"METACESTODE INFECTION IN GOAT AND SHEEP SLAUGHTERED IN AND AROUND PATNA AND ITS PUBLIC HEALTH IMPORTANCE"

THESIS

SUBMITTED TO THE

RAJENDRA AGRICULTURAL UNIVERSIT

(FACULTY OF POST - GRADUATE STUDIES)

PUSA (SAMASTIPUR), BIHAR

In Partial fulfillment of the requirements

FOR THE DEGREE OF

MASTER OF VETERINARY SCIENCE

(Veterinary Public Health)

By

DR. GUDDU KUMAR

Registration No. - M/VPH/03/2006-2007.

DEPARTMENT OF VETERINARY PUBLIC HEALTH,

BIHAR VETERINARY COLLEGE

PATNA - 800 014

2008

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Dr. A. Quasim,
Chairman & Head
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Bihar Veterinary College, Patna - 14

CERTIFICATE – I

This is to certify that the thesis entitled "***Metacestode infection in goat & sheep slaughtered in and around Patna and its Public Health Importance***" submitted in partial fulfilment of the requirements for the Degree of Master of Veterinary Science **(Veterinary Public Health)** of the faculty of post-graduate studies, Rajendra Agricultural University, PUSA, Samastipur, Bihar is the record of bonafide research work carried out by **Dr. Guddu Kumar, Registration No. M/VPH/03/2006-07,** under my supervision and guidance. No part of the thesis has been submitted for any other degree or diploma.

It is further certified that the assistance and help received during the course of this investigation and preparation of the thesis have been fully acknowledged.

Endorsed

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CERTIFICATE – II

We, the undersigned members of the Advisory Committee of **Dr. Guddu Kumar**, Registration No. **M/VPH/03/2006-2007**, a candidate for the Degree of Master of Veterinary Science with major in **Veterinary Public Health** have gone through the manuscript of the thesis and agree that the thesis entitled ""***Metacestode infection in goat & sheep slaughtered in and around Patna and its Public Health Importance***" may be submitted by **Dr. Guddu Kumar** in partial fulfilment of the requirements for the degree.

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CERTIFICATE – III

This is to certify that the thesis entitled "***Metacestode infection in goat & sheep slaughtered in and around Patna and its Public Health Importance***" submitted by **Dr. Guddu Kumar, Registration No. M/VPH/03/2006-07** in partial fulfilment of the requirements for the Degree of Master of Veterinary Science **(Veterinary Public Health)** of the Faculty of Post-Graduate Studies, Rajendra Agricultural University, PUSA, Samastipur, Bihar was examined and approved on ..8.. / ..7.. / 2009.

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(Nominee, Dean Post Graduate Studies)

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Last but not the least, I wish with my all sense of humanity for the encorragement, love, affection, moral support and blessings and patience of my beloved parents, relatives and friends.

Date : 08/12/08

Place : Patna

Guddu Kumar

(Guddu Kumar)

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Dedicated to My Parent

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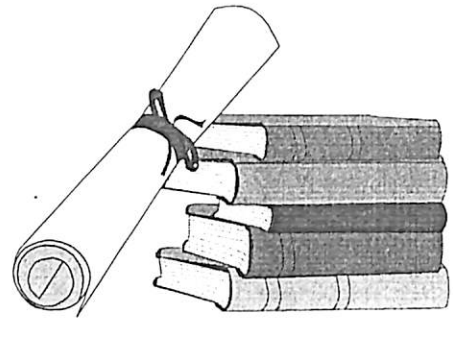
Chapter - I

INTRODUCTION



INTRODUCTION

The fast growing human population puts tremendous pressure on the exploitation of fertile lands to meet increasing demand of food. The present demand for food has led to the search of newer and novel food sources. Hence now-a-days there is change in food habits and considerable attention has been focused on meat industry. Since meat and meat products are important sources of high quality nutrients for human beings. With increasing education and awareness, people are now more concerned to the hygiene and safety of food related to public health significance. This has led to the establishment of modern slaughter houses for quality meat production. But Indian meat industry is not well equipped to meet this increasing demand due to several socio-economic factors. Open butcheries & meat shops, further undermine the hygienic conditions of meat and hence need immediate modernization of meat industry to keep pace with time.

