeni *et al.*,2013; Laha *et al.*, 2014a; Borkotoky *et al.*, 2014), But nobody reported about the prevalence of *B.coli* infections in pigs from Nagaland and also they did not mentioned about treatment of GI protozoan infections in pigs. So, the present study was undertaken to know the prevalence of GI protozoan infections in pigs of Dimapur District of Nagaland and to treat such infections, to chalk out a control programme of GI protozoan infections in pigs.

## 2. Materials and Methods

To know the prevalence of GI protozoan infections in pigs, a total of 142 numbers of faecal samples of pigs, maintained in both organized and unorganized ways, irrespective of age were collected randomly. The pigs maintained in organized way in pig farm of ICAR Research Complex for NEH Region, Nagaland Centre, Jharnapani and pigs maintained in unorganized way in a village of Dimapur Distt. of

Nagaland named as Molvom Village were taken into consideration for collection of faecal samples. Out of 142 numbers of faecal samples, 84 numbers of faecal samples were collected from organized pig farm and 58 numbers of faecal samples were collected from village. These faecal samples were examined microscopically to observe the presence of protozoan infections by direct and indirect methods (Soulsby 1986).

For the treatment of these animals, two experimental trials to see the comparative efficacy of two treatments against *B. coli* infections and one treatment against *Eimeria* spp. infections were undertaken in pig farm of ICAR Research Complex for NEH Region, Nagaland Centre (Table 2 and Table 3). For treatment of *B. coli* infections first groups of six pigs were treated orally with a combination of Metronidazole (@20 mg/kg. b.wt.) and Furazolidone (10 mg/kg b.wt.), for consecutive four days. The second groups of six pigs were treated with Oxytetracycline @10 mg/kg. b.wt. orally, for consecutive four days. For treatment of *Eimeria* spp. infections six pigs of one group was treated with Amprolium @ 45 mg/kg b.wt. orally, for consecutive four days. For comparison, infected control group comprising 4 pigs for each infections were also studied. Faecal samples of pigs of all groups were collected on 3, 5,7,15 and 30 days post treatment and examined to see the efficacy of these treatments by observing cysts or oocysts.

## 3. Results and Discussion

The prevalence of gastrointestinal protozoan infections in pigs of Dimapur District (Nagaland) has been presented in Table 1 and Fig.1. It could be observed from the table that overall 58.45% pigs were found as positive for *B. coli* infections (Fig.2) with a distribution of 70.23% in pigs of organized farm and 41.37% in pigs maintained in village condition. Overall prevalence of *Eimeria* spp. was recorded as 42.95% with a distribution of 32.14% in pigs of organized farm and 58.62% in pigs maintained in village condition. Mixed infections were noticed in 2.38% pigs of organised pig farm. Results of experimental treatments against *B. coli* and *Eimeria* spp. have been presented in Table 2 and Table 3, respectively. It could be observed from these tables that after 15 days of treatment by Metronidazole and Furazolidone combination and 7 days of treatment by Oxytetracycline, all treated pigs showed negative for *B. coli* infections. Faecal samples collected after 3 days onwards post treatment were found negative for *Eimeria* spp. infections. Infected control group of first and second experiments found positive for *B. coli* and *Eimeria* spp. infections, respectively, throughout the experiments.

**Table 1.**Prevalence of gastrointestinal protozoan infections in pigs

Source of faecal samples	Nos. Examined	Numbers Positive for <i>B.coli</i>	% Prevalence <i>B.coli</i>	Numbers Positive for <i>Eimeria</i> spp.	% Prevalence <i>Eimeria</i> spp.
Organised pig Farm	84	59	70.23	27	32.14
Pigs of village	58	24	41.37	34	58.62
Total	142	83	58.45	61	42.95

