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## RESEARCH ARTICLE

# PREVALENCE OF ENDOPARASITIC DISEASES IN PRIVATE ELEPHANTS OF BUFFER ZONE OF CHITWAN NATIONAL PARK, NEPAL

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### ABSTRACT

Elephants in private resort are mainly kept for tour operation. Parasitic infestation, tuberculosis and poor foot health are the common problems in the captive elephants of private sector of chitwan. These problems are associated with poor management and poor veterinary care to those elephants. In the study of Karki (2007), there was 100 % prevalence of parasitic infestation in the fecal samples of 20 elephants from Suklaphanta national park, Bardiya national park, Chitwan national park and Koshi Tappu wildlife reserve. In that study, various parasites like *Fasciola jacksoni*, *Paramphistome*, *Oesophagostome*, *Chabertia*, *Schistosomes*, *Dicrocoelium* and *Moneizia* were commonly observed. However, in the study of Jani (2008), the prevalence of gastrointestinal parasites in Indian elephants was found to be 62.5 %. In the same study, the prevalence rate of *Strongyloides* was 20 %, 8 % and 48 %. In another study, the prevalence rate of parasite infestation was 48 % in forest department system, 32 % in temple and 31 % in private sector. Egg per gram (EPG) was moderate (Nishanth *et. al.*, 2012). The study was conducted in the private elephant stables located around the buffer zone of Chitwan National Park, Sauraha of Nepal in the monsoon season (i.e. June to August, 2013). Altogether 35 fecal samples were examined for parasitic prevalence and questionnaire survey was done with each mahout of respective elephants. Parasitic appraisal was done using both sedimentation and floatation method and egg per gram (EPG) count was done using Mac. Master's egg counting technique (Soulsby, 1982). Among 35 elephants, 63 % were found negative with Tuberculosis, 23 % were TB positive with treatment ongoing, 11 % have completed the TB treatment before one year and 3 % have completed the treatment before 2 years. Similarly, 9 % of the elephants have the infestation of *Fascioloides magna* and *Strongyloides westeri* infestation was seen in 23 % of the elephants. The EPG count in 3 samples was 100 eggs per gram with *Fascioloides magna* and 8 samples have *Strongyloides westeri* with EPG count of 200 eggs per gram. The research shows that parasitic prevalence was found significantly higher (chi-square value= 19.86,  $p < 0.01$ ) in the elephants once suffered from tuberculosis. The foot infection was found significantly higher (chi-square value= 11.21,  $p < 0.05$ ) in the elephants once suffered from tuberculosis. The parasitic prevalence was found significantly higher (chi-square value= 15.326,  $p < 0.01$ ) in the elephants with poor BCS. Unhygienic stable with very poor urine drainage, dung storage very close to stable (less than 5 meter in most stable) are responsible for the parasitic infestation. Similarly, elephant drinking water in contaminated and untreated water from river, food providing directly in the floor are responsible for the high prevalence of parasite. However, EPG count is low because most of the elephants are provided with antihelminthic drugs regularly in the interval of six months. The prevalence rate of parasitic infestation was lower as compared to that observed by Karki (2007), Jani (2008) and Nishanth *et. al.* (2012). The comparatively lower prevalence rate of parasitic infestation is due to regular treatment with antihelminthics in majority of stables. However, egg per gram (EPG) was moderate as observed by Nishanth (2012). Parasitic infestation and BCS are significantly higher in TB patients compared to healthy animals which is due to immune – compromised state in TB patients.

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### INTRODUCTION

Elephants in private resort are mainly kept for tour operation. There is very little documentation about the disease and parasite condition of this animal in Nepal (Karki, 2008). In the study of Karki (2008), there was 100 % prevalence of parasitic

infestation in the fecal samples of 20 elephants of from Suklaphanta national park, Bardiya national park, Chitwan national park and Koshi Tappu wildlife reserve. In that study, various parasites like *Fasciola jacksoni*, *Paramphistome*, *Oesophagostome*, *Chabertia*, *Schistpsomes*, *Dicrocoelium* and *Moneizia* were commonly observed.

