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STUDY OF GASTRO-INTESTINAL HELMINTH INFECTION IN INDIGENOUS COW POPULATION FROM BENGAI & GOBINDAPUR VILLAGES OF THE DISTRICT HOOGHLY OF WEST BENGAL

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ABSTRACT

The type and infection rate of Helminth parasites in indigenous cow population of Bengai and Gobindapur region of the district Hooghly of West Bengal is observed. The qualitative methods i.e. direct smear, simple test tube flotation and sedimentation methods are conducted in parallel manner to identify the type as well as infection rate of helminth in cow population. Both areas are with same geo-climatic condition and indigenous cow species but with different rearing method and population size which helps to develop a comparative study with infection rate. We also compare the helminth infection rate with age and sex of cattle. Several type of gastrointestinal macro-endo-parasitic helminth infection detected among them the Trematode parasite *Fasciola sp.*, the Cestode parasite *Taenia sp.*, and the Nematode parasite *Toxocara sp.* are predominant. The infecting Helminth species are almost equal in both region but the rate of infection is comparatively higher in Bengai region due to rearing method, feeding habit, grazing area and availability of intermediate host in pasture etc.

KEYWORDS: Bengai and Gobindapur village, Gastrointestinal helminth Parasites, Indigenous cattle, Prevalence.

1. INTRODUCTION

Helminthology is the study of worms i.e., round worms, flat worms etc. which are either parasitic or free living. Recent parasitological researches are frequently occurred with Taxonomy, external and internal morphology, immunology, pathogenesis and pathology, epidemiology etc. where parasitic worms are the area of interest.[1]

Several pathological analyses performed with excretory products of host because the excreta of the body may contain different type of micro and macro-endo-parasite where macro-endo-parasites are either adult or in immature stage depending on the nature of parasite, incubation period and the rate of infection. Among excreta, the fecal matter is important in gastro-intestinal parasitic (helminth) study because the eggs, larvae and adult parasite leave the body through it.

India is now world's number one milk production country[2], thus have to maintain the richest buffalo population & world's second richest cow & goat population. In tropical and subtropical countries (especially in India) the health of the cattle is mostly affected by the gastro-intestinal helminth infection which occurs frequently in young age.[3-4] Because the climatic factors such as rainfall, humidity, temperature etc. and ecological factors like food habit, inter & intra species interaction, host parasite interaction; indigenous cattle species culture by traditional method etc. are favorable for successful completion of the macro-endo-parasitic life cycle through infection.[5-6] As a result it causes severe economic losses by increasing cattle mortality rate, malnutrition & low body weight, delaying sexual maturity and inadequate milk production.[7]

Thus the study of type & intensity of macro-endo-parasite infection in cow population by fecal analysis is the simplest and effective method for diagnosis of affected host and further recovery.

2. Study area

Population basis study of helminth infection was done at the village Bengai which situated in the block Goghat-II and from village Gobindapur in the same block of the district Hooghly of West Bengal. These regions having same geo-climatic condition and the distance is less than 6 km.

The study areas have several significances in relation with this study.

Bengai village

Most of the cattle population (cow) is comprised of indigenous species and with grazing habits on wild pasture in which vector and intermediate hosts of helminth are available. Patch or flock size of cow varies

within 1-6 individuals and the laboratory is situated near the village.

Gobindapur village

Most of the cattle population (cow) is comprised of indigenous species which are rear in cow-house with supplied food materials. Vector and intermediate hosts of helminth parasite are present in that area. Patch or flock size varies within 2-15 individual and the laboratory is situated near the village.

