

PREVALENCE OF RUMEN PARAMPHISTOMES IN SHEEP SLAUGHTERED AT PERAMBUR SLAUGHTER HOUSE IN CHENNAI, TAMIL NADU

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Abstract: A total of 9600 sheep were examined for the presence of paramphistomes at Perambur slaughter house, Chennai, Tamil Nadu from January 2014 to December 2015. Paramphistomes were identified as *Cotylophoron cotylophorum*, *Fischoederius elongatus*, *Gastrothylax crumenifer* and *Paramphistomum cervi*. Of the 9600 animals examined, 10.30% (989/9600) had paramphistome infection. Among the sex, females were highly infected 73.10% than the males 26.90%. Among the season, highest prevalence observed in northeast monsoon (42.16%) followed by south-west monsoon (40.65%) and very low level during winter (10.82%) and summer (6.37%). Among the species of the parasites, highest infection of *C. cotylophorum* (76.25%) followed by *F. elongatus* (12.72 %) *G. crumenifer* (8.71 %) and very low level of *P. cervi* (2.32 %) was recorded. Among the paramphistomes, the prevalence of *C. cotylophorum* occurs in all the months except during February, March and May and with highest prevalence during August and October. Prevalence of *F. elongatus* was also recorded in all the months except during February, March, May, September and December of the year 2014 and November, December of the year of 2015. *Gastrothylax crumenifer* was found only during the month of January and September to November of the year 2014, January, February and August to December of the year 2015 and with highest level 70.50 % (n = 11253) during November 2014. Similarly, *Paramphistomum cervi* found only during the month of January, October and November of 2014 and January, February, August, September and November with highest level 24.27 % (n = 3004) during December 2015.

Keywords: Paramphistomes; sheep; prevalence.

I. INTRODUCTION

Sheep and goats are the earliest ruminants to be domesticated. Sheep and goats are important source of animal protein. They can withstand a period of drought better than any other livestock and they can use those pastures, which cannot be used by other livestock. Goats can survive under limited fodder need and they are capable to withstand water scarcity. Gastrointestinal parasitic infections in sheep and goats are of much economic importance because a small ruminant rearing has been a major source of income especially to the marginal farmers of the country [1].

Paramphistomum is a genus of parasitic flat worm belonging to the digenetic trematodes. It includes tiny flukes which are mostly parasitizing livestock ruminants, as well as some wild mammals. They are responsible for a serious disease called

Paramphistomosis (or classically amphistomosis) belonging to the family Paramphistomatidae especially in cattle and sheep. The flukes are often found in small numbers but seriously affect only livestock under certain conditions, in heavy infections, and in certain growth stages. Adult flukes in the rumen or reticulum, for instance, are not known to cause clinical disease. However, damage to the rumen due to heavy infections has been recorded.

Infection with this adult flukes in the rumen at most may cause a localized loss of rumen papillae, causing indigestion. The severity of the disease depends on how heavily contaminated the pastures are with metacercariae. In heavy infections of previously uninfected young animals, the immature helminths attach to the duodenal mucosa using their powerful ventral suckers and deeply embedded in the mucosa causing severe enteritis, duodenitis, hypoproteinemia, edema hemorrhage and possibly necrosis. The pathological lesions lead animals' exhibit anorexia, polydipsia, unthriftiness and severe diarrhea [2, 3]. Consequently, death due to immature paramphistomes is very high and may be as high as 80-90% in domesticated ruminants [4, 5]. They are found throughout the world, and most abundantly in livestock farming regions such as Australia, Asia, Africa, Eastern Europe, and Russia [6, 7].

This disease causes mortality of cattle, loss of milk, meat and wool production. In context to India, livestock are of great economic importance as they are closely associated with the life activities of resource-poor rural people. They contribute to financial independency for the people by providing milk, meat and skin. Besides natural calamities, cattle are susceptible to parasitic diseases which bring great loss to poor farmers. Paramphistomosis has a wide geographical distribution in subtropical and tropical areas, where the infection leads to mortality and low productivity. Incidence of paramphistomosis in cattle, buffaloes, sheep and goats has been reported in different states of India [8, 9, 10]. In the present study prevalence of rumen paramphistomes in sheep slaughtered at Perambur slaughter house in Chennai, Tamil Nadu was studied.