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However, Jani (2008) reported 62.5% prevalence of gastrointestinal parasites in Indian elephants. In that study, *Fasciola spp.* was commonly observed. In another study, the prevalence rate of *Strongyle* was 40%, 16% and 8% in the elephants of Mudumalai sanctuary, Anamalai sanctuary and Sathyamangalam forest respectively. In the same study, the prevalence rate of *Strongyloides* was 20%, 8% and 48% respectively. In the study, Eggs per gram (EPG) was moderate (Nishanth et al., 2012). In the study of 115 elephants, nearly 37% were infected by gastrointestinal parasites. Among them, the prevalence rate of parasite infection was 48% in forest department system, 32% in temple and 31% in private sector (Vanitha et al., 2011).

Similarly, in the study of 6 African forest elephants (*Loxodonta africana cyclotis*) from Nouabale-Ndoki National Park of Republic of Congo, and the Dzangha-Sangha National Park of Central African Republic, one elephant was found highly infected with 12 species of intestinal parasites including 2 bot fly larvae, 1 trematode and 9 nematodes. Necropsy examination and fecal examination of that elephant also revealed the infection of a schistosome, *Bivitellobilharzia*, a tracheal nematode, *Mammomonogamus*, an intestinal strongylid and nematodes like *Decrusia* and *Equinurba* (Kinsella et al., 2004). Hing (2012) reported the prevalence of *Fasciola*, *Anoplocephala* and *Strongyles* to be 70.2%, 50.0% and 66% respectively in the study of 104 Bornean elephants.

## MATERIALS AND METHODS

### Site and time period of the study

The study was conducted in the private elephant stable located around the buffer zone of Chitwan National Park, Sauraha of Nepal. The study was conducted in the monsoon (June to August) of 2013 AD. Altogether 35 fecal samples were tested for parasitic prevalence and questionnaire survey was done with each mahout of respective elephants.

### Sample Collection and Questionnaire Survey

From the total population of private elephants to be 45, altogether 35 elephants (nearly 78 %) were selected. The fresh fecal sample was collected early in the morning in the zip – lock bag and stored in 10 % formalin and each of those sample was also collected in another zip – lock bag and stored without 10 % formalin.

Questionnaire survey was conducted with respective mahouts to access the various information related to health aspects (Tuberculosis Status, Body Condition Score etc.) and managerial aspects of the elephants.

### Parasite prevalence appraisal

The prevalence of intestinal parasites among the captive elephants of private stable was assessed through coprological analysis using two scientific methods namely, Sedimentation method and Flootation method.

### Sedimentation Method

In the sedimentation, known weight of fecal sample (3 gram) feces was first of all pasted and mixed in 42 ml of water and the rough debris was removed by filtration. Then, the solution was sedimented for about 15 minutes and the supernatant was discarded. Again mix some water there and is again sedimented for 15 minutes and supernatant was discarded. After that, few drops of sedimented portion were examined under microscope to examine the presence of parasitic eggs in the sample.

### Flootation Method

The dung sedimented was dissolved in 10 ml of saturated Zinc Sulphate solution of specific gravity 1.8 % (Saturated Solution) and was centrifuged. After centrifugation, few loopfuls of the solution were removed from the surface using a wire – loop of 5 mm diameter and the solution was examined to record the presence or absence of the parasitic eggs.

### Determination of Egg per Gram (EPG) of the fecal sample

First of all, 3 gram of the feces was pasted and mixed in 42 ml of water. Then, rough debris was removed by filtration. The sample was then poured in three plastic tubes of 15 ml each and was centrifuged in 2000 rpm for 5 minutes. After centrifugation, the supernatant was discarded and the tube was filled with saturated solution of  $ZnSO_4$  solution and it was mixed well. Then, 0.15 ml of solution was poured in the well of Mac. Master slide and observed in the microscope. Then the numbers of eggs were counted.