3. Climatic condition

The areas Bengai & Gobindapur is situated in the district of Hooghly of W.B. at 22.94^{0}N& 87.69^{0}E; 22.36^{0}N & 88.05^{0}E respectively. Hooghly has a tropical savanna climate with annual mean temperature 26.8^{0}C, although monthly mean temperature range from 16^{0}C to 33^{0}C and maximum temperatures in Hooghly often exceed 38^{0}C. In winter the monthly average temperature is lying between 11^{0}C to 17^{0}C. Average relative humidity is 71%.The Monsoon play the major role in seasonal influence upon the climate and the maximum rainfall occurs during the monsoon (JUN to OCT) in August. The average annual total rainfall is above 1500mm.[8]

Fig 1: Map of Hooghly indicating Bengai (●) and Gobindapur (▲) village

4. *Study animals*

The animals (indigenous cow) are identified & observed randomly within study area. At first they are observed morphologically & noted physical features like body weight, physical fitness, food consumption etc. before collection of fecal sample will occur.

5. Materials and methods

Simple random sampling method was applied to collect fresh cattle (cow) fecal sample.[9-10] Then the parasitological analysis (microscopic) of cattle fecal sample occurred to identify the type of helminth infection by identifying the helminth eggs applying several methods.

5.1. Collection of fecal samples

Collection of fecal samples for parasitological examination occurred from the rectum of the animal. Several samples should be collected and samples should be dispatched as soon as possible to a laboratory in suitable containers. Each sample should be clearly labeled with animal identification, date and place of collection. The container is filled to its capacity or tightening the sleeve as close to the feces as possible to exclude air from the container.

5.2. Parasitological analysis for identifying and concentrating eggs by qualitative method

Here the direct smear, test-tube flotation and sedimentation method are used for parasitological analysis.

5.2.1. *Direct smear method*

We use direct smear method which is a useful technique to identify intestinal parasitic infection of different animals by analyzing feces. The live or dead adult parasite, parasitic eggs or larval stages are generally observed in this process.

This method is suitable for a very rapid examination, but it usually fail to detect low grade infections.

5.2.2. Simple test tube flotation method

We use the simple test tube flotation method which is a qualitative test for the detection of Nematode and Cestode eggs and coccidian oocysts in the feces. It is based on the separation and concentration techniques of eggs from fecal material by means of a flotation fluid with comparatively higher specific gravity than eggs e.g. Saturated aqueous $ZnSO_4$ solution (**1.18**), Saturated aqueous NaCl solution (**1.20**), 50% NaOH solution (**1.53**) etc.

This is a good technique to use in initial surveys to establish which groups of parasites are present.

5.2.3. Sedimentation method

We use the sedimentation method which also is a qualitative method for detecting Trematode eggs in the feces. Most Trematode eggs are relatively large and heavy compared to nematode eggs. Mean specific gravity of some helminth eggs are *Ancylostoma caninum* (1.0559), *Toxocara canis* (1.0791), *Toxocara cati* (1.1005), *Taenia sp.* (1.2251) and *Physaloptera sp.* (1.2376) etc.[11] Thus this method concentrates them in sediment.

This is a procedure to assess the presence of Trematode infections. It is not run routinely generally run only when such infections are suspected by morphological and physiological symptoms. The procedure can be used generally to detect liver fluke, *Paramphistomum* etc. by their eggs.

6. Observation

During the period of observation we performed qualitative method to identify the infecting helminth species and the rate of infection respectively in the study area. Actually we used the qualitative method to identify the infected individual or host (cow).

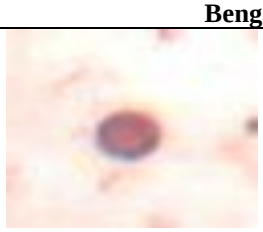
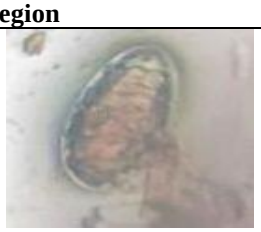
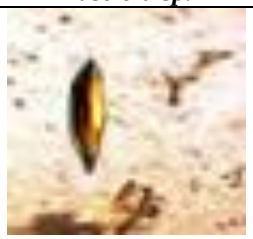
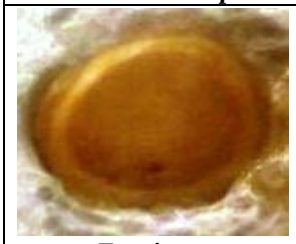
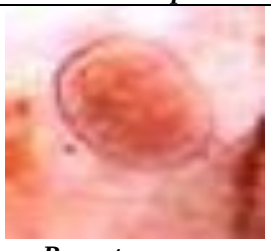
6.1. *Microscopical examination of prepared samples*

The prepared samples on micro-slides, obtained from the simple test tube flotation method and the sedimentation method are examined under a microscope at the magnification listed below.

