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Prevalence of end parasites of pig at Mymensingh, Bangladesh

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Abstract: *We examined faecal samples (110) and viscera (20) of pig to investigate the prevalence of endoparasites from different areas of Mymensingh from January to May, 2013 by using Stoll's ova counting technique. In faecal samples examination, 96.4% animals were infected with 12 types of endoparasites, namely Ascaris suum (50.9%), Strongyloides sp.(29.1%), Oesophagostomum sp.(12.7%), Trichuris suis (9.1%), Ancylostoma sp. (3.6%), Hyostrongylus rubidus (1.8%), Fasciolopsis buski (14.6%), Dicrocoelium sp. (8.2%), Schistosoma suis (7.3%), Eimeria spp. (56.4%), Balantidium coli (40%) and Isospora suis (9.1%). The prevalence of gastrointestinal parasites in relation to age and sex were examined. In age groups, significantly ($p<0.05$) higher prevalence was found in growers (100%) and adults (100%) than piglets (90.5%). There was no significant difference between infection rates on male and female ($p>0.05$). In viscera (20) examination, seventeen (17) pigs were found to be infected with one or more species of endoparasites indicating an overall prevalence was 85%. Identified parasites were Ascaris suum. (65%), Trichuris suis (60%) and Fasciolopsis buski (55%). EPG/CPG/OPG were also calculated and ranges from 100-36500. It is concluded that pigs are highly susceptible to parasitic infection in Mymensingh. So, further investigation is needed to find out possible impact of parasitic infestations of pigs on public health.*

Key Words: *Prevalence, endoparasites, pig, Mymensingh*

I. Introduction

Infection of pigs with gastrointestinal (GIT) parasites is widely reported from all corners of the world and shown to be influenced by the type of pig management practiced. Poor environmental hygiene coupled with extensive managements is reported as risk factors of infection of pigs with GIT parasites [1]. Free range pig keeping is still common in the rural set-up of many developing countries inspite of its shortcomings such as poor feed conversion, high mortality rates and poor products and the risk of spreading zoonotic diseases such as cysticercosis [2] [3]. There are very few regions in Bangladesh where pigs are reared for consumption mainly by ethnic people and almost all ethnic families rear one or two pigs for household consumption. There is potential to develop pig industry in Bangladesh for increasing pork production for local consumption and trade. Parasitisms in pigs do not commonly represent the severe clinical diseases, but these parasitic infections hamper the production. In specific circumstances, different worm parasites can cause severe clinical illness and even death in pigs, such parasitism is also important economically as it can restrict growth, affect sow productivity and increase the cost of growth. Gastrointestinal parasites are responsible for substantial loss of productivity in swine and other livestock industry [4] [5]. The indigenous pig predominates in smallholder areas where it is kept under the free range system and thrives on low planes of nutrition [6]. These pigs are primarily scavengers [7], utilizing food scraps thrown away by people. The roaming of pigs favors the uptake of internal parasite eggs [8], making the pigs particularly susceptible to infestation with internal parasites. Moreover, the warm and humid conditions of the tropics and the inadequate treatment of local pigs against parasitic diseases [6] invariably cause them to carry heavy burdens of gastrointestinal (GI) nematodes. Pigs can harbor a range of parasites and diseases that can be transmitted to humans. These include trichinosis, Taenia solium, cysticercosis and fasciolosis. Thirty-nine percent (39%) of children have been found to be infected with Fasciolopsis buski in India and Bangladesh. There are few published information on the relationship between the parasitic infections and management factors in piggeries in Bangladesh. Considering these facts, the present study was undertaken to know the prevalence, intensity and status of endoparasites in relation to age and sex in pig.

II. Materials And Methods

2.1 Research Area

In this study, faecal samples and viscera of pig were collected from the Mymensingh Sadar. These samples were carried to the laboratory, Department of Parasitology, Faculty of Veterinary Science, Bangladesh Agricultural University, Mymensingh for morphological examination of the parasites and their developmental stages.

2.2 Study Period

The study was conducted for a period of five months from January to May, 2013.