The meat when not properly handled and inspected may prove a public health hazard, due to its association with several pathogens. The common harmful pathogens associated with meat may be virus, bacteria and parasite. Parasitic infection in general causes degradation in meat quality and may cause a threat to the human consumers as well. Among the parasitic group of organisms, the metacestodes (larval forms of cestodes) has been considered as the most prevalent and potent danger to human health.

Although it is distributed world wide including Indian subcontinent, South-Africa, New Zealand, Kenya & Uganda are the area with high occurrence of metacestode.

Although the adult parasite, which inhabits the intestine of various carnivore is not pathogenic but the larval or metacestode stages can be highly pathogenic, causing economic losses to livestock and various forms of echinococcosis in human, some of which have a high fatality rate. The hydatid cysts are usually found in the visceral organs (liver, lung, mesentry, spleen, thoracic wall etc.) of herbivores, swine & man, whereas the adult parasites are located in the intestine of definitive host. The parasite excretes eggs in the faeces contaminating food and water. Man considered as an accidental host gets infections through contaminated foods and water and may also get infection directly through infected pets particularly dogs. Definitive host gets the infection from intermediate host, by eating carcases containing hydatid cyst. In Bihar goat and sheep population is 9489830 and 382236 respectively (Census 2002). A fair percentage of this population is slaughtered annually for meat purpose.

Hydatid cysts may lead to economic losses due to condemnation of carcases. Unlike other countries, there is no organized survey reports available for Indian slaughter houses. So it is very difficult to estimate the exact economic loss. The infection is believed to be common amongst certain sections of the people, particularly those connected with trade of meat and their products. This is also due to change in food habits of eating semi-cooked or ready to eat meat products which do not kill the parasites in meat and their products during processing.

Considering the above mentioned facts, and its public health importance, the present study is proposed with the following objectives :

(i) To study the occurrence of metacestodes in goat and sheep slaughtered in and around Patna.

(ii) To study the relationship between the occurrence of infection in dog (definitive host) and goat and sheep (intermediate host).

(iii) To assess the economic loss caused due to condemnation of carcases / viscera infected with the metacestodes.

(iv) Case study of cyst infection in human beings with the data available with the nearby Medical institutes and Diagnostic Centers.

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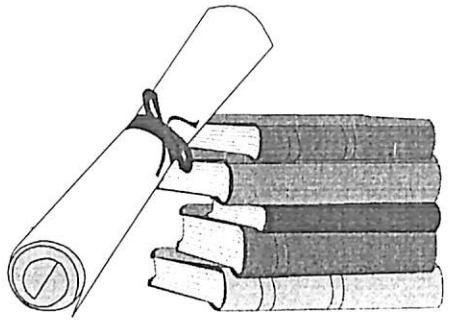
Chapter - II

REVIEW OF LITERATURE



REVIEW OF LITERATURE

(a) Occurrence of Cysticercosis / hydatidosis in human being :

Neurocysticercosis is prevalent in virtually all states of the country although it varies significantly between different states (Raj-shekhar and Chandy, 2000). There are few reports of patients with cysticercosis from Jammu and Kashmir, a predominantly muslim state and Kerala where educational levels and hygienic standard are probably the highest in the country. Anywhere between 26 - 50 percent of all Indian patients presented with partial seizures were diagnosed as neurocysticercosis on CT Scan (Wadia *et al.*, 1987; Misra *et al.*, 1994). The occurrence of Human cysticerosis in China is 3-4 percent and in Indonesia 1.7-19 percent (Raj - shekhar *et al.*, 2003).

Several reports of patients with cysticercosis from Asian countries, such as India, China, Indonesia, Thailand, Korea, Taiwan and Nepal are a clean indicator of wide-spread occurrence of cysticercosis. Cysticercosis is the cause of epilepsy in upto 50 percent of Indian patients presented with partial seizures (Raj-shekhar and Chandy, 2000).

