

# Prevalence and Shedding Intensity of Giardiasis in Naturally Infected Buffaloes

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## ABSTRACT

In a study involving naturally infected buffaloes (n=300) with *Giardia duodenalis* cysts, the overall prevalence was 33%. The prevalence was (43.0%) in buffaloes  $\leq 1$  year old followed by 28.7 and 27.5% in 1-3 and  $\geq 3$  years of age, respectively. The prevalence of giardiasis in buffaloes with normal faeces was 23.3% and in abnormal faeces was 39.4%. The cyst counts in faeces of buffaloes of  $\leq 1$  year was  $4.5 \times 10^3$  followed by  $2.8 \times 10^3$  (1-3 years) and  $1.7 \times 10^3$  ( $\geq 3$  years) cysts per gram of faeces. Mean shedding intensity of cysts per gram of normal faeces was  $2.7 \times 10^2$  and  $4.3 \times 10^3$  in abnormal faeces. Cumulatively, cyst prevalence and shedding intensity was higher in younger animals/abnormal faeces than older animals/normal faeces.

**Key Words:** *Giardia duodenalis*; Buffalo

## INTRODUCTION

*Giardia (G.) duodenalis* is a flagellated protozoan parasite that inhabits the small intestine in trophozoite and cystic form. There are number of reports of diarrhea and ill health associated with *Giardiasis* in calves (Deshpande & Shastri, 1981; O'Handley *et al.*, 1997). It has also been associated with low weight gain, impaired feed efficiency and reduced carcass weight gain (Olson *et al.*, 1995). Studies conducted in different geographical regions of the world have reported a variable prevalence (1-100%) in bovines (Deshpande & Shastri, 1981; Oviedo *et al.*, 1987; Nikitan *et al.*, 1991; Himonas *et al.*, 1998). It has been observed that young calves have higher incidence of *Giardiasis* as compared to adult bovine and intensity of cysts shedding was also higher in young calves (Saeed, 1998; Xaio & Herd, 1994; Mockber, 1995). Some cross-sectional and experimental studies have indicated the pathogenesis and economic effects of *Giardia* infection in young animals (Jean *et al.*, 1987; Olson *et al.*, 1995). A negligible work has been conducted pertaining to this important parasitic infection in Pakistan. Considering this hitch, a study was initiated to investigate different aspects of this parasitism in buffaloes. This paper describes the prevalence and shedding intensity of *G. duodenalis* cysts in naturally infected buffaloes.

## MATERIALS AND METHODS

Buffaloes of diverse age groups ( $\leq 1$  to  $\geq 3$  years) were selected for the collection of faecal samples from different livestock farms located in Districts Sheikhpura and Lahore. About 20 g of fresh faecal samples (n=300) were collected from these buffaloes in zip lock plastic bags and were

identified with permanent number. Information about animals, clinical history and farm were also recorded. Samples were brought to the Department of Veterinary Parasitology, University of Veterinary and Animal Sciences, Lahore in an ice-box and scanned for *G. duodenalis* cysts on the same day. The samples were subjected to Zinc Sulphate Flotation Technique (Sloss *et al.*, 1994) to determine the prevalence of *G. duodenalis* cysts. The cyst shedding intensity from the positive samples was calculated by Sucrose Density Gradient Centrifugation Method (Gasser *et al.*, 1987). The collected data were analyzed statistically (Steel & Torrie, 1980).

## RESULTS AND DISCUSSION

The worldwide studies regarding *Giardiasis* have indicated widespread prevalence of *G. duodenalis* in farm animals under different managerial and environmental conditions. The overall prevalence of *G. duodenalis* cysts was 33.0% (99/201) in naturally infected buffaloes. The present prevalence has a similarity with Huetink *et al.* (2001) and Hunt *et al.* (2000) that it was 54.5 and 40.0% prevalent in buffalo calves, respectively. A lower prevalence of 2.2% (Majewska *et al.*, 1998), 8.9% (Wade *et al.*, 2000), 10.4% (Buret *et al.*, 1990), 14.0% (Bednorska *et al.*, 1998), 16.0% (O'Handley *et al.*, 1999) and 18.6% (Vilchez & Potel, 1999) has been reported in cattle and buffaloes. On the other hand, it showed a higher prevalence of 57.0 to 58.0% (O'Handley *et al.*, 2000), 73% (Olson *et al.*, 1997) and 100.0% (Himonas *et al.*, 1998) in buffaloes and cattle from the different parts of the globe. The wide variation in its prevalence is probably due to difference in management practice, climate, detection methods, parasitic burden and age of sampled population.