2.3Selection of Pig

One hundred and ten (110) pigs were selected randomly irrespective of age and sex from the study area. The age of the pig was determined by interrogating the farmers. According to the age the pigs were divided into three groups, pigs under 6 months of age were classed as piglets (n = 42), those in the range of 7-12 months were classed as growers (n = 42) and those between 13-above months were classed as adults (n = 26). Pigs were further grouped as males (n = 66) and females (n = 44).

2.4 Collection and Preservation of Faecal Sample

After collection of all relevant information of selected pigs, the sample collection procedure was proceed. Freshly voided faecal samples from 110 pigs were collected by all possible hygienic measures such as wearing of apron, hand gloves, gumboot etc. to avoid contamination. Each samples were kept in separate polythene bag, tied carefully, numbered properly and the samples were preserved in 10% formalin. The faecal samples (with all required information) were brought to the laboratory and examined as early as possible.

2.5 Examination of Faecal Samples

Samples were examined at the laboratory in the department of Parasitology, Faculty of Veterinary Science, Bangladesh Agricultural University, Mymensingh. The faecal samples were processed for microscopic examination. The ova / cyst / oocyst of different parasites were identified according to the morphology and quantitative estimation was done by applying the modified Stoll's ova counting technique for counting the EPG / CPG / OPG (eggs /cysts/oocysts per gram of faeces) by their characteristic morphological features as described by [9] and [10].

2.6 Post-Mortem Examination for Helminth Parasites

Viscera of 20 pigs slaughtered at different local places were collected for parasitic investigations. After collection, the viscera were brought to the laboratory of Parasitology. Lungs, kidney with peri-renal fat, liver, spleen were also separated carefully. Liver and spleen were cut into small pieces and kept in two separate glass jars with normal saline. Then the pieces were squeezed gently and removed from the jar. After several washing the supernatant was poured off carefully and the sediment was examined for presence of parasites. Lungs were collected from all slaughtered pigs and were examined grossly for lung worms after opening the bronchial passages with scissors. The gastrointestinal tracts were placed in a clean bucket. Various parts of the tract were tied with thread and separated with scissors. Each part of the gastrointestinal tract was opened through long axis by giving longitudinal incision with scissors in separate clean buckets. The contents of the respective part were washed in several changes of water until became clean. The mesentery were cut into small pieces with the help of a sharp scissors and kept in a jar containing sufficient amount of normal saline. After some times the supernatant was decanted and the sediment was examined. The collected parasites were carefully washed in saline to remove mucus and other waste materials. Diaphragms and intercostals muscle were examined for the larvae of Trichinella spiralis by artificial digestion method. Kidney and perirenal fats were examined for the collection and detection of kidney worms.

Nematodes were preserved in glycerine alcohol and trematodes were in 10% formalin. Trematodes were identified according to the keys and description given by [9] and [11] by preparing permanent slide following the methods as described by [12]. Nematodes were identified by preparing temporary slides adding one drop of lactophenol [12] according to the keys and description given by [9], [13] and [14].

Statistical Analysis

The data were entered into Microsoft Excel and exported to SPSS version 17.0 (Statistical package for Social Scientists 2003) for statistical analysis.

III. Results And Discussion

3.1 Faecal Sample Examination

3.1.1 Overall prevalence of endoparasites of pigs

During the study period, about 96.4% pigs were infected with one or more endoparasites and 12 types of parasites were identified. Among identified parasites, six(6) species of nematodes such as Ascaris suum (50.9%), Strongyloides sp.(29.1%), Trichuris suis(9.1%), Oesophagostomum sp.(12.7%), Ancylostoma sp. (3.6%) and Hyostrongylus rubidus (1.8%); that of 3 species of trematodes such as Fasciolopsis buski (14.6%), Dicrocoelium sp. (8.2%) and Schistosoma suis(7.3%); that of 3 species of protozoa such as Eimeria spp.