Serological assays using the enzyme linked immuno transfer blot (ELIB) revealed exposure to the disease in 21.5 percent of 107 neurological patients attending a hospital in Mumbai (Tsang and Garcia, 1999).

Examination of stools from patients attending a hospital in Northern India revealed that 2% of patients had taeniasis and more than 95 percent of Indian patients are vegetarian (Mahajan and Malla, 1992).

Based on a positive serological test using Enzyme Linked Immunosorbent Assay (ELISA), 10 of 74 (13.5%) patients with epilepsy in Bali (Indonesia) were diagnosed to have neurocysticercosis (Margono *et al.*, 2001).

A serological assay of 2667 randomly selected patients with epilepsy was performed using ELISA, in South Korea and 4 percent of patients were diagnosed to have neurocysticercosis (Kong *et al.*, 1993).

Based on medical and veterinary records from 1971-1984; in Slovakia (Czechoslovakia), taeniasis in man was recorded in 3.8, 5.6 and 3.07 / 100000 population in 1971, 1981 and 1984 respectively (Hovorka *et al.*, 1986).

Method of preventing the acquisition by man of larval cestode infection from animals are discussed in prophylaxis of zoonotic metacestode infections (Euzeby, 1975).

Matchanov *et al.* (1977) reported larval cestode infections in man and animals in Uzbekistan (USSR). They also estimated economic losses due to larval cestodes infection.

In a report by Bhoopat *et al.* (1989), 45 of 132 patients with neurocysticercosis were found to have solitary cysticercus granuloma in Thailand and more recently Yodnopaklow and Mahuntussangapong (2000) found a solitary cysticercus granuloma in 20 of 972 patients presented with epilepsy.

Raj-shekhar and Chandy (2000) reported 14 patients with cysticercosis from Christian Medical College Hospital, Vellore, India.

In a study carried by Ertug *et al.* (2002) in the province of Aydin (Turkey), 56 cases were diagnosed as cystic echinococcosis, ranging in age from 20-76 years, of whom 27 (48%) were male and 29 (52%) female. 50 (89.3%) cases had cysts in the liver, but in 5 cases between the liver and lungs were affected. In only one case the brain was also affected.

Eckert *et al.* (2001) conducted faecal examination in 130 peruvian patients with neurocysticercosis. They found a direct correlation between the occurrence of taeniasis and the severity of metacestode infection.

A study by Torgerson and Budke (2003) revealed that adult parasite which inhabits the intestine of various carnivore species is not much pathogenic. But the larval or metacestode stages can be highly pathogenic causing economic losses to livestock and various forms of echinococcosis in human, some of which have a high fatality rate (70%).

A nation wide survey of taeniasis was conducted between 1988 and 1992 covering 30 provinces in China involving 1.48 million people, revealed average occurrence of taeniasis as 0.112 percent (Yu *et al.*, 1999).

Survey reports of Bali (Indonesia) indicated taeniasis in 0.4 percent of population (Suweta, 1991). These surveys were done using the stool examination of the patients.

(b) Prevalene of metacestode infection in common food animals in India:

In Punjab, Chhuttani and Chugh (1957) found 2.8 percent occurrence of hydatid cyst in sheep and goats Sharma and Chitkara (1963) reported 3.5 percent occurrence of hydatidosis in sheep and goats in Amritsar (Punjab);

out of which 33 percent involve of lungs, 23 percent in liver and 43.6 percent in lungs and liver.

Pandey (1971) reported occurrence of metacestode infection in goat with an average of 6.5 percent in Bihar. The organs mostly affected were lungs, liver and spleen.

Abraham *et al* (1980) in their survey of slaughtered animals at various abattoirs in Kerala reported 2.55 percent and 1.05 percent hydatid cysts in sheep and goat, respectively. They found 93 percent fertile cysts in sheep and 75 percent in goats in an organized survey of slaughter houses in Kerala during 1978.

Occurrence rate of metacestode infection in sheep and goats were reported as 16 percent in Karim Nagar district whereas in Anantpur district of Andhra Prades ı it was 81 percent (S.L. Rao, 1980)

Katiyar and Sinha (1981) reported hydatidosis in 50 percent sheep and 33.33 percent goats in Sikkim whereas Deka *et al.* (1985) found 5.1 percent and 2.8 percent occurrence of hydatidosis in sheep (328) and goats (315) respectively, in Ludhiana.

