Prevalence of Gastrointestinal Parasitic Infection in Sheep and Goats of Sandwip Island, Chattogram, Bangladesh

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Abbreviation	Elaboration
GDP	Gross Domestic Product
GI	Gastrointestinal
GIP	Gastrointestinal Parasites
CVASU	Chattogram Veterinary and Animal Sciences University
%	Percent
Sp.	Species

Abstract

Gastrointestinal parasitic infection is considered one of the major concerns of small ruminants (e.g., sheep and goat) production in Bangladesh. The current study was undertaken to explore the prevalence of gastrointestinal (GI) parasitic infection in small ruminants (sheep and goats) and its associated risk factors (e.g., age, sex, lactation, nutritional status, feeding practices etc.) in sheep and goats of three areas (Bauria, Magdhara and Santoshpur) of the Sandwip Island, Chattogram, Bangladesh. A total of 330 fecal samples of which 220 sheep and 110 goats were taken following random sampling technique from June to July 2019. The samples were subjected to direct smear, flotation and sedimentation techniques to screen out the positive samples. Results demonstrated that the overall prevalence of GI parasitic infection was 66.36% in small ruminants. Species wise prevalence indicated that 68.64% of sheep and 61.82% of goats harbored various parasitic infections. Seven types of gastrointestinal parasites (*Fasciola* sp., *Paramphistomum* sp., *Moniezia* sp., Strongyles, *Strongyloides* sp., *Trichuris* sp. and *Eimeria* sp.) were identified of which Strongyles (37.27%) were higher in sheep and *Fasciola* sp. (29.09%) was higher in goats. The prevalence of GI parasites was higher in Bauria (72.96%) among three areas of Sandwip. The prevalence GI parasites showed that poor health condition of animals (88.50%) were significantly more susceptible than the moderate (55.56%) and good health animals (54.41%). It was also observed that dewormed animals (>3 months interval) (70.23%) were significantly more prone to parasitic infection than the dewormed animals (≤3 months interval) (59.13%). The current study was fresh of its types and we recommended further studies for molecular detection of such diseases which will assist to take necessary prevention measures.

Key words: Gastrointestinal parasites, goat, prevalence, sheep

Chapter 1: Introduction

Globally, livestock production is growing faster than any other sector, and by 2020, livestock is predicted to become the most important agricultural sector in term of added value (Fereja, 2016). In Bangladesh, livestock is one of the most potential sector in rural economy. It plays an important role in improving human health by providing nutrition through milk and meat. In 2018-19 fiscal year, the population of cattle, buffalo, goats and sheep was 24.24 million, 1.50 million, 26.27 million and 3.54 million respectively in Bangladesh (Anonymous, 2019). The contribution of livestock to Gross Domestic Product (GDP) in Bangladesh was approximately 1.47% and livestock in agricultural production was 13.46% (Anonymous, 2019). About 20% of the population is directly and 50% indirectly dependent on the livestock sector (Anonymous, 2019).

In Bangladesh, agricultural production like rearing of sheep and goats plays an important role in the livelihood of rural people and provides an extra source of income especially for rural women helping in women empowerment (Kabir et al., 2019). It often requires a minimum investment and most of the animals are reared with traditional husbandry practices. They can withstand a period of draught better than any other livestock and they can use those pastures, which cannot be used by other livestock.

Gastrointestinal parasites like helminths and protozoa are very common in small ruminants (sheep and goats). The challenge is, however, much more severe in tropical countries due to favorable environmental conditions for GIP transmission (Mohanta et al., 2007). Small ruminants (sheep and goats) under intensive and extensive production systems are extremely susceptible to the effects of wide range of helminths (Abede and Esayas, 2001). GI parasites are thought to be one of the major constraints that hinder the development of livestock population (Jabbar and Green, 1983) and it also adversely affect the health and productivity of animal (Irfan, 1984). The losses caused by parasitic infestation are in the form of lowered general health condition, retarded growth rate, diminishing the working efficiency, decrease milk and meat production, abortion; cost associated with preventive

measures and reduces the disease resistance capability, which may ultimately lead to higher mortality (Radostits et al., 1994).

In Bangladesh, previous studies reported high prevalence of GI parasites in small ruminants affecting 60.67 - 65.9% sheep and 77%, 64.1 - 77% goats (Islam et al., 2017; Rahman et al., 2017). Various risk factors related to host and environment play an important role in the onset of GI parasitic infections. Environmental factors include agro-ecological conditions, animal husbandry practices such as housing system, deworming intervals and pasture management; these largely determine the type, incidence and severity of various parasitic diseases (Badran et al., 2012). Other risk factors such as the host species, sex of the animal, age, body condition and breed/genotype, parasite species and intensity of the worm population, have an effect on the development of gastrointestinal parasitic infections (Tariq et al., 2010).