(56.4%), Isospora suis (9.1%) and Balantidium coli (40%)(Table. 1). Similar results were reported by [15] in South Eastern Uganda (94.8%), [16] in Uganda (91%) and [17] in Burkina Faso (91%). The present report is nearly similar with the findings of [3] in Western Kenya (84.2%), [18] in Kenya (83%), [19] in Western Estonia (82%) and [20] in Southwest Nigeria (80.4%). The present report is higher than [21] in Korea, [22] in Kenya, [23] in Zimbabwe, [24] in Western Iran and [25] in Aizawl who reported 73.5%, 67.8%, 58.7%, 58.3% and 37.5%, respectively. The differences in the prevalence may be due to the differences in climatic conditions, husbandry practies, breeds and inherent characteristics such as host immunity in the study regions.

The present findings is in agreement with the earlier findings of [26] in Nigeria (53.1%) and [27] in Botswana (54.6%) in case of Ascaris suum in pig. The higher prevalence of Ascaris suum was reported [28] in Denmark, [29] in Nagaland and [30]) in Brazial which was 88%, 67.4% and 64.3%, respectively and the lower prevalence was reported by [4] in China (36.7%) and [22] in Kenya (28.7%). The finding of the present study also differ from finding of other scientists such as [18] in Kenya, [23] in Zimbabwe and [30] in Brazial who reported that the prevalence of Strongyloides sp. was 26.9%, 14% and 32.1%, respectively. [31] in Bangladesh and [32] in India reported 16.7% and 32.1% prevalence of Fasciolopsis buski respectively. The result of Eimeria spp. infection is similar to [33] in Poland (58.5%), and [34] in Japan (40%) and highly differ from [35] in Ghana and [36] in China. The present result of Balantidium coli infection is differ from [21] in Korea (64.7%), [3] in Kenya (64%) and [37] in Danish (>57%). The differences in the prevalence may be due to the differences in husbandry practies, the techniques of sample collection, period and place of study, environmental factors and breed of animal etc.

In the present study, EPG/CPG/OPG (eggs/cysts/oocysts per Gram) of faeces was also determined. The range of EPG / CPG / OPG varies among the parasites and range from 100-36500. The highest EPG /CPG/OPG count was found in case of Dicrocoelium sp. (300-36500) followed by Ascaris suum(100-29000), Isospora suis (100-10800) and Eimeria spp. (100-10800) and lowest in case of Schistosoma suis(100), Strongyloides sp.(100), Ancylostoma sp. (100) and Hyostrongylus rubidus (100). Mean EPG/OPG/OPG ± SE, count was also higher in Dicrocoelium spp.(11466.7±5610.4) followed by Ascaris suum(2962.5±748.1), Isospora suis (2900±1532.9) and lowest in case of Schistosoma suis (100±00), Ancylostoma sp. (100±00) and Hyostrongylus rubidus (100±00) (Table. 2).

3.1.2 Age related prevalence of endoparasites of pig

In the present study, it was found that prevalence of endoparasites of pig were significantly ($p<0.05$) higher in grower (100%) and adult (100%) than piglet (90.5%). Among the 12 types of endoparasites, growers were infected by highest 11 species of parasites followed by piglet (9 species) and adult (8 species). Ancylostoma sp., Hyostrongylus rubidus and Oesophagostomum sp. were absent in piglet; only Schistosoma suis in grower and Hyostrongylus rubidus, Schistosoma suis, Dicrocoelium sp. and Isospora suis in adult(Table 2).

It was revealed that age of pig had significant ($p=0.035$) effect on endoparasites infection. This result is supported by [27] in Botswana, [38] in India, [39] in Nordic countries and [4] in China. The present study differ from [20] in Nigeria, [40] in West Indies, [41], [42] and [43] in China reported that the higher prevalence in piglet than adult. The piglets are undernourished and when exposed to heavily contaminated environment, they acquire high levels of infection with severe consequences. Hence the few piglets sampled could be the only survivors that resisted infection and so shed few GI parasite eggs thus giving a lower prevalence.