In Chennai the slaughter houses are situated in Perambur, Saidapet and Villivakkam. Perambur slaughter house is one of the oldest and largest slaughter houses in India. Comparatively more number of sheep are slaughtered here than the other two places. This study was carried out in naturally infected sheep slaughtered at Perambur slaughter house in Chennai. The data like age, sex, locality of the sheep and number of sheep slaughtered in week days and week end were also collected from the slaughter house. The parasites were collected periodically i.e. weekly from the Perambur Slaughter house maintained by the Corporation of Chennai. This Slaughter house is the prime source to cater the need of mutton to the most part of Chennai City. The period of study covers from January 2014 to December 2015. Keeping in view, the endemicity, economic impact of paramphistomosis in ruminants in the region, the study aimed to determine the prevalence of paramphistomes in domesticated ruminants in sheep slaughtered at Perambur slaughter house in Chennai, Tamil Nadu.

II. MATERIALS AND METHODS

A total of 9600 sheep's rumen were examined over this period to determine the prevalence of Paramphistomes. Paramphistomes were obtained from the inner walls of rumens. Each month 400 sheep rumen (200 males and 200 females) were examined from January 2014 to December 2015. The parasites were identified based on the characteristics given by Soulsby and Biu and Oluwafunmilayo [11, 12].

Staining Procedure

The parasitic flukes were stained by following the standard staining procedure and then dehydrated through series of alcohol for 1 hour each, and cleared by using xylene for 30 minutes. The cleared specimens were mounted and viewed under the light microscope to identify the parasitic fluke [13].

Statistical analysis

The data were fed in to computer using Microsoft excel spreadsheet and analyzed using STATA-11. Descriptive statistics was employed and expressed in terms of frequency and percentage. Chi-square (X^2) test statistics were used to test the association between variables.

III. RESULTS AND DISCUSSION

In the present study, four different species of paramphistomes were identified viz., *Cotylophoron cotylophorum*, *Fischoederius elongatus*, *Gastrothylax crumenifer* and *Paramphistomum cervi*. Overall prevalence of paramphistome

infection (Table 1) in the sheep was 10.30 % (n = 9600). There is statistically significant variation in prevalence observed between sex ($P < 0.05$), month and season ($P < 0.001$) of animals examined. Bansal *et al.* [14] reported 38.28% paramphistomes in Madhya Pradesh. Bui and Oluwafunmilayo [12] reported 28.0% infection in Nigeria. Mostly the infection was found between the months of July to December. Among the species of the parasites, (Table 2 and 5) highest infection of *C. cotylophorum* (76.25 %) followed by *F. elongatus* (12.72 %) *G. crumenifer* (8.71 %), and very low level of *P. cervi* (2.32 %) was recorded which is in contrary to that of Bansal *et al.* [14] who reported that the prevalence of *Paramphistomum cervi* (27.34%) was found to be significantly ($p < 0.01$) higher than *Gastrothylax crumenifer* (10.94%) in sheep at Madhya Pradesh. Melaku and Addis [7] reported 28.9 % of *Paramphistomum* infection in Ethiopia. Tehmina *et al.* [15] and Njoku-Tony and Nwoko [16] also reported 17.83% and 26.2% *P.cervi* in sheep at Pakistan and Nigeria, respectively. Ozdal *et al.* [6] reported 4.43% *Paramphistomum* spp. in sheep at Turkey. The high prevalence of paramphistomosis might be attributed to the marshy area of animals grazing land and lack of intervention with anthelmintics [17].