Sandwip Island is a sub-district under Chattogram district of Bangladesh. This island is very prospective for rearing small ruminants due to its agro-ecological condition. In view of the impact of parasites on the economic losses to livestock, it is important to take an action to identify the major cause of parasitic infection in this area. In addition, no epidemiological information was available on GI parasites of this island. A proper understanding about the epidemiology of GI parasitism is a prerequisite for the rational designing of the effective preventive and control measures against these dreadful GI parasitic diseases (Rajarajan et al., 2017).

Therefore, the present study was conducted with following objectives:

1) To determine prevalence of GI parasites in small ruminants such as sheep and goats.
2) To determine the prevalence of GI parasites according to age, sex, lactation, feeding practices, nutritional status and deworming status.

Chapter 2: Materials and Methods

2.1 Study area

Three areas (Bauria, Magdhara and Santoshpur) of Sandwip Island were randomly selected for the current study. Sandwip (Latitude: 22º22' N - 22º34' N, Longitude: 91º26' E – 91º34' E) is a sub-district of Chattogram which is located along the south eastern coast of Bangladesh (Figure 1). It is bounded by Bamni River on the north, Bay of Bengal on the south, separated from the coast of Chattogram by Sandwip Channel on the east and Meghna River on the west. The average temperature is 25.7º C and the annual rainfall is about 2794 mm.

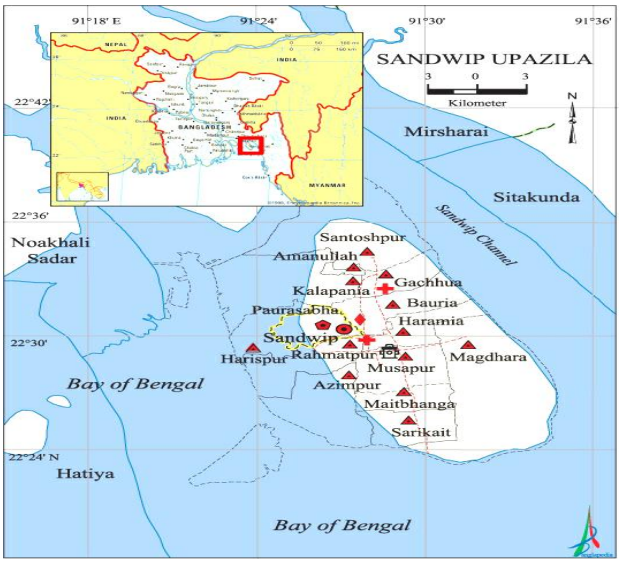


Figure 1: Map of Sandwip (Inset: Bangladesh) (Image source: www.banglapedia.org and www.britannica.com)

2.2 Study design and sampling strategy

A total of fecal 330 samples of which 220 sheep and 110 goats were taken following random sampling technique from June to July 2019. A prototype questionnaire was used to record the information like owner's name and address, animal Identification, age, sex, lactation status, nutritional condition, feeding practice and deworming history. The age of animal was determined by the standard dentition methods (Banerjee, 1964). According to the age, animal was divided into young (<1 year) and adult (≥1 year). Sex was determine by examining the external genitalia. Based on lactation, the animals were categorized into lactating and non-lactating group. The animal was examined to determine body condition score (BCS) as described by Detweiler et al. (2008). After calculating the BCS, animal was categorized into three group, namely, poor (BCS 1-<2), moderate (BCS 2-3) and good health (BCS >3). The animals that were provided concentrate feed regularly were grouped into regular

concentrate feed group and those that were provided concentrate feed irregularly were grouped into irregular concentrate feed group. The animals which were dewormed ≤3 months of interval were grouped into regularly dewormed animals and more than this interval was considered as irregularly dewormed animals.

2.3 Sample collection and preservation

Around 10 gm of rectal or freshly voided feces samples were collected for fecal examination according to standard methods (Urquhart et al., 1996). Then, air tight vials containing 10% formalin were used to preserve the samples. Each vial was marked with the unique identification number and that time basic demographic information also collected through questionnaire. After collecting, the samples were transported to the Department of Pathology and Parasitology, Faculty of Veterinary Medicine, CVASU. The samples were preserved at 4º C until examined.