3.1.3 Sex related prevalence of endoparasites of pig

In this study, it was recorded that prevalence of endoparasites was insignificantly ($p>0.05$) higher in female (100%) than male (93.9%). Among the 12 types of endoparasites males were infected by all species of parasites while female with 10 species. Ancylostoma sp. and Hyostrongylus rubidus were absent in female (Table 3). This finding is the agreement with the earlier study of [17] in Burkina Faso and [18] in Kenya. The present study differs from [20] in Nigeria who recorded higher prevalence in male (45%) than female (30.4%). [27] in Botswana reported that prevalence was not significantly different between sexes which agree the present study. The reason of higher prevalence of infection in the females cannot be explained exactly but it might be assumed that the alteration of the physiological condition of the female during pregnancy, lactation and parturition (hormonal influence) as well as stress leading to immunosuppression may be associated with this phenomenon. Higher level of lactation and progesterone hormones make the female individual more susceptible to any infection [44].

3.2 Visceral Sample Examination

A total of 20 visceral samples were examined, of which 17 (85%) pigs were found to be infected with one or more species of endoparasites. There are three (3) types of parasites were identified such as Ascaris suum (65%), Trichuris suis (60%) and Fasciolopsis buski (55%). The Mean ± SE in Ascaris suum, Trichuris suis and

Fasciolopsis buski were 1.3±0.1, 3.9±0.8 and 1.5±0.2, respectively (Table-4). Similar results were reported by [18] in Kenya and [19] in Western Estonia who found an overall prevalence was 90%, 86.7% and 82%, respectively. The present study differs from earlier report of [25] in Aizawl (19.5%). The differences in the prevalence may be due to the differences in husbandry practies, the techniques of sample collection, period and place of study, environmental factors and breed of animal etc.

IV. Figures And Tables

Table 1. Overall prevalence and burden of endoparasites of pig at Mymensingh

Parasites	No. Infected (N=110)	Prevalence (%)	EPG	
			Range	Mean±SE
Fasciolopsis buski	16	14.6	100-700	275±57.4
Schistosoma suis	8	7.3	100	100±00
Dicrocoelium sp.	9	8.2	100-36500	11466.7±5610.4
Ascaris suum	56	50.9	100-29000	2962.5±748.1
Strongyloides sp.	32	29.1	100	831±226.0
Trichuris suis	10	9.1	100-400	211.1±38.9
Oesophagostomum sp.	14	12.7	100-200	142.9±13.7
Hyostrongylus rubidus	2	1.8	100	100±00
Ancylostoma sp.	4	3.6	100	100±00
Balantidium coli	44	40	100-4800	452±107.9
Eimeria spp.	62	56.4	100-10800	1527.4±287.8
Isospora suis	10	9.1	100-10800	2900±1532.9
Sub total	**106**	**96.4**	**100-36500**	**4285.9±708.0**

Table 2. Age related prevalence and burden of endoparasites of pig at Mymensingh Sadar.

Parasites	Piglet (≤ 6 months) (N=42)				Grower (7-12 months) (N=42)				Adult (≥ 12 months) (N=26)			
	No. of infected	Prevalence (%)	EPG		No. of infected	Prevalence (%)	EPG		No. of infected	Prevalence (%)	EPG	
			Range	Mean±SE			Range	Mean±SE			Range	Mean±SE
Fasciolopsis bosky	6	14.3	100-200	133.3±21.1	6	14.3	100-700	333.3±117.4	4	15.4	200-600	400±115.5
Schist soma sues	8	19.1	100	100±00	-	-	-	-	-	-	-	-
Dicrocoelium sp.	4	9.5	300-36500	18400±10450.0	5	11.9	100-28000	5920±5521.6	-	-	-	-
Ascaris suum	26	61.9	200-29000	5526.9±1471.9	26	61.9	100-	957.7±139.9	4	15.4	300-600	450±86.6
Strongyloides sp.	12	28.57	300-5200	1217±537.8	10	23.8	200-1700	580±190.2	8	30.8	100-2200	750±319.0
Oesophagostomum sp.	-	-	-	-	6	14.3	100-200	166.7±21.1	8	30.8	100-200	125±16.4
Ancylostoma sp.	-	-	-	-	2	4.8	100	100±00	2	7.7	100	100±00
Hyostrongylus rubidus	-	-	-	-	2	4.8	100	100±00	-	-	-	-
Trichuris suis	4	9.5	100-400	250±86.6	4	9.5	100-200	150±28.9	2	7.7	200	200±00
Balantidium coli	12	28.6	200-900	850±367.1	22	52.4	100-900	286.4±51.9	10	38.5	100-600	340±61.8
Eimeria spp.	22	52.4	100-8000	1645.45±470.7	24	57.1	100-	720.83±90.5	16	61.5	500-10800	2638±840.5
Isospora suis	4	9.5	400-12000	6200±2303.7	4	9.5	100	100±00	-	-	-	-
Sub total	**38**	**90.48**	**100-37100**	**7389.47±1547.60**	**42**	**100**	**100-28500**	**2793.33±915.0**	**26**	**100**	**100-10900**	**2176.92±546. 4**
P- value	**0.035 [a,b]**											
	P< 0.05 = Statistically significant											