Among the paramphistomes, the prevalence of *C. cotylophorum* occurs in all the months except during February, March and May and with highest prevalence during August and October. Prevalence of *F. elongatus* was also recorded in all the months except during February, March, May, September and December of the year 2014 and November, December of the year of 2015. *Gastrothylax crumenifer* was found only during the month of January and September to November of the year 2014, January, February and August to December of the year 2015 and with highest level 70.50 % (7940/11253) during November 2014 (Table 4). This correlates with the observation of Tehmina *et al.* [15]. *Paramphistomum cervi* found only during the month of January, October and November of 2014 and January, February, August, September and November with highest level 24.27 % (729/3004) during December 2015 (Table 4). According to Hakalahti *et al.* [18] rainfall had a direct effect on the dynamics of parasite populations and consequently on transmitting the disease.

Highest infection was found in females (73.10 %) than the males (26.90%) (Table 1) which is similar to the observation of Bui and Oluwafunmilayo [12], Bansal *et al.* [14] and Tehmina *et al.* [15]. The higher infection rate in females than the males could be attributed to genetic predisposition and differential susceptibility owing to hormonal effects [19]. Further the females generally get more attention in the hands of farmer on account of economic reasons and those experience problems with their health and production are usually culled while it is a standard production procedure for males to be eliminated [20]. Among the season, highest prevalence observed in south-west monsoon (42.16 %) followed by northeast monsoon (40.65%) and very low level during winter (10.82 %) and summer (6.37 %) (Table 3) which is in accordance with that of Chaudhri [21] who reported the high incidence during rainy season. The infection was encountered throughout the year. The weather pattern of the region with ambient temperature and sufficient moisture, even during the dry spell of the year due to the perennial irrigation of the fields were important contributing factors for the translation and transmission of paramphistome species all round year. These results are in accordance to earlier reports [19, 20, 22].

IV. CONCLUSION

Paramphistomosis is one of the most common parasites of ruminants, distributed globally with the highest incidence from tropical and sub tropical regions particularly the Asian subcontinent. It has an endemic status in India with persistent infection throughout the year in various geo-agroclimatic conditions with bouts of epidemic by amphistomes, causing a major production loss. The present study clearly shows that paramphistomosis in ruminants is an issue that can assume a part in upsetting the domesticated animal's advancement in the area particularly and the country at large. In this way, improvement of feasible financially savvy control systems with intercessions based on the basic epidemiological principle of host, agent and environment interaction is essential. The epidemiological pattern of parasitic infection in various agroclimatic zones of the area will give a premise to developing tangible control measures for paramphistomosis administration in ruminants. Different intercessions through chemotherapy, pasture management and good husbandry practices may ameliorate the present scenario.

REFERENCES

- [1] Singh V, Varshney P, Dash SK and Lal HP (2013). Prevalence of gastrointestinal parasites in sheep and goats in and around Mathura, India, *Vet. World* 6(5):260-262, doi:10.5455/vetworld.2013.260-262
- [2] Blood, D.C. and O.M. Radostits(1989). *Veterinary Medicine: A textbook of diseases of cattle, sheep, pigs and horses*. 7th Ed., Bailliere Tindall, London, UK. Bailliere Tindall, London, pp: 66-71.