2.4 Laboratory examination

The direct smear, flotation and sedimentation methods described by Urquhart et al. (1996) were performed to screen out the positive samples. The eggs of parasites were identified morphologically under a compound microscope (10x, 40x magnification) to the genus level, or in the case of Strongyles, to group level previously described (Soulsby, 1982) (Figure 2). A sample was considered as positive when minimum one GI parasite's egg was detected.

2.5 Statistical analysis

The collected information was imported, stored and coded accordingly using Microsoft (MS) Excel-2013™. The data was exported from MS Excel-2013™ to STATA™ 15.1 (Stata Corporation College Station, Texas) for Chi-Square test. Statistical significance was considered at 5% level ($P<0.05$).

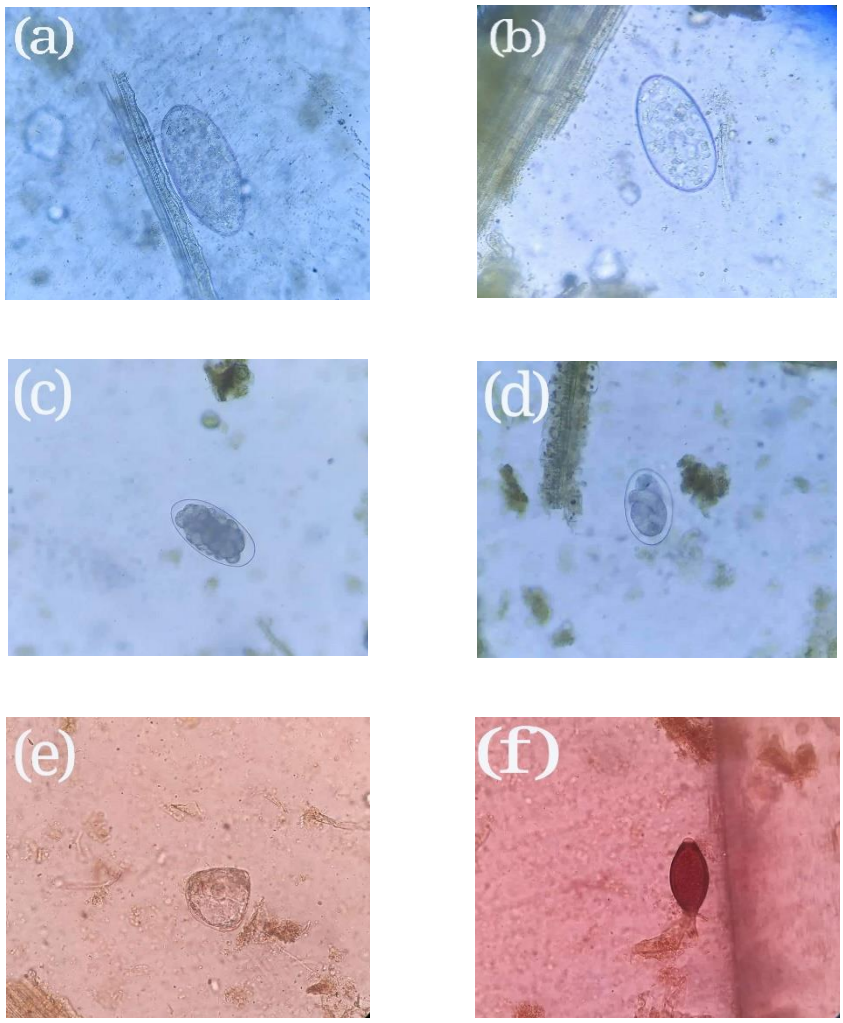


Figure 2: Egg of different gastrointestinal parasites in sheep and goat (40x). (a) *Fasciola* sp. (b) *Paramphistomum* sp. (c) Strongyle (d) *Strongyloides* sp. (e*) Moniezia* sp. (f) *Trichuris* sp.