Rana *et al.* (1986) examined 1103 sheep, out of which 206 (18.5%) showed presence of metacestode in liver (71), lung (67), mesentries (61), spleen (4) and kidney (3).

In a study of 758 sheep, examined by Reddy *et al.* (1986) at several abattoirs in Andhra Pradesh, 36 were found infected with hydatid cyst with equal percentage of occurrence in lungs and liver.

A survey report (November, 1995 to March, 1997) of Das and Krishnan (1998) revealed, 47.64 percent and 37.84 percent of hydatid infection in sheep and goats respectively, with corresponding fertility rate of 78 percent and 82 percent. Sheep had highest infection in lung (35.85%) followed by liver (20.25%), heart (12.30%) and spleen (2.02%) whereas infection was highest in lungs (32.01%) followed by liver (26.85%) heart (14.75%) in goat.

Deka and Gour (1998) showed the overall occurrence of 2.56 percent in sheep and 1.45 percent in goats. In West Bengal, Biswas *et al.* (1989) reported the occurrence of hydatid cyst as 7 percent in sheep and 39 percent in goats in West Bengal with 73.0 percent of fertile and 11 percent sterile cyst in sheep.

From 1980 to 1985, 2100 goats of different breeds, age and sex from different parts of Uttar Pradesh were screened for the presence of cysticerci (Pathak and Gaur, 1989). Economic losses due to condemnation of affected meat were calculated.

(c) World wide occurrence of metacestode infection in common food animals :

Hegazi *et al.* (1986) found low occurrence (0.42 percent) of hydatidosis in sheep slaughtered at Mansoura (Egypt), whereas a National abattoir in Great Britain, reported 3 percent of sheep infected with hydatidosis.(Walters, 1986).

Gusbi *et al.* (1987) found hydatid cysts in 402 (7.85%) out of 5118 sheep examined in Libya. The occurrence of hydatidosis in adults and lambs

were 12.74 percent, and 0.29 percent, respectively. Hydatid cysts were found in 97.26 percent, 58.7 percent and 1.76 percent of liver, lung and kidney, respectively.

Petkov *et al.* (1987) observed, 35 percent occurrence of hydatid cysts in sheep in Bulfaria. Slepnev (1988) examined 2429 sheep slaughtered from specialized farms and found them free from echinococcosis in USSR.

In U.K., Gubsi *et al.* (1990) screened 2295 goats and found that 35 adults (1.5%) had hydatidosis and no kids were infected.

In Spain, out of 513 adult sheep examined as representative of 21400 adult sheep population by Garcia Marin *et al.* (1990); 422 (82.3%) were found infected with hydatid cyst in sheep with occurrence among zones ranging from 60.9 percent to 99.3 percent.

In Nigeria, Pangul and Salla (1992) found higher occurrence of hydatidosis in goats (83 percent) than in sheep (2.8 percent) and also reported 2.2% of cattle infected with *E. granulosus.*

Yang (1992) examined 44438 sheep of which 53.72 percent were infected with hydatid cyst in Qinghai province of China.

Anwar *et al.* (1993) reported 0.98 percent occurrence of hydatidosis in sheep and goats in Pakistan and found fertility of cyst as 80.95 percent and 65.49 percent in sheep and goats, respectively.

Oryan *et al.* (1994) during their study for two years reported 26.12% sheep infected with *E. granulosus* in Iran. However in Jordan, Kamhawi *et al.* (1995) reported an occurrence (12.9%) of hydartidosis in sheep and goats.

Musinov (1999) examined, sheep for metacestode infection at various abattoirs in Uzbekistan (1984-1996) and found (47.23 %) sheep infected.

El-metenawy (1999) carried an abattoir survey of metacestodes infection among the slaughtered ruminants at Al-Qassim Area, Saudi-Arabia and found 14.9 percent of 3045 sheep and 29.5 percent of 312 goats were infected with metacestodes.