- [3] FAO (1994). Diseases of Domestic Animals caused by flukes. Food and Agriculture Organization of the United Nations. Rome, Italy.
- [4] Juyal, P.D., K. Kaur, S.S. Hassan and K. Paramjit (2003). Epidemiological status of paramphistomosis in domestic ruminants in Punjab. *Parasites and Diseases*, 231: 235
- [5] Ilha, M.R., A. P. Loretto and A.C. Reis (2005). Wasting and mortality in beef cattle parasitized by *Eurytrema coelamaticum* in state of Parana, southern Brazil. *Journal of Veterinary Parasitology*, 133: 49-60.
- [6] Ozdal N, Gul A, Ilhan F, Deger S (2010). Prevalence of Paramphistomum infection in cattle and sheep in Van Province, Turkey. *Helminthologia*. 47:20–24.
- [7] Melaku S, and Addis M (2012). Prevalence and intensity of Paramphistomum in ruminants slaughtered at Debre Zeit industrial abattoir, Ethiopia. *Global Veterinaria*. 8(3):315–319.
- [8] Gupta A, Dixit AK, Dixit P, Mahajan C (2012). Prevalence of gastrointestinal parasites in cattle and buffaloes in and around Jabalpur, Madhya Pradesh. *J Vet Parasitol*. 26: 186-188.
- [9] Shahnawaz M, Shahardar RA, Wani ZA (2011). Seasonal prevalence of plathyhelminthosis of sheep in Ganderbal area of Kashmir valley. *J Vet Parasitol*; 25: 59-62.
- [10] Kumar M, Banerjee P.S, Singh H (2000). Incidence of different helminth infections in Tarai and Western plains of Uttar Pradesh. *Indian Vet Med J*; 26: 105-10
- [11] Soulsby E.J.L. (1982). Helminths, Anthropods and Protozoa of Domesticated Animals, 7th Ed:
- [12] Biu, A. and Oluwafunmilayo, A. (2004). Identification of some Paramphistomes infectingsheep in Maiduguri, Nigeria *Pakistan Vet J.*, 24 (4): 187-189
- [13] Singh, S.K.R. and H.D. Srivastava (1977). Diagnosis and treatment of helminth infections. Division of Parasitology, *Indian Vet. Res. Inst., Izatnagar*, Uttar Pradesh, India.
- [14] Bansal, K., Agrawal, V., Jayraw, A., Garg, U.K., Jatav, G.P., Jamra, N., Nidhi Singh. (2018). Incidence of amphistome infection in sheep from Mhow, Madhya Pradesh. *J Parasit Dis*. 42: 19.
- [15] Tehmina, S.; Shahina, R.; Razzaq, A.; Marghazani, I.B.; Khosa, A.N (2014). Prevalence of *Paramphistomum cervi* in different sheep breeds of Balochistan (Pakistan). *Rev. Vet*. 25: 1, 12-15,
- [16] Njoku-Tony, R.F. and Nwoko, B.E.B. (2009). Prevalence of Paramphistomiasis among sheep slaughtered in some selected abattoirs in IMO state Nigeria. *Science world Journal* Vol 4(No.4):12-15.
- [17] Kifleyohannes, T., Kebede, E., Hagos, Y., Weldu, K., & Michael, M. G. (2015). Prevalence of Paramphistomosis in Ruminants in Ashenge, Tigray Ethiopia.
- [18] Hakalahti T, Karvonen A, Valtonen ET (2006). Climate warming and disease risks in temperate regions: *Argulus coregoni* and *Diplostomum spathaceum* as case studies. *Journal of Helminthology*, 80, 93–98.
- [19] Tariq KA, Chishti MZ, Ahmad F, Shawl AS (2008). The epidemiology of paramphistomosis of sheep (*Ovis aries* L) in the north-west temperate Himalayan region of India. *Vet Res Commun*;32:383–391.
- [20] Phiri AM, Phiri IK, Monrad J (2006). Prevalence of amphistomiasis and its association with *Fasciola gigantica* infections in Zambian cattle from communal grazing areas. *J Helminthol*; 80:65–68.
- [21] Chaudhri, S.S. (1983). Studies on the incidence and epidemiology of paramphistomiasis in sheep. Information Bulletin Dept. *Vet. Parasitol*. Coll. Vet. Sci., Haryana Agri. Univ., Hassar, India.
- [22] Khedri, J., Radfar, M. H., Borji, H., and Mirzaei, M. (2015). Prevalence and intensity of Paramphistomum spp. in cattle from South-Eastern Iran. *Iranian journal of parasitology*, 10(2), 268.