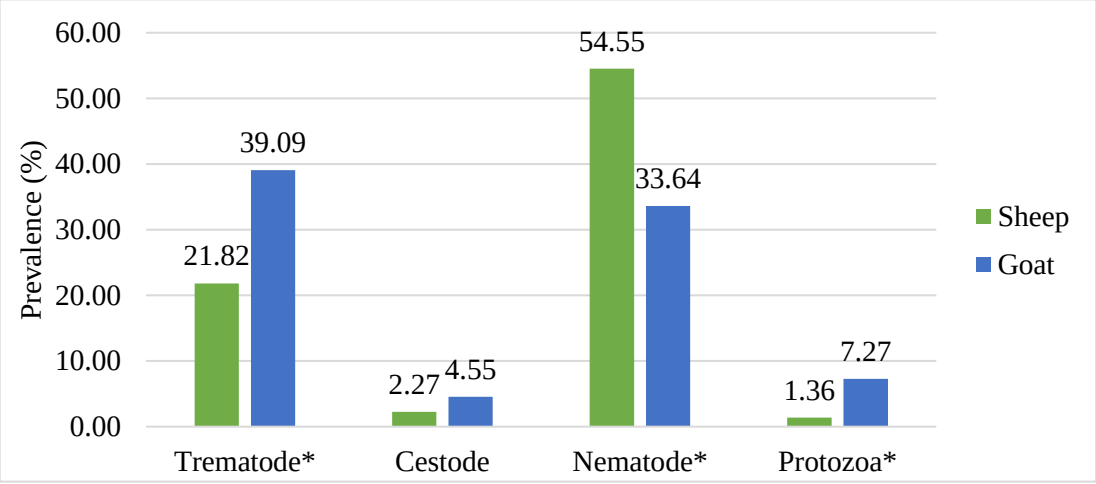
Chapter 3: Results

3.1. Overall prevalence of gastrointestinal parasitic infection in sheep and goat

Total of 330 small ruminants examined, 219 (66.36%) were found to be infected with one or more types of GI parasites. The prevalence of GI parasites were higher in sheep (68.64%) than goats (61.82%).

A mixed infection with two or more type of GI parasites was found in 33.33% of infected animals. Mixed infection was significantly higher (P = 0.000) in goats (48.53%) than in sheep (26.49%).

The prevalence of nematode (P = 0.000) was significantly higher in sheep than goats (Figure 3). On the other hand, trematode (P = 0.000) and protozoa (P = 0.005) showed significantly higher in goats in comparison to sheep (Figure 1). Between sheep and goats, there was no significant difference (P = 0.256) in case of cestode infection. Specifically, prevalence of Strongyles (P = 0.032) and *Strongyloides* sp. (P = 0.000) were significantly higher in sheep than in goats (Table 1). *Fasciola* (P = 0.000), *Trichuris* sp. (P = 0.004) and *Eimeria* sp. (P = 0.002) showed significantly higher prevalence in goats in comparison to sheep (Table1). Prevalence of *Moneizia* sp. (P = 0.256) was alike in both types of animal (Table 1).



*statistically significant

Figure 3: Prevalence of trematode, cestode, nematode and protozoa parasites in sheep and goat

Parasites	Sheep (N=220)		Goat (N=110)	
	Prevalence (%)	95% CI	Prevalence (%)	95% CI
Fasciola sp.*	13.18	0.093 - 0.182	29.09	0.214 - 0.381
Paramphistomum sp.	9.09	0.059 - 0.136	13.64	0.084 - 0.212
Moniezia sp.	2.27	0.009 - 0.052	4.55	0.019 - 0.102
Strongyles*	37.27	0.311 - 0.438	25.45	0.182 - 0.343
Strongyloides sp.*	28.64	0.230 - 0.349	10.00	0.056 - 0.170
Trichuris sp.*	0.91	0.002 - 0.032	6.36	0.031 - 0.125
Eimeria sp.*	1.36	0.004 - 0.393	8.18	0.043 - 0.148
Overall	68.64	0.622 – 0.744	61.82	0.524 – 0.703

N= Total no. of animal; CI= Confidence interval; *****significant

Table 1: Prevalence of gastrointestinal parasitic infection in sheep and goat

3.2. Area wise prevalence of gastrointestinal parasitic infections in sheep and goat

In current study, the overall prevalence was the highest in Bauria (72.96%), followed by Magdhara (69.81%) and Santoshpur (56.64%) which were statistically significant (P = 0.023). Prevalence of nematode was higher in all three areas. Bauria and Magdhara showed the lowest for cestode whereas Santoshpur showed the lowest prevalence for protozoa infections (Figure 4).