Although some research work on prevalence of GI parasitism in pigs in different states of north eastern region of India including Nagaland are available (Yadav and Tandon 1989 ; Chandra and Ghosh 1989 ; Rajkhowa *et al.*, 2003), but they have restricted their studies on GI helminthes infections indicated GI protozoan infections have generally received little attention. Earlier from north eastern region of India, Rajkhowa *et al.* (2012) recorded 16.16% *B.coli* infections in an organized pig farm of Assam. Laha *et al.* (2013) reported that 41.3% pigs of Meghalaya, were infected with *B. coli*. Deka *et al.* (2005) recorded heavy burden of *Balantidium coli* infection in pigs of Aizawl, Mizoram. Particularly from Nagaland, Borkotoky *et al.* (2014) reported 16.25% *Eimeria* spp. infections among indigenous local pigs in Phek District of Nagaland. Ebibeni *et al.* (2013) reported 34.7% *Eimeria* sp. infections in pigs maintained in village condition in Dimapur district of Nagaland, but they have not reported about the presence of *B. coli* infections in pigs. So, the findings of 58.45% pigs as positive for *B. coli* infection in the present study is important for pigs and a caution for human being, as the infection has zoonotic signification. Laha *et al.* (2014a) reported that 30.00% and 1.33% pigs of Nagaland are infected with *Eimeria* spp. and Isosporaspp. infections, respectively. From Meghalaya, Rajkhowa (1996) and Laha *et al.* (2014b) observed 8.31% and 37.96% pigs, respectively found to be infected with coccidial oocysts. As regarding reports of *B.coli* infections in pigs from other parts of India are concerned, as high as 93% pigs maintained in farm condition at Ranchi, Jharkhand has been reported to be infected with *B. coli* (Bauri *et al.*, 2012). In and around Nagpur city, Bhargale *et al.* (2010) observed 58.10% stray pigs found to be infected with *B. coli*. Dadas *et al.* (2016) reported 31.85% pigs of Mumbai region were infected with *B. coli*. From West Bengal, overall 46.18% pigs found as positive for *B.coli* infections (Dutta *et al.*, 2005). Krishna Murthy *et al.* (2016) found 11.3 % and 4.0% pigs of Shimoga region of Karnataka were harbored *B. coli* cyst and coccidian oocysts, respectively. In a study Godara and Sharma (2010) observed the rete of *Balantidium* sp. and *Eimeria* sp. infections found to be 3.66% and 5.00%, respectively in pigs of Jaipur, Rajasthan. Occurrence of *B. coli* infections in pigs of nearby country

Bangladesh (Mymensingh district) was recorded as 34.62% (Hasan *et al.* 2015). The parasite has also been reported from other animals including human. A high prevalence (64.2%) of *B.coli* infection in bred Rhesus monkeys has been reported from China (Hai long *et al.*, 2014). The parasite have also been reported from cattle, buffaloes and camels of India (Randhawa *et al.*, 2010; Partani *et al.*, 1998; Patil *et al.*, 1998). *Balantidium coli* infections in faecal samples of 5% children has been reported from abroad and treatment with Tetracycline and Metronidazole found to be safe and effective for children (Mul *et al.*, 2007; Al-Musawi 2016). From India, Kaur *et al.* (2002) reported that 2.4% diarrhetic children of Delhi were positive for *Balantidium coli* infection. Besides, the infection has also been reported as case report from India (Kumar *et al.*, 2016).

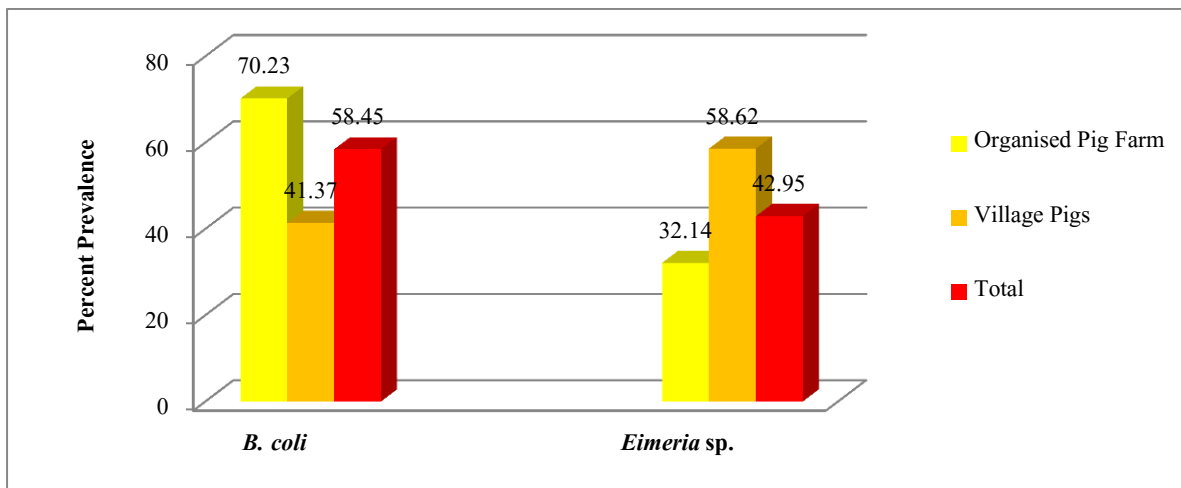
In the present study higher percentage of *B.coli* infections has been recorded in pigs maintained in organized farm (70.23%) compared to pigs maintained in village condition (41.37%). In general, higher percentage of GI parasitic infections could be observed in pigs maintained in free range systems in village condition than the pigs maintained in organized farm (Dutta *et al.*, 2005; ) due to scientific rearing of pigs in organized farm by improved housing, feeding, deworming *etc.* Among these deworming with suitable dewormer can be considered as the main cause of lower percentage of parasitic infections in pigs maintained in organized farms. Generally, only anthelmintics are used as dewormer and antiprotozoan medicines particularly anti *B.coli* medicines are not used in this farm as dewormer, as the *B.coli* infections in this pig farm was not diagnosed earlier. Hence, although these pigs were maintained in organized farm, but due to lack of use of anti *B.coli* medicines, higher percentage of *B.coli* infections has been recorded in pigs maintained in organized farm. Successful treatments of *B.coli* infections with a combination of Metronidazole and Furazolidone and with Oxytetracycline has been reported by Bauri *et al.* (2012) but they observed a quick response of treatment as compared to our study. In case of buffalo calves that were naturally infected with *B. coli*, treatment with a combination of tetracycline hydrochloride and metronidazole plus furazolidone showed 100% elimination of *B.coli* cysts and trophozoites on day three of

