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METACESTODIASIS IN NORTH EAST INDIA : A STUDY ON THE PREVALENCE OF HYDATIDOSIS AND CYSTICERCOSIS IN MIZORAM, NAGALAND AND ASSAM

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The prevalence of metacestodiasis was investigated in 279 cattle, 171 pigs and 269 goats slaughtered at different slaughter houses at various abattoirs in Mizoram, Nagaland and Assam. The overall infection rates due to different metacestodes was 14.69%, 14.61% and 27.50% respectively in the mentioned States. The prevalence of hydatid infection was 7.52%, 2.33% and 3.34% and that of *Cysticercus tenuicollis* 1.43%, 5.26% and 21.56% respectively. 5.73% of cattle and 2.60% of goats were infected with *C. bovis*. *C. cellulosae* was observed only in pigs (7.01%). The percentage of infected animals that harboured fertile hydatid cysts was 16.16% (cattle), 20 0% (pigs) and 71.42% (goats). Peritoneal cavity was the predominant site for *C. tenuicollis* and *C. bovis*; however, *C. cellulosae* was observed only in the heart and diaphragm. Most of the hydatid cysts were located in the lung in cattle and goats, and confined to liver only in case of pigs.

Metacestodiasis is the disease caused by larval forms of different cestode species among cattle, pigs, goats, sheep and also in man. These parasites are world-wide in occurrence and attain considerable importance from veterinary as well as public health point of view, since they cause serious diseases like hydatidosis or cysticercosis among human populations and also cause extensive loss to livestock.

Information on the incidence of these infections in various animals in different parts of India are available (Srivastava and Shah, 1968; Prasad and Mandal, 1979; Pathak and Gaur, 1982; Deka *et al.*, 1982, 1983; and Kulkarni *et al.*, 1986). However, there are very few reports regarding these infections in North-East India (Endrejat 1964; Deka *et al.*, 1985) which too are limited to parts of Assam only. Mizoram and Nagaland remain unexplored regions as far as the parasites and the extent of losses caused by them to the economy of the States are concerned.

The main objective of this study was to determine the prevalence of metacestodes and fertile hydatid cysts amongst animals of food value like cattle, pigs and goats in certain areas of Mizoram, Nagaland and Assam.

MATERIALS AND METHODS

The study area is constituted by both hills and plains of North-East India. The six localities surveyed are Aizawl in Mizoram; Kohima and Dimapur in Nagaland, and Karimganj and Silchar in Assam, numbered 1 to 6 respectively in the map (Fig. 1). As surveys in some other places of Assam have already been conducted by other authors, the same are omitted from the present investigation.

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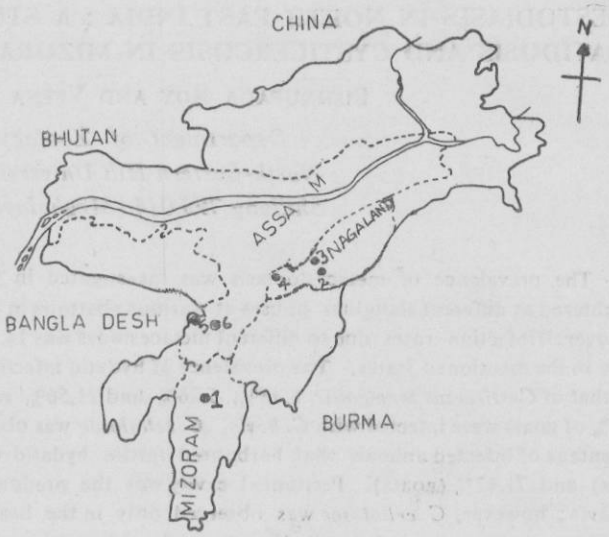

Fig.1 Map showing survey area

Starting from March, 1986 to August, 1987 a total of 279 cattle, 171 pigs and 269 goats of both sexes, freshly slaughtered at various abattoirs in Mizoram, Nagaland and Assam were examined. Necropsies of the animals were done on the spot to recover metacestodes from the internal organs like liver, lungs, peritoneal cavity, diaphragm and heart.