### Calculation of EPG

During the microscope observation, if the number of eggs observed was found to be Y, then  $EPG = Y \times 100$ .

### Analysis

The descriptive study were made through percentage, frequency which were displayed in table, bar and pie charts. The association were described through chi square too. The prevalence of parasite was described through percentage. All the data were analyzed in SPSS 16.0 version and Microsoft Excel. Probability was taken 0.05 for significance.

## RESULTS

Out of 35 elephants chosen, only one elephant was male and only one of the elephant was pregnant. Other 33 elephants were adult female.

### Basic Management

Concerning the cleanliness of the stable, 66 % of the stables were cleaned only one time a day, 28 % of the stable were cleaned two times a day and only 6 % of the stable were cleaned three times a day.

Similarly, none of them uses chemical disinfectant to clean the stable. Only 26 % of the stables have proper drainage of urine

while 74 % of the stables have very poor hygienic condition of the floor due to lack of urine drainage.

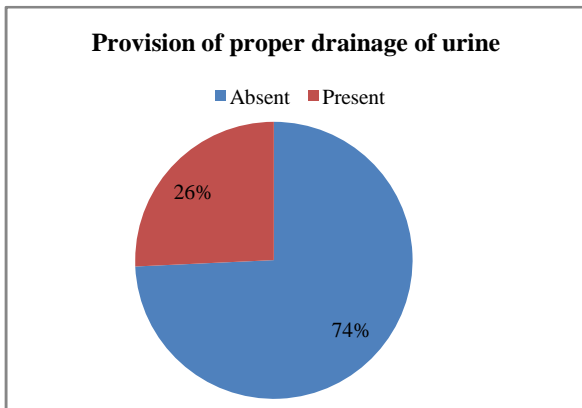


Figure 1 Provision of proper drainage of urine

Dung of the elephant was piled very near to the stable, i.e. near than 5 meter distance in all the stables. To the vicinity of the stable, vectors of most of the parasites like snail, ant dung beetles, street dogs were found.

All the elephants were allowed to graze in the forest during elephant safari and they were allowed to drink water both in river and tap water. During grazing and drinking of water of river, there was high risk of parasitic infestation because snails were found in those areas and the river water was contaminated with feces of domestic animals also.

In all the stables, the food (Kuchi) was given directly on the floor. So, if the floor is contaminated with parasitic eggs from feces, there is high risk of parasitic infestation in the elephants.

**Deworming practice**

None of the elephant’s feces was tested regularly by the veterinarian. However, 69 % of the elephants were provided antihelminthic every six months but other 31 % of the elephants were given when the elephants show the signs like diarrhea and anorexia.

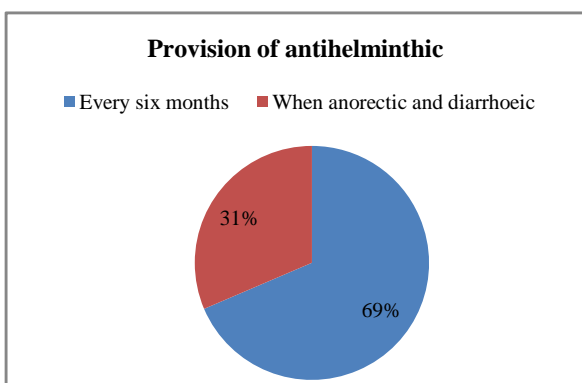


Figure 2 Provision of anthelminthic

**Prevalence of Parasitic infestation**

Among 35 fecal samples, the prevalence of *Fascioloides magna* was found to be 9 % and that of *Strongyloides westeri* was found to be 23 %. The rest of the samples were not positive.