Table 3. Sex related prevalence and burden of endoparasites of pig

* = p> 0.05

Parasites	Male (N=66)				Female (N=44)			
	No. of infected	Prevalence (%)	EPG		No. of infected	Prevalence (%)	EPG	
			Range	Mean±SE			Range	Mean±SE
Fasciolopsis buski	6	9.1	100-700	466.7±117.4	10	22.73	100-200	160±16.3
Schistosoma suis	4	6.1	100	100±00	4	9.1	100	100±00
Dicrocoelium sp.	5	7.6	300-36500	20320±8319.2	4	9.1	100-700	400±173.2
Trichuris suis	10	15.2	100-400	170±39.6	2	4.6	200	200±00
Ascaris suum	31	47.0	100-5000	1664.5±273.2	24	54.6	100-29000	4758.1±1659.4
Oesophagostomum sp.	11	16.7	100-200	145.5±15.8	2	4.6	100	100±00
Ancylostoma sp.	4	6.1	100	100±00	-	-	-	-
Hyostrongylus rubidus	2	3.0	100	100±00	-	-	-	-
Strongyloides sp.	23	34.9	100-5200	917±304.0	9	20.5	100-1700	633.3±210.2
Balantidium coli	24	36.4	100-900	416.7±51.7	20	45.5	100-4800	500±231.7
Eimeria spp.	40	60.6	100-10800	1593±365.6	24	54.6	100-8000	1191.7±328.6
Isospora suis	2	3.0	100	100±00	6	13.6	100-12000	4166.7±2477.7
Sub total	**62**	**93.9**	**100-37100**	**4719.4±1001.6**	**44**	**100**	**100-29600**	**3675±963.8**
p-value	**0.096***							

Table 4. Load of endoparasites in infected pigs observed by visceral sample examination

Parasites	No. Infected (N=20)	Prevalence (%)	EPG	
			Range	Mean ± SE
Fasciolopsis buski	11	55	1-2	1.3±0.1
Ascaris suum	13	65	1-8	3.9±0.8
Trichuris suis	12	60	1-2	1.5±0.2
Sub total	**17**	**85**	**2-9**	**4.4±0.7**

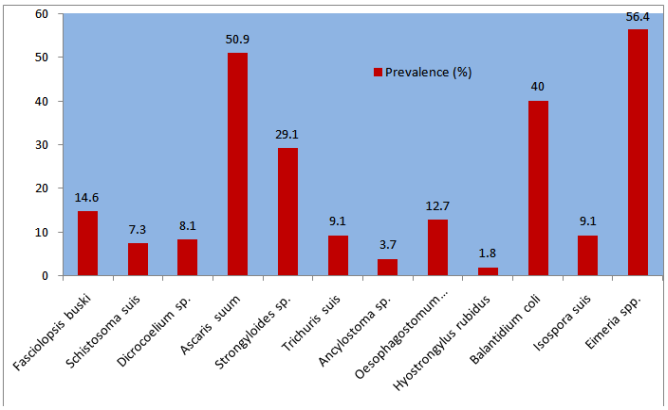

Figure-1: Overall prevalence and burden of endoparasites of pig by faecal sample examination

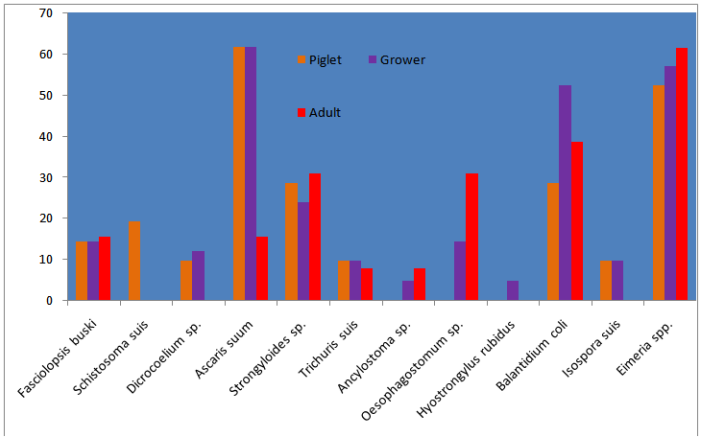

Figure -2: Age related prevalence and burden of endoparasites of pig by faecal sample examination

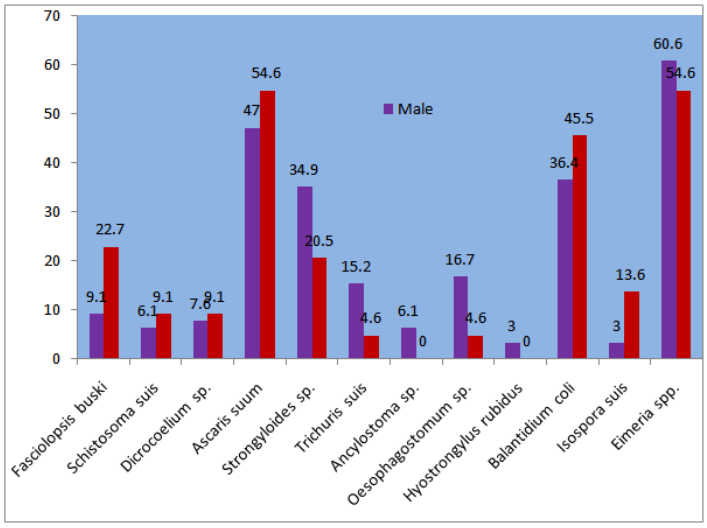

Figure -3: Sex related prevalence and burden of endoparasites of pig by faecal sample examination

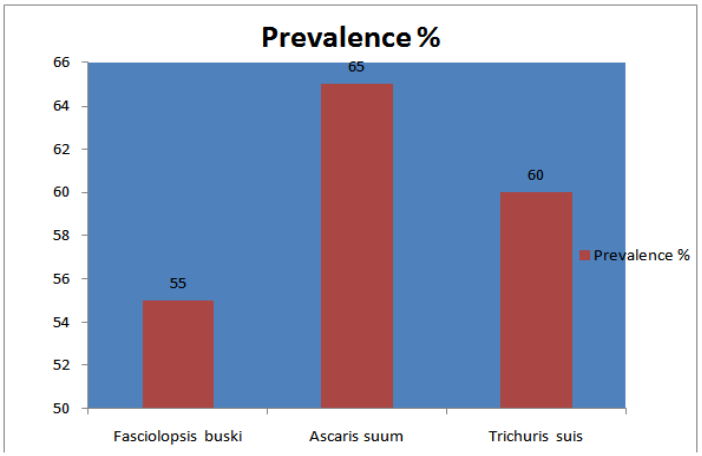

Figure -4: Overall prevalence and burden of endoparasites of pig by viscera examination

V. Conclusions

Present study revealed that pigs were highly susceptible to parasitic infection and influenced by sex and age. The occurrence of this large spectrum of parasites raises the question as to whether there are zoonotic parasites in that area. In a community setting where pigs are reared and pig meat is consumed by the population, they could be involved in zoonotic helminthosis. So, further investigation should study the possible impact of parasitic infestations of pigs on public health.

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