**Table 2.** Comparative efficacy of treatments against *Balantidium coli* infections in pigs

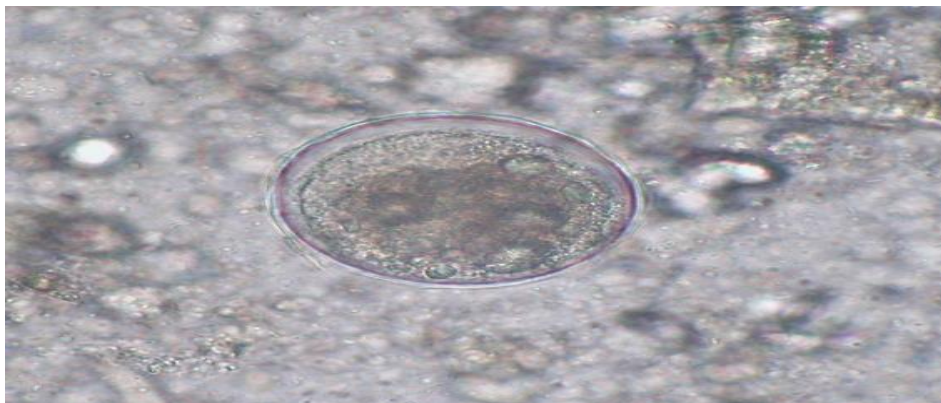
Groups	Nos. of Pigs	Treatment	Collection of Faecal Samples	Results
Group-I. Infected and treated	6	Combination of Metronidazole and Furazolidone Orally consecutive for 4 days	3,5,7,15 and 30 days post treatment	Faecal samples collected after 15 days onwards post treatment were found negative for <i>B. coli</i> infection
Group-II. Infected and treated	6	Oxytetracycline Orally consecutive for 4 days	-Do-	Faecal samples collected after 7 days onwards post treatment were found negative for <i>B. coli</i> infection
Group-III. Infected control	4	No Treatment	-Do-	Found positive for <i>B. coli</i> infection throughout the experiment

**Table 3.** Efficacy of Amprolium Hydrochloride against *Eimeria* spp. infections in pigs

Groups	Nos. of Pigs	Treatment	Collection of Faecal Samples	Results
Group-I. Infected and treated	6	Amprolium Hydrochloride	3,5,7,15 and 30 days post treatment	Faecal samples collected after 3 days onwards post treatment were found negative for <i>Eimeria</i> spp. infection
Group-II. Infected Control	4	No Treatment	-Do-	Found positive for <i>Eimeria</i> spp. infection throughout the experiment



**Figure1.** Prevalence of gastrointestinal protozoan infections in pigs



**Figure 2.** Cyst of *Balantidium coli* identified from faecal sample of pig

treatment (Sengar *et al.*, 2006). The perusal of literature indicated that references are not available for the treatment of *Eimeria* spp. infections in pigs particularly the efficacy of amprolium against *Eimeria* spp. infections in pigs. Hence we cannot compare our study regarding the efficacy of amprolium against *Eimeria* spp. infections in pigs. However, Laha *et al.* (2015) successfully used amprolium for the control of *Eimeria* spp. infections in rabbits in subtropical hill region of Meghalaya.

## Conclusion

The study suggests that GI protozoan parasitic infections particularly *B.coli* and *Eimeria* spp. are very much prevalent in pigs of Dimapur District of Nagaland which is alarming for both pigs and human health. A combination of Metronidazole and Furazolidone or single Oxytetracycline orally consecutive for 4 days are very much effective for the treatment of *B. coli* infections in pigs. For the treatment of *Eimeria* spp. infections in pigs, use of Amprolium for consecutive four days are very much effective. .

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