Dueger and Gilman (2001) examined 212 sheep of different age in the central Peruvian region and reported overall occurrence of the disease in sheep as were 77.4 percent.

Dalimi *et al.* (2002) found 25.29 percent of the sheep and 11.08 percent of the goats infected with hydatid cysts in Horestan province of Western Iran.

Yildiz and Gurcan (2003) conducted research work at Kirikkate, Turkey in order to determine the occurrence and fertility of hydatid cysts in sheep and found 3.2 percent lambs and 50.9 percent adults to be infected with hydatid cyst. The most common location of cysts were in the liver and lung. Liver cysts tended to be more fertile than lung cysts (81.53 Vs 76.4%).

Islam *et al.* (2003) carried out an investigation in the Cox's Bazar district of Bangladesh and found significantly higher occurrence of metacestode infection in sheep (52.11%) than goats (14.73%). The fertility rate of cyst was also recorded high in sheep (65.43%) than goats (14.80%).

(d) Economic loss due to condemnation of carcases and viscera :

Kulkarni (1986) reported condemnation of 70 livers, 27 lungs and 2 hearts of goat slaughtered in Maharastra owing to cyst infection that costs a total economic loss of Rs. 632.

Kaloyanov *et al.* (1989) reported metacestode infection in the liver were responsible for condemnation of 44 percent liver of sheep, 6.5 percent liver of pigs, 38 percent liver of cows and 68 percent liver of calves. In the lungs they were responsible for 70 percent condemnation of lungs of sheep, 5 percent lungs of pigs, 70 percent lungs of cow and 81 percent lungs of calves slaughtered at Shumen abattoir during 1988 and 1989.

Gathura and Gathama (1991) studied the annual economics in Kenya and reported a loss of Rs. 944286 due to hydatid cyst infection in cattle. They also reported economic loss due to condemnation of livers of sheep and goats to be Rs. 60453.

Fan and Chung (1997) estimated the annual economic loss due to taeniasis (all species including *Taenia asiatica*) in the mountain regions of Taiwan, Cheju island of Korea and Samoir island of Indonesia amounted to US$18 millions, US$13 million and US$2.4 million, respectively.

Togerson *et al.* (2000) had studied economic loss in Uruguay due to cysticercus in man and animals. The estimated minimum cost (US$2.9 million/year) was based on the condemnation of infected offal together with the actual costs of the hospital treatment of human cases. The estimate of the minimum cost (US$22.1 million/year) also included production losses

resulting from lower livestock efficiency and the reduced income of individuals with mortality attributable to the disease.

Togerson and Dowling (2001) evaluated the economic loss due to metacestode infection of sheep, goat and human in Wales, U.K. and estimated US$7.9 million losses each year.

(e) Occurrence of Taeniasis in Stray & Pet Dogs :

Tarish *et al.* (1986) studied on occurrence of Taeniasis in stray dogs from the area of Baghdad and 25 percent were found positive for the disease.

Islam *et al.* (2003) investigated and described the local epidemiological pattern of Taeniasis in the Cox's Bazar district of Bangladesh. Faecal examinations of stray and house dogs show high infection level (50.65%) with *Taenia* spp.

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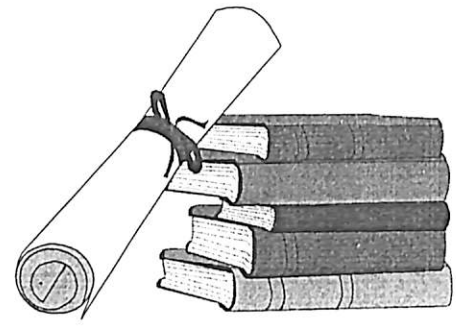
Chapter - III

MATERIALS AND METHODS



MATERIALS AND METHODS

Present survey was carried out within the months of July 2007 to February 2008 (A total of 8 months) to study the occurrence of metacestode infection in goats and sheep. The goats and sheep slaughtered in and around Patna at street butchery were assumed, to be drawn from the different parts of Bihar.

In the present study a total of 3450 carcasses of goat comprising of 2250 males and 1200 females were examined on the basis of random sampling (Thapliyal and Misra, 1996).