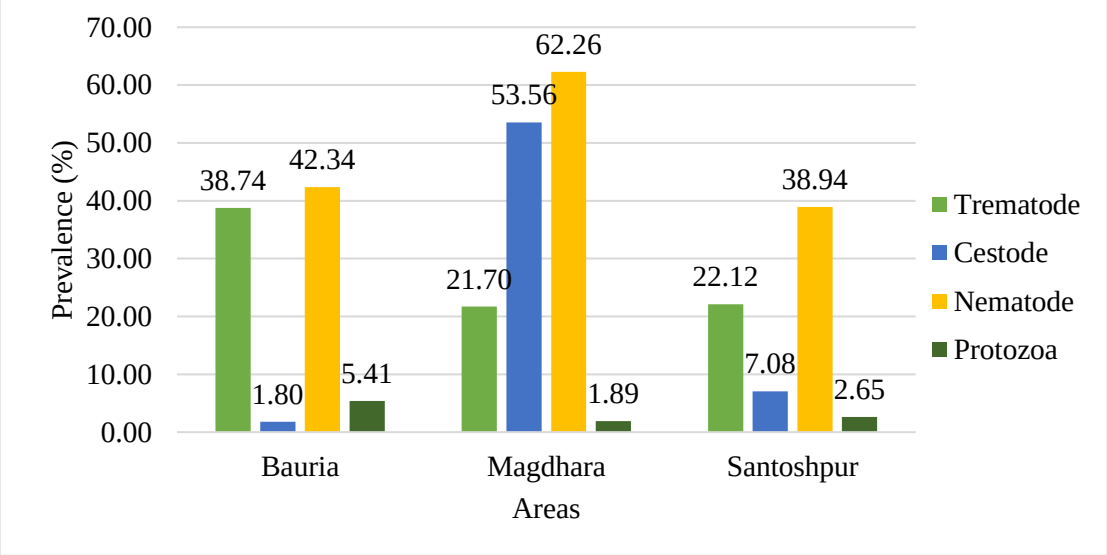


Figure 4: Prevalence of trematode, cestode, nematode and protozoa in three areas of Sandwip in small ruminants

3.3. Age specific prevalence of gastrointestinal parasitic infections in sheep and goat

The overall prevalence of parasitic infection was found higher in adults (68.29%) than young (63.20%) (P = 0.342). The prevalence of parasitic infection was higher in young (70%) in comparison to adult sheep (67.86%) whereas adult goats (69.23%) were more infected with GI parasites than the young goats (51.11%) (Table 2). However, age related data was not significant (P>0.05).

Parasites	Sheep			Goat		
	Young % (N=80)	Adult % (N=140)	p-value	Young % (N=45)	Adult % (N=65)	p-value
Fasciola sp.	12.50 (10)	13.57 (19)	0.821	20.00 (9)	35.38 (23)	0.081
Paramphistomum sp.	10.00 (8)	5.71 (8)	0.239	4.44 (2)	20.00 (13)	**0.019***
Moniezia sp.	1.25 (1)	2.86 (4)	0.442	8.89 (4)	1.54 (1)	0.069
Strongyles	40.00 (32)	35.71 (50)	0.527	28.89 (13)	23.08 (15)	0.491
Strongyloides sp.	30.00 (24)	27.86 (39)	0.735	4.44 (2)	13.85 (9)	0.106
Trichuris sp.	0.00 (0)	1.43 (2)	0.283	4.44 (2)	7.69 (5)	0.493
Eimeria sp.	1.15 (1)	1.43 (2)	0.913	0.00 (0)	13.85 (9)	**0.009***
Total	70.00 (56)	67.86 (95)	0.742	51.11 (23)	69.23 (45)	0.054

N= Total no. of animal;*significant

Table 2: Age-specific prevalence of gastrointestinal parasitic infection in sheep and goat

3.4. Sex specific prevalence of gastrointestinal parasitic infections in sheep and goat

In current study, the overall prevalence of GI parasites in sex showed that female (67.39%) had more prevalent than male (64%) (P = 0.549). While, it is interesting to note that in goats the prevalence of GI parasites was higher in male (64.29%) in compare to female (60.29%), while in sheep the opposite result was found (Table 3). However, sex related prevalence was not significant (P>0.05).

Parasites	Sheep			Goat		
	Female % (N=162)	Male % (N=58)	p-value	Female % (N=68)	Male % (N=42)	p-value
Fasciola sp.	11.73 (19)	34.48 (20)	0.287	27.94 (19)	30.95 (13)	0.735
Paramphistomum sp.	8.02 (13)	5.17 (3)	0.473	10.29 (7)	19.05 (8)	0.194
Moniezia sp.	2.47 (4)	1.72 (1)	0.744	7.35 (5)	0.00 (0)	0.072
Strongyles	40.74 (66)	27.59 (16)	0.075	25.00 (17)	26.19 (11)	0.889
Strongyloides sp.	25.31 (41)	37.93 (22)	0.068	5.88 (4)	16.67 (7)	0.067
Trichuris sp.	1.23 (2)	0.00 (0)	0.395	4.41 (3)	9.52 (4)	0.286
Eimeria sp.	1.23 (2)	1.72 (1)	0.783	8.82 (6)	7.14 (3)	0.755
Total	70.37 (114)	63.79 (37)	0.354	60.29 (41)	64.29 (27)	0.675