**Table I. Age related prevalence of *G. duodenalis* in buffaloes (n=300)**

Age groups	No. of samples examined	Positive samples	Negative samples	Prevalence (%)
G 1 ( $\leq 1$ year)	100	43	57	43.0 <sup>*</sup>
G 2 (1-3 years)	80	23	57	28.7
G 3 ( $\geq 3$ years)	120	33	87	27.5
Total	300	99	201	33.0

\* denotes significance at 0.05 level

**Table II. *G. duodenalis* cysts in normal and abnormal faeces (n=300)**

Condition of faecal sample	No. of samples conducted	Positive samples	Negative samples	Prevalence (%)
Normal	120	28	92	23.33
Loose	180	71	109	39.44 <sup>*</sup>

\* denotes significance at 0.01 level

**Table III. Shedding intensity of *G. duodenalis* in different age groups of buffaloes (n = 99)**

Age group	No. of positive samples	Cysts per gram of faeces (CPG)
G 1 ( $\leq 1$ year)	43	4.5x10 <sup>3</sup> A
G 2 (1-3 years)	23	2.8x10 <sup>3</sup> AB
G 3 ( $\geq 3$ years)	33	1.7 x10 <sup>3</sup> B
Total	99	3.2 x10 <sup>3</sup>

The values having different alphabets along the column differ significantly (p<0.01)

**Table IV. Shedding intensity of *G. duodenalis* in normal and abnormal faeces (n=99)**

Faecal consistency	No. of positive samples	Total cyst per gram of faeces (CPG)	Average cyst per gram of faeces
Normal	28	7.5x10 <sup>3</sup> B	2.7x10 <sup>2</sup>
Loose	71	3.1x10 <sup>3</sup> A	4.3x10 <sup>3</sup>

The values having different alphabets along the column differ significantly (p<0.01)

When compared with age factor, its prevalence was 43.0% (Table I) in buffaloes of group 1 followed by 28.7 and 27.5% in group 2 and 3, respectively. Group 1 had a significantly higher (P<0.05) cysts prevalence with the companion. *Giardiasis* occurs early in life and cyst excretion is seen in calves as young as four days of age. Younger buffalo calves (2-24 weeks) had higher (80%) cyst prevalence (Olson *et al.*, 1997) and Wade *et al.* (2000) mentioned that younger cattle (< 6 months) have higher risk of infection. A similar pattern has also been reported by Saeed (1998), O'Handley *et al.* (2000) and Huetink *et al.* (2001). Abnormal and normal faeces reflected 39.4 and 23.8% (Table II) cyst prevalence, respectively. Buffaloes with abnormal faeces had a significantly high infection (p<0.01) than those with normal faeces. Huetink *et al.* (2001) reported that *G. duodenalis* was more prevalent in diarrheic than in normal faeces. Some cross sectional

studies also implicated *Giardia* as a cause of diarrhea (Deshpande & Shastri, 1981; O'Handley *et al.*, 1999).

Shedding intensity of *G. duodenalis* cysts in sampled buffaloes are depicted in Table III. The mean cyst count was 3.2x10<sup>3</sup> cysts per gram of faeces (CPG). The CPG of buffaloes of group 1, 2 and 3 were 4.5 x10<sup>3</sup>, 2.8 x10<sup>3</sup> and 1.7x x10<sup>3</sup>, respectively. The shedding intensity of group 1 was significant different (p<0.01) from group 3, whereas, Group 1 with Group 2 and Group 2 with Group 3 revealed no difference. Mean *Giardia* CPG in normal faeces was 2.7x10<sup>2</sup> and 4.3x10<sup>3</sup> in abnormal faeces (Table IV) having a significant difference (P<0.01). A variable range of shedding intensity of *Giardia* cysts has been reported in calves. For instance, 4.1 x 10<sup>3</sup> and 3 x 10<sup>5</sup> cysts/gram of faeces (Taminelli & Eckert, 1989), 3.8 x 10<sup>7</sup> cysts/gram of faeces (Nydam *et al.* (2001), 110 to 270 cysts/gram of faeces (Nizeyi *et al.*, 2002) and 2230 cysts/gram of faeces at 5 week of age and then decreased to 2 cysts/gram of faeces at 25-27 weeks of age (Ralston *et al.*, 2003). This variation might be due to the different geographical conditions and parasitic burden in the infected animals. A higher infection rate and cysts shedding intensity of *G. duodenalis* could be attributed to the presence of other concomitant infection. Our buffalo population has a high parasitic infection rate and in one study over 80% of the buffaloes were found infected with various parasites (Nazir, 2003). A high infection rate of *G. duodenalis* in buffaloes indicate a risk for humans and other animals as studies have indicated its potential of cross species transmission. A detailed study on its epidemiology, pathogenesis, treatment and control is recommended.

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