A total of 1350 carcasses of sheep were also examined comprising of 875 males and 475 females. Faeces of 325 dogs comprising of 95 street dogs and 230 pet dogs were microscopically examined for taeniasis from different localities of Patna.

Occurrence of cysticercosis/hydatidosis in human being was recorded from Patna Medical College, and Hospital (PMCH), Nalanda Medical College and Hospital (NMCH), Indira Gandhi Institute of Medical Sciences (IGIMS) and New Magadh Hospital.

Detection of hydatid cyst and microscopic examination of metacestode fluid :

The organs of dressed carcasses were thoroughly screened after unaided visual examination and palpation. Organs containing metacestodes from each site were collected in separate containers and were taken in laboratory for detailed examination. The location and intensity of hydatid

cysts were also recorded separately. The lungs were carefully examined by giving 3-4 incisions in each lobe after palpation. Thorough examinations were carried out to find even small cysts situated in the deeper parts of the organs. Similarly spleen and mesentery of different parts were carefully examined to detect the metacestodes situated in different parts.

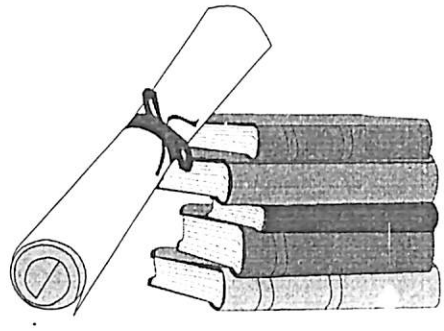
In the laboratory, metacestodes were punctured by sterilized needle in the watch glass and fluid was examined under electrical stereoscope to identify the type of metacestodes. In case of hydatid cyst, brood capsule containing protoscolex was found in the third chamber where as in cysticercus fluid was devoid of it. Brood capsule containing protoscolex indicates fertile cyst (Bhatia *et al.*, 2006).

In vivo experiment :

Viability of the cysticercus was studied in pups comprising of 3 male and 2 female during the present experiment. The pups were first dewormed with fenbendazole (FENTAS; Intas Pharmaceuticals Pvt. Ltd.) the dose being 50 mg/kg body weight twice at one day interval by oral route. The faeces were examined for the presence of parasitic ova ten consecutive days. After the drug administration when pups were found free from parasites, each pup was infected by feeding cyst fluid containing sufficient scolices. Pups were kept in captivity for about 2 months. After 55 days of giving infection to the pups, faecal examination of each pup was carried for consecutive 7 days to find out the cestode eggs in faeces (Dada and Belino, 1981).

Chapter - IV

RESULTS



RESULT

GOAT

The study of metacestodes in 3450 goats of both sexes revealed the overall occurrence of 14.35 percent (Table 1, fig. 4). Sex-wise occurrence of metacestodes was found to be 13.11 percent in male and 16.66 percent in female (Table 5). Occurrence of metacestode infection was highest in mesentry (38.38 percent) followed by liver (19.2 percent), lung (15.1 percent), thoracic wall (9 percent), abdominal wall (3.1 percent) of Goat (Table 3). Metacestode infection in mesentry was 31 percent and 35.06 percent in male and female respectively (Table 5). Similarly in lung and liver, it was 25.35 percent and 20.98 percent respectively in male while in female it was 14.5 percent and 11.60 percent, respectively (Table 5). Average number of cyst per animal was 2.13, but in male it was 2.40 and in female 1.73 (Table 5). Hydatid infection in mesentery of intermediate host was 29.66 percent, while that of cysticercus was 38.54 percent (Table 4). Metacestode infection was highest in September and October, 24.4 percent and 25.9 percent respectively (Table 8) while lowest in November 4.3 percent (Table 8). In each month metacestode infection in female was higher than that of corresponding male (Table 8). Percent cysticercus infection was lower from July to October than the corresponding hydatid infection, while it was higher from November to January that the corresponding hydatid infection respectively (Table 7). Fertility of hydatid cyst was highest in September 84 percent, while it was lowest in January 55 percent (Table 10) Viability of cysticercus in vivo