N= Total no. of animal

Table 3: Sex specific prevalence of gastrointestinal parasitic infections in sheep and goat

3.5. Lactation-wise prevalence of gastrointestinal parasitic infections in sheep and goat

Overall prevalence of parasites was observed higher in lactating animal (68.53%) than non-lactating animal (64.71%) (P = 0.466). Lactating sheep (71.96%) also

seemed to be more infected with GI parasites than the non-lactating sheep (65.49%) whereas non-lactating goats (63.51%) found to be more infected with GI parasites than the lactating goats (58.33%) (Table 5). Non-lactating sheep and goats seem to be more infected with Strongyles and *Strongyloides* sp. (Table 4). Although they did not reach the significance (P>0.05). Lactating goats showed significantly (P = 0.003) higher prevalence with *Eimeria* sp. than the non-lactating goats (Table 4).

Parasites	Sheep			Goat		
	Non lactating (N= 113) %	Lactating (N= 107) %	p-value	Non lactating (N= 74) %	Lactating (N= 36) %	p-value
Fasciola sp.	14.16 (16)	12.15 (13)	0.660	28.38 (21)	30.56 (11)	0.814
Paramphistomum sp.	5.31 (6)	9.35 (10)	0.249	13.51 (10)	13.89 (5)	0.957
Moniezia sp.	1.77 (2)	2.80 (3)	0.607	6.67 (5)	0.00 (0)	0.110
Strongyles	38.94 (44)	35.51 (38)	0.600	29.73 (22)	16.67 (6)	0.140
Strongyloides sp.	30.97 (35)	26.17 (28)	0.431	10.81 (8)	8.33 (3)	0.684
Trichuris sp.	0.88 (1)	0.93 (1)	0.969	9.46 (7)	0.00 (0)	0.057
Eimeria sp.	0.88 (1)	1.87 (2)	0.529	2.70 (2)	19.44 (7)	**0.003***
Total	65.49 (74)	71.96 (77)	0.301	63.51 (47)	58.33 (21)	0.600

N= Total no. of animal;*significant

Table 4: Lactation-wise prevalence of gastrointestinal parasitic infections in sheep and goat

3.6. Nutritional status related prevalence of gastrointestinal parasitic infections in sheep and goat

In this study, nutritional status showed significant difference on the prevalence of GI parasites. Highest overall prevalence of GI parasites was observed in poor health

(88.50%) animal followed by moderate (55.56%) and good health (54.41%) animal (P = 0.00). Individually sheep and goats showed similar kind of result (Table 5). Poor health sheep and goats had significantly higher prevalence for Stronglyes and *Strongyloides* sp. (Table 5).

Parasites	Sheep				Goat			
	Poor (N=70) %	Moderate (N=44) %	Good (N=106) %	p-value	Poor (N=43) %	Moderate (N= 37) %	Good (N=30) %	p-value
Fasciola spp	18.57 (13)	9.09 (4)	11.31 (12)	0.254	32.56 (14)	24.32 (9)	30.00 (9)	0.715
Paramphistomum spp	11.43 (8)	2.27 (1)	6.60 (7)	0.174	20.93 (9)	8.11 (3)	10.00 (3)	0.198
*Moniezia*spp	2.86 (2)	0.00 (0)	2.83 (3)	0.528	11.63 (5)	2.70 (1)	3.33 (1)	0.614
Strongyles	50.00 (35)	47.73 (21)	24.53 (26)	**0.001***	37.21 (16)	24.32 (9)	10.00 (3)	**0.031***
Strongyloides spp	45.71 (32)	15.91 (7)	22.64 (24)	**0.000***	18.60 (8)	2.70 (1)	6.67 (2)	**0.047***
*Trichuris*spp	0.00 (0)	4.55 (2)	0.00 (0)	**0.018***	11.63 (5)	2.70 (1)	3.33 (1)	0.193
Eimeria spp	2.86 (2)	2.27 (1)	0.00 (0)	0.235	11.63 (5)	5.41 (2)	6.67 (2)	0.562
Total	91.43 (64)	68.36 (27)	56.60 (60)	**0.000***	83.72 (36)	48.65 (18)	46.67 (14)	**0.001***

N= Total no. of animal;*significant

Table 5: Nutritional status related prevalence of gastrointestinal parasitic infections in sheep and goat

3.7. Feeding practice related prevalence of gastrointestinal parasitic infections in sheep and goat

Current study further revealed that, animal reared with irregular concentrate (69.68%) feed showed higher prevalence of GI parasites than reared with regular concentrate feed (61.97%). However, the difference was not statistically significant (P = 0.142). Individually sheep and goats showed similar kind of result (Table 6).