The magnification level of Nematode & Cestode eggs, Trematode eggs, Coccidian eggs are 10X10, 10X4 & 10X40 respectively.

There are several types of Nematode and Trematode gastrointestinal endo-macro-parasitic eggs identified on the basis of morphological features described by Solsby[12] among them the frequently abundant parasitic species observed in replication samples are tabulated below.

Table1: Observed infecting eggs of helminth.

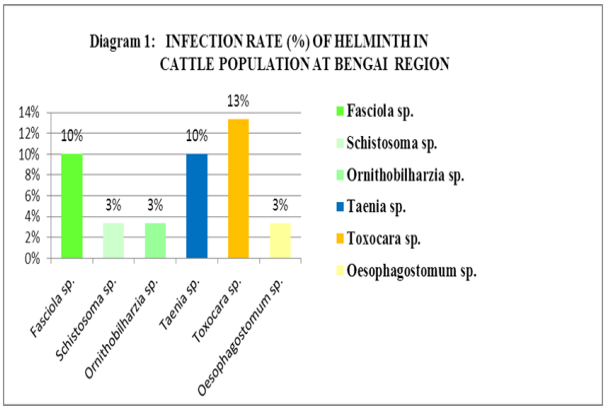
LIGHT MICROSCOPIC IMAGE OF HELMINTH EGGS			
Bengai region		**Gobindapur region**	
 ***Toxocara sp.***	 ***Oesophagostomum sp.***	 ***Toxocara sp.***	 ***Fasciola sp.***
 ***Schistosoma sp.***	 ***Fasciola sp.***	 ***Taenia sp.***	 ***Schistosoma sp.***
 ***Taenia sp.***	 ***Ornithobilharzia sp.***	 ***Bunostomum sp.***	 ***Strongyloides sp.***

7. RESULT

The type and prevalence of Helminth eggs in observed cow populations are tabulated with diagrammatic representation.

Table 2: Types & prevalence of helminth eggs in cow population

	Sl No.	Types of egg		Number of fecal sample Examined	Number of fecal sample positive (Single+Mixed)	Infection Rate (%) In Cattle Population	TOTAL (%)
BENGAI	1	Trematode	*Fasciola sp.*	30	3	10	16.66
			Schistosoma sp.	30	1	3.33	
			Ornithobilharzia sp.	30	1	3.33	
	2	Cestode	*Taenia sp.*	30	3	10	10
	3	Nematode	*Toxocara sp.*	30	4	13.33	16.66
			Oesophagostomum sp.	30	1	3.33	
GOBINDAPUR	1	Trematode	*Fasciola sp.*	30	2	6.67	10
			Schistosoma sp.	30	1	3.33	
	2	Cestode	*Taenia sp.*	30	2	6.67	6.67
	3	Nematode	*Toxocara sp.*	30	2	6.67	13.33
			Bunostomum sp.	**30**	**1**	**3.33**	
			Strongyloides sp.	**30**	**1**	**3.33**	