The recovered bladder worms were either fixed in 10% formalin or brought to the laboratory in 0.9% saline solution for subsequent examination.

Fertility of hydatid cyst was based on the presence of protoscoleces in the cyst's fluid, for which the cysts were opened and the fluid placed on a slide and examined under the microscope. A separate record was maintained on the location and number of cysts recovered.

Results and Discussion

Two types of metacestodes, namely *Cysticercus* and hydatid cyst, were found to occur in the various hosts examined. Three species of *Cysticercus* recovered are *Cysticercus bovis*, *C. tenuicollis* and *C. cellulosae*. The prevalence of *Cysticercus* spp. and hydatid cyst in cattle, pigs and goats is presented in Table 1. The infection rates with *C. bovis* and hydatid cyst were found to be highest in cattle (7.52% and 5.73% respectively). However, the prevalence *C. tenuicollis* was the maximum in goats. *C. cellulosae* infection was restricted to pigs alone and was recorded only from liver, diaphragm and heart. *C. tenuicollis* and *C. bovis* were mainly found in peritoneal cavity for all the animal types examined.

Lactation and fertility rates of hydatid cysts in different animals are presented in Table 2. A high rate of fertility of cysts (71.42%) was found amongst goats, whereas most of the cysts recovered from cattle (72.22%) and pigs (80.0%) were sterile. Most of

Table—1. Prevalence of Metacestodes in animals of food value in Mizoram, Nagaland and Assam.

Place	Animal (C=cow P=pig G=goat)	Total No. examined	Total No. and percentage infected		Number and percentage (of total) infected with							
					hydatid cyst		*C. bovis*		*C. tenuicollis*		*C. cellulosae*	
			No.	%	No.	%	No.	%	No.	%	No.	%
Mizoram	C	79	8	10.12	4	5.06	3	3.79	1	1.26	—	—
	P	42	4	9.52	1	2.38	—	—	—	—	3	7.14
	G	36	8	22.22	1	2.77	—	—	7	19.44	—	—
Nagaland	C	82	9	10.97	5	6.09	4	4.87	—	—	—	—
	P	64	8	12.50	1	1.56	—	—	4	6.25	3	4.68
	G	24	6	25.00	1	4.61	1	4.61	4	16.66	—	—
Assam	C	118	24	20.23	12	10.16	9	7.62	3	2.45	—	—
	P	65	13	20.00	2	3.07	—	—	5	7.69	6	9.23
	G	209	60	28.70	7	3.34	6	2.87	47	22.48	—	—
Total	C	279	41	14.69	21	7.52	16	5.73	4	1.43	—	—
	P	171	25	14.61	4	2.33	—	—	9	5.26	12	7.01
	G	269	74	27.50	9	3.34	7	2.60	58	21.56	—	—

Table—2. Location and fertility rates of hydatid cysts in cattle, pigs and goats of Mizoram, Nagaland and Assam.

Place	Animal	Total No. of cyst recovered	Nature and No. of cyst		No. (percentage) of cysts as per location		
					Lung	Liver	Heart
Mizoram	Cattle	9	F	2	2(100.0)	—	—
			S	6	4(66.66)	2(33.33)	—
			C	1	—	—	1(100.0)
	Pigs	1	F	—	—	—	—
			S	1	—	1(100.0)	—
			C	—	—	—	—
	Goats	3	F	2	2(100.0)	—	—
			S	1	1(100.0)	—	—
			C	—	—	—	—
Nagaland	Cattle	8	F	1	1(100.0)	—	—
			S	6	3(50.0)	3(50.0)	—
			C	1	—	1(100.0)	—
	Pigs	2	F	1	—	1(100.0)	—
			S	1	—	1(100.0)	—
			C	—	—	—	—
	Goats	1	F	1	1(100.0)	—	—
			S	—	—	—	—
			C	—	—	—	—
Assam	Cattle	19	F	3	2(66.66)	1(33.33)	—
			S	14	8(57.14)	6(42.85)	—
			C	2	—	2(100.0)	—
	Pigs	2	F	—	—	—	—
			S	2	—	2(100.0)	—
			C	—	—	—	—
	Goats	10	F	7	5(71.42)	2(28.57)	—
			S	2	—	2(100.0)	—
			C	1	—	—	1(100.0)
Total	Cattle	36	F	6	5(83.33)	1(16.66)	—
			S	26	15(57.69)	11(42.30)	—
			C	4	—	3(75.0)	1(25.0)
	Pigs	5	F	1	—	1(100.0)	—
			S	4	—	4(100.0)	—
			C	—	—	—	—
	Goats	14	F	10	8(80.0)	2(20.0)	—
			S	3	1(33.33)	2(66.66)	—
			C	1	—	—	1(100.0)