Parasites	Sheep			Goat		
	Irregular concentrate (N= 118) %	Regular concentrate (N= 102) %	p-value	Irregular concentrate (N= 70) %	Regular concentrate (N= 40) %	p-value
Fasciola sp.	16.10 (19)	9.80 (10)	0.169	30.00 (21)	27.50 (11)	0.781
Paramphistomum sp.	13.56 (16)	0.00 (0)	**0.000***	20.00 (14)	2.50 (1)	**0.010***
Moniezia sp.	1.69 (2)	2.94 (3)	0.536	5.71 (4)	2.50 (1)	0.436
Strongyles	33.05 (39)	42.16 (43)	0.164	28.57 (20)	20.00 (8)	0.321
Strongyloides sp.	27.97 (33)	29.41 (30)	0.813	12.86 (9)	5.00 (2)	0.186
Trichuris sp.	0.00 (0)	1.96 (2)	0.126	7.14 (5)	5.00 (2)	0.658
Eimeria sp.	2.54 (3)	0.00 (0)	0.105	8.57 (6)	7.50 (3)	0.844
Total	70.34 (83)	66.64 (68)	0.558	68.57 (48)	50.00 (20)	0.054

N= Total no. of animal;*significant

Table 6: Feeding practice related prevalence of gastrointestinal parasitic infections in sheep and goat

3.8. Deworming status related prevalence of gastrointestinal parasitic infections in sheep and goat

Rarely dewormed (> 3 months interval) animal (70.23%) was more likely to become infected with GI parasites than frequently dewormed (≤ 3 months interval) small ruminant (59.13%) with statistically significant difference (P = 0.042). Individually sheep and goats showed similar kind of results but statistical significance was not found in sheep (Table 7).

Parasites	Sheep			Goat		
	Rarely dewormed (N= 150) %	Frequently dewormed (N= 70) %	p-value	Rarely dewormed (N= 45) %	Frequently dewormed (N= 65) %	p-value
Fasciola sp.	16.00 (24)	7.14 (5)	0.070	53.33 (24)	12.31 (8)	**0.030***
Paramphistomum sp.	10.67 (16)	5.71 (4)	**0.005***	31.11 (14)	1.54 (1)	**0.004***
Moniezia sp.	3.33 (5)	0.00 (0)	0.122	6.67 (3)	3.08 (2)	0.966
Strongyles	31.33 (47)	50.00 (35)	**0.008***	40.00 (18)	15.38 (10)	0.517
Strongyloides sp.	30.00 (45)	25.71 (18)	0.512	17.78 (8)	4.62 (3)	0.332
Trichuris sp.	0.00 (0)	2.86 (2)	**0.038***	8.89 (4)	4.62 (3)	0.914
Eimeria sp.	2.00 (3)	0.00 (0)	0.234	17.78 (8)	1.54 (1)	0.058
Total	69.33 (104)	67.14 (47)	0.744	72.31 (47)	46.67% (21)	**0.006***

N= Total no. of animal;*significant

Table 7: Deworming status related prevalence of gastrointestinal parasitic infections in sheep and goat

Chapter 4: Discussion

Gastrointestinal (GI) parasitic infection causes serious health problem in small ruminants such as sheep and goat. Current study revealed an overall prevalence of 66.36% parasitic infection in sheep and goat in Sandwip. This finding indicates high level of GI parasitic infection in the small ruminant of Sandwip. This level of infection was 63-67% in small ruminants also have been reported by previous research (Asif et al., 2008; Rahman et al., 2017; Velusamy et al., 2015). However, the overall prevalence reported in this study was relatively lower than the report of Koinari et al. (2013) and Singh et al. (2017) who reported 78% and 83.03% from Papua New Guinea and India, respectively. Comparatively lower prevalence was reported by Dagnachew et al. (2011) and Rajarajan et al. (2017) who reported 47.47% and 43% from Ethiopia and India, respectively. The reason of difference might be due to sample size, geographic locations, climatic states, breed of animal, anthelmintic treatment and management system.

This study showed lack of significant difference in the prevalence of GI parasites between sheep and goats. This may be due to most of the farmers in Sandwip were rearing mixed species flocks which usually grazed together that might give equal chances for both species to be infected with GI parasites. In consent to this findings, Rahman and colleagues have also reported no significant difference in prevalence between sheep and goats. Similarly, unlike the present study significantly higher prevalence of GI parasites was observed in sheep than in goats by Singh et al. (2017) and Velusamy et al. (2015).