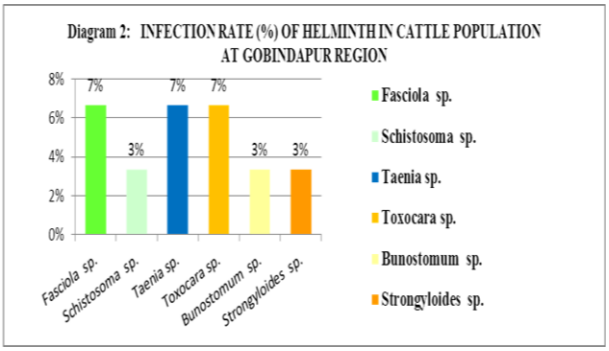
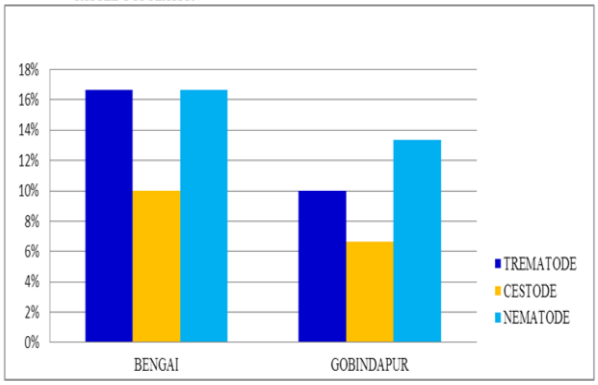


Diagram 3: COMPARATIVE STUDY OF HELMINTH INFECTION RATE IN DIFFERENT CATTLE POPULATION



7.1. Comparative study of helminth infection between two adjacent areas having same geo-climatic condition

We identify several type of helminth infection in the study areas during the observation period among them most are common but a few eggs like *Toxocara, Fasciola etc.* are varying with infection rate. Both single & mixed infections are comparatively higher in Bengai than Gobindapur region. In comparison between study areas the Trematode & Cestode infections are more fluctuated than Nematode infection.

7.2. Relationship of helminth egg prevalence with ecological (grazing area, food habit and population density) and geo-climatic factors

In Bengai region egg prevalence is higher than Gobindapur region which indicate the difference in ecological factors because the other factors are almost equal.

The relationship between ecological factors like grazing area, food habit, population density etc. and egg prevalence are significant.[13-14] Our study reveals it again. Egg prevalence depends on food habit of the cattle and the presence of intermediate host which again depends on the types of the pasture. The greater cattle population size and limited pasture also promote the animals to uptake grass near from the submerge areas and near from feces thus the rate of new infection as well as egg prevalence in fecal sample significantly increases.[1]

The Geo-climatic factors like temperature, rainfall, humidity, moisture etc. are predominantly regulate the rate of Helminth infection in cattle. Because the factors have an optimum range for each species parasite which help to complete the life cycle of that parasite with new infection.

7.3. Prevalence of fecal eggs (helminth) with age & sex of cattle

Helminth infections are observed randomly in both male and female in all age of cattle. But the rate of infection is

to some extent varies this is because the developing adaptive immune system, physical fitness, diet and feeding habit, maintenance etc. In calf the infection rate is greater than adult due to mainly the developing adaptive immune system. Males are more affected than female because in case of female during lactation period a special care have been taken with special diet which help to adapt its immune system and the mean age of female is more than male.[15]

8. CONCLUSION

We examine total 60 (30+30) individual of indigenous cow from Bengai and Gobindapur region of the district Hooghly of W.B. in winter season to obtain helminth infection where several parasites of Trematode, Cestode, and Nematode group are present with different rate of infection. Among them mostly are with light or moderate (*Fasciola*, *Taenia*) type infection rate and a few (*Toxocara*) are with high infection rate at specific climatic condition i.e., temperature range 33^0C to13^0C, monthly average rainfall 231.4cm to 14.7cm and monthly average humidity 81% to 58%.

In spite of same geo-climatic condition and host (indigenous cow), the rate of infection also differ in two adjacent area due to several ecological factors like grazing nature, food habit & maintenance, population density etc.

The rate of parasitic infection also changes with sex and age of cattle. The males are more affected than female due to lack of proper maintenance, diet and comparatively less mean age. Similarly the young are more affected than adult due to developing adaptive immune system.

Region wise data about helminth infection in indigenous cattle populations signify the actual state of host parasite interaction which helps to develop a comparative study.

Future aspect

In same geo-climatic condition & host the Trematode as well as Cestode parasitic infection are more fluctuated than Nematode requires further study to specify the reason. The indigenous cow species population in both region have high infection rate with *Toxocara* parasite than other requires further studies to identify the cause & its remedies.

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