* F — fertile ; S — sterile ; C — calcified.

the fertile cysts were found associated with lungs in case of cattle and goats ; however, sterile cysts were also recorded from this organ as well as from liver, and calcified cysts were recovered only from the liver and heart.

The overall rate of infection by metacestodes was found to be highest in Assam (24.74%) and lowest in Mizoram (12.73%). While the hydatid cyst was found to occur in all the mentioned host types in the three States, the same is not true for cysticercus infections. Pigs in Mizoram and cattle in Nagaland were found free from *C. tenuicollis* infection. Likewise, no infection of *C. bovis* was recorded from goats in Mizoram.

The results of the study indicate that hydatidosis occurs more frequently in cattle than in pigs and goats. Senekjie and Beattic (1940), Endrejat (1964), Al-Yaman *et al.* (1985) also observed a higher incidence of hydatidosis in cattle than in other animals. In the present investigation the overall rate of infection in cattle (7.52%) was found to be lower than that reported by Endrejat (1964) in the neighbouring Assam, Deka *et al.*, (1985) in Northern Region of India, Al-Yaman *et al.* (1985) in North Jordan, and Pal and Jamil (1986) in Pakistan and higher than that recorded by Mahmuod and Al-Janabi (1981) in Iraq and Abdel-Hafez *et al.* (1986) in North Jordan.

In the present study, the rate of infection with hydatid cyst in cattle of Mizoram (5.06%) and Nagaland (6.09%) is somewhat similar to that reported by Abdel-Hafez *et al.*, (1986, *loc. cit*) but differs from that recorded by the fore-mentioned authors.

In the present study, the rate of hydatid infection reported in goats of Nagaland and Assam seem to differ considerably from that reported by Endrejat (1964) and Deka *et al.* (1985) for the same hosts in N. E. Region. However, the rate of infection in pigs of Assam and Mizoram reported herein tallies with the findings of the latter mentioned authors.

Although the cysts were mainly located in the lung and liver of most ruminants, the degree of involvement of these organs in various host animals was variable. Lung was more affected than liver as a site for cysts in cattle, an observation also recorded by Mahmoud and Al-Yaman (1985). In pigs this infection was totally restricted to liver, as also recorded by Deka *et al.* (1985).

The prevalence of fertile cysts in goats was higher than that in cattle and pigs as also found by Deka *et al.* (1982) in their study on similar hosts in Assam and also of Abdel-Hafeez *et al.* (1986) and Pal and Jamil (1986) in Northern Jordan and Pakistan respectively. Most of the fertile cysts of cattle, pigs and goats were recovered from the lungs. Deka *et al.* (1982) had a similar observation with regard to pulmonary cysts in sheep ; however, in cattle the maximum abundance of fertile cysts was noticed in liver by them.

In agreement with the observations made by Pathak and Gaur (1982) and Deka *et al.* (1985) most of the *Cysticercus bovis* and *C. tenuicollis* were found attached to mesentery in the peritoneal cavity in all the animal types studied herein ; however, the rate of these metacestode infections and also that of *C. cellulosae* were found to be lower than these reported by these authors.

The prevalence of *C. bovis* among the beef cattle indicates the occurrence of a potent source of taenia infection to consumers of beef in this region. Further, the fertile hydatid cysts occurring in the slaughtered animals provide a ready source of infection to canine hosts which harbour the adult form of the worm *Echinococcus granulosus*. Further investigation on metacestodiasis seems necessary throughout North-East India.

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