This study found significantly higher prevalence of nematodes infection in sheep in compare to goats. On the other hand, goats were found significantly more infected with trematode and protozoa than in sheep (Figure 3). Sheep prefer to graze, while goats usually browse that's why goats avoid the infective nematode larvae, which usually remain on the grass consumed by sheep, particularly when sheep and goats feed together. In consistent with this result, higher prevalence of nematodes in sheep was reported by previous research (Gorski et al., 2004) and higher prevalence of trematodes and protozoa in goats were reported by prior research (Dabasa et al.,

2017). In contrast, higher prevalence of nematodes in goats and higher prevalence of protozoa in sheep were reported by prior published article (Islam et al., 2017). This variation may be due to availability of intermediate hosts, grazing practice and rearing system.

The various species of GI parasites identified in this study have also been reported by previously published reports from different areas of Bangladesh (Hossain et al., 2016; Rahman et al., 2017) and other geographic locations (Dagnachew et al., 2011). Yet, the present study has variation in the prevalence of GI parasites with the mentioned studies, which may be attributed to geographic locations, climatic states required for the development of free living stages of different parasites.

Overall prevalence of GI parasites in Bauria and Magdhara were close and Santoshpur showed the lowest GI parasitic prevalence. The lowest prevalence in Santoshpur may be due to intensive management system of animals followed by the most of farmers in this area. The lower prevalence of the GI parasites under intensive management system was reported by the previously published research (Iyad et al., 2012). There is no recent data available on the prevalence of parasitic infections in none of the areas of Sandwip.

In this study, young and adults showed no statistically significant difference in GI parasitic prevalence. This may be due to equal opportunities in grazing land for both age groups. In consistent with this result, Getachew and colleagues (2017) also found no significant differences between age groups. However, Islam and his co-workers found higher prevalence in young whereas Rahman et al. (2017) and Singh et al. (2017) found higher prevalence in adults.

In this study, sex of animal did not show any significant association with the prevalence of GI parasites. Islam and Taimur (2008) and Rahman et al. (2017) also found no significant association between sexes with the prevalence of GI parasities. It could be due to the grazing practices in Sandwip, wherein, males and females were grazed together on same grazing land, having equal opportunity of infection. In concordance with this result, significantly higher prevalence in female was reported by Islam et al. (2017) and Singh et al. (2017).

This study found, no significant association of lactation with parasitic prevalence. Sorathiya and colleagues (2016) also did not find any significant association of lactation with parasitic prevalence. Both lactating and non-lactating animal used to graze together on grazing land which might give equal chances of exposure (Sorathiya et al., 2016).

This study revealed, nutritional status had significant effect on the prevalence of GI parasites. Parasitic prevalence was relatively higher in both sheep and goats with poor health followed by moderate and good health. The animals with poor health might have low immunity to resist parasitic infection which might lead to higher parasitic prevalence. Islam et al. (2017) and Rahman et al. (2017) observed consistency with this result. In contrast, Dabasa and colleagues (2017) found that animal with good condition more likely prone to GI parasites and they justified that emaciation observed in the studied animals were due to malnutrition and concurrent infections.

In this study, no statistically significant variation had been observed between irregular and regular concentrate feeding practice with parasitic prevalence which indicates regular concentrate feeding had no effect on parasitic prevalence. It also noted that along with concentrate feed, most of the animal grazed regularly. No available data has been found on parasitic prevalence with concentrate feeding practice.

This study further found that, regularly dewormed animal had significantly lower parasitic prevalence than rarely dewormed animal. Ratanapob and colleagues (2012) also found similar significant difference. However, Amran et al. (2018) and Kantzoura et al. (2012) did not find any significant association with deworming which may be attributed to lack of proper interval.

Limitations

Seasonal variation of gastrointestinal parasitic infections was not observed due to time shortage. This study was limited to certain parameters and some parameters (breed, flock size, pregnancy status, housing condition etc.) were left untouched so that future researchers can elaborate this study by approaching the untouched portion.

Conclusion

The investigation documented a higher prevalence of GI parasites in sheep and goat in Sandwip Island, Chattogram. The highest prevalence of gastrointestinal parasitic infections was found in Bauria union. Sheep was more prone to be infected by Strongyles and goat was more susceptible to be infected with *Fasciola* sp.. Gastrointestinal parasitic infections were strongly associated with nutritional status and deworming interval. Further extensive studies are recommended to identify the various disease along with GI parasites in this area which will ultimately assist to build up an effective preventive and control measures.

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