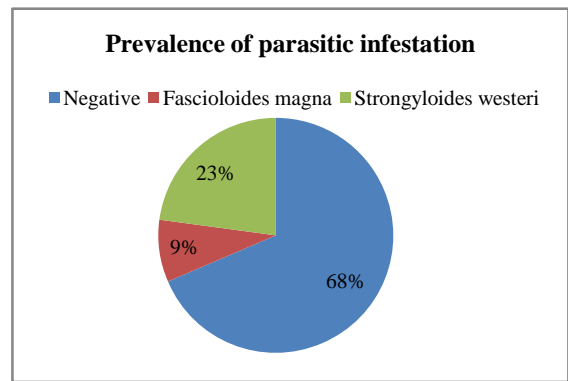


Figure 3 Prevalence of parasitic infestation in respective

**Association between TB presence (Either treatment ongoing or completed) and Parasitic infestation**

The parasitic prevalence was found significantly higher (chi-square value= 19.86, p< 0.01) in the elephants once suffered from tuberculosis.

**Association between TB presence (Either treatment ongoing or completed) and infected foot**

The foot infection was found significantly higher (chi-square value= 11.21, p< 0.05) in the elephants once suffered from tuberculosis.

**Association between Parasitic infestation and Body condition Score**

The parasitic prevalence was found significantly higher (chi-square value= 15.326, p< 0.01) in the elephants with poor BCS.

**DISCUSSION**

The cleanliness of the stable was not satisfactory with very poor urine drainage in most of the elephant stable. Similarly, the dung was very close to the stable and food was given directly on the floor. The drinking water from river have very high chance of contamination with feces of domestic animals. These factors are highly responsible for the high prevalence of parasite in the area. However, most of the elephants (69 %) were provided with antihelminthic drugs regularly in the interval of six months though the feces are not examined by veterinarians regularly. The regular provision of antihelminthics in most of the elephants was the cause for the low egg per gram in all the positive samples.

The prevalence rate of parasitic infestation was lower as compared to that observed by Karki (2007), Jani (2008), Hing (2012) and Nishanth *et. al.* (2012). The comparatively lower prevalence rate of parasitic infestation is due to regular treatment with antihelminthics in majority of stables. However, egg per gram (EPG) was moderate as observed by Nishanth (2012).

Similarly, high prevalence of Tuberculosis in that area is due to stressful condition with high work load, lack of balanced diet and unhygienic condition in almost all stables.

The prevalence rate of TB was higher than that of North America in 2011 but it is almost similar as reported by Elephant Care International in Nepal. The higher prevalence rate in Nepal than in North America is related to higher workload, lack of proper nutrition and lack of regular health checkup in Nepal.

Almost all of the elephants have overgrown nails or pads and most of the elephants have cracked nails, which is related to bad management with lack of regular foot trimming. Cracked nails in most elephants is also due to lack of daily inspection and hard surfaced road in their way of elephant safari.

About one – third population have infected and necrotic foot, which shows very bad management of foot health and the negligence of the mahouts and owners towards foot health.

Body condition Score is average in most of the elephants and poor body condition score is highly associated with presence of TB in their life which is due to anorexia during the treatment period and lack of immunity during this period.

Similarly, the association of TB presence and parasitic prevalence is highly significant which suggests the immune – compromised TB patients are highly susceptible to parasitic infestation. The association between TB patient and foot infection is also related to secondary infection of foot with micro – organisms in their immune – compromised period. Body condition score is significantly low in the parasite infested animals which suggests lack of energy in those animals due to parasites.

## CONCLUSION

High prevalence of TB, parasitic infestation and poor foot health are related to the poor management of health, poor nutrition and negligence of the owner and mahouts.

Despite the poor management, Body condition score was poor only in less number of elephants and poor BCS was only associated with health conditions like tuberculosis and parasitic infestation.

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So, if the mahouts and owners are trained about the health management, the overall condition will be maintained. Similarly, infected foot is associated with TB presence. So, if those diseases is controlled and mahouts are trained about foot health, overall foot health will also be improved.

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