APPENDIX - A

List of Tables:

TABLE 1. Prevalence of rumen paramphistomes in the sheep slaughtered at Perambur slaughter house from January 2014 to December 2015

Sex	No. of samples examined	No. of samples infected	Prevalence %
Male	4800	266	26.90 (266/989)
Female	4800	723	73.10 (723/989)
Total	9600	989	10.30 (989/9600)

TABLE 2. Species wise prevalence of rumen paramphistomes in sheep slaughtered at Perambur slaughter house from January 2014 to December 2015

Species	Sex		Total
	Male	Female	
<i>C.cotylophorum</i>	25.03% (24665/98524)	74.97% (73859/98524)	76.25 % (98524/129212)
<i>F.elongatus</i>	16.40% (2694/16431)	833.60% (13737/16431)	12.72 % (16431/129212)
<i>G.crumenifer</i>	32.45% (3652/11253)	67.55% (7601/11253)	8.71 % (11253/129212)
<i>P.cervi</i>	4.83% (145/3004)	95.17% (2859/3004)	2.32 % (3004/129212)
Total	24.11 % (31156/129212)	75.89% (98056/129212)	129212

TABLE 3. Season wise prevalence of rumen paramphistomes in sheep slaughtered at Perambur slaughter house from January 2014 to December 2015

Season	No.of samples examined	No.of samples infected	Prevalence %
Winter	2400	107	10.82 (107/989)
Summer	2400	63	6.37 (63/989)
Northeast monsoon	2400	402	40.65 (402/989)
South west monsoon	2400	417	42.16 (417/989)
Total	9600	989	10.30 (989/9600)

TABLE 4. Month wise prevalence of rumen paramphistomes of sheep slaughtered at Perambur slaughter house, Chennai from January 2014 to December 2015

Month	No. of sample examined			No. infected			Species			
	M	F	Total	M	F	Total	<i>C.cotylophorum</i>	<i>F.elongatus</i>	<i>G.crumenifer</i>	<i>P.cervi</i>
Jan-14	200	200	400	0	4	4	560	1080	146	55
Feb-14	200	200	400	0	0	0	0	0	0	0
Mar-14	200	200	400	0	0	0	0	0	0	0
Apr-14	200	200	400	0	17	17	472	1360	0	0
May-14	200	200	400	0	0	0	0	0	0	0
Jun-14	200	200	400	0	27	27	2838	64	0	0
Jul-14	200	200	400	50	58	108	13927	1403	0	0
Aug-14	200	200	400	64	82	146	22991	704	0	0
Sep-14	200	200	400	8	81	89	7590	0	687	0
Oct-14	200	200	400	42	90	132	19080	318	780	525
Nov-14	200	200	400	31	56	87	7660	955	7940	320
Dec-14	200	200	400	15	12	27	3860	0	0	0
Jan-15	200	200	400	0	17	17	385	663	45	72
Feb-15	200	200	400	0	34	34	1490	600	195	240
Mar-15	200	200	400	0	6	6	235	150	0	0

Apr-15	200	200	400	6	19	25	1215	2815	0	0
May-15	200	200	400	6	9	15	0	1637	0	0
Jun-15	200	200	400	10	20	30	1841	1354	0	0
Jul-15	200	200	400	18	43	61	3431	1273	0	0
Aug-15	200	200	400	2	28	30	2629	1225	266	349
Sep-15	200	200	400	0	27	27	1665	625	463	340
Oct-15	200	200	400	0	22	22	1577	205	90	0
Nov-15	200	200	400	12	48	60	2670	0	350	374
Dec-15	200	200	400	2	23	25	2408	0	291	729
Total	4800	4800	9600	266	723	989	98524	16431	11253	3004

TABLE 5. Species and season wise prevalence of rumen paramphistomes of the sheep slaughtered at Perambur slaughter house from January 2014 to December 2015

Species	Season				Total
	Winter	Summer	SWM	NEM	
<i>C.cotylophorum</i>	67.89% (8703/12819)	24.38% (1922/7884)	87.94% (40242/54295)	74.23% (40242/54214)	76.25% (98524/129212)
<i>F.elongatus</i>	18.28% (2343/12819)	75.62% (5962/7884)	11.09% (6023/54295)	3.88% (2103/54214)	12.72% (16431/129212)
<i>G.crumenifer</i>	5.28 % (677/12819)	0.00%	0.49% (266/54295)	13.02% (10310/54214)	8.71% (11253/129212)
<i>P.cervi</i>	8.55% (1096/12819)	0.00%	0.64% (349/54295)	2.88% (1559/54214)	2.32% (3004/129212)
Total	12819	7884	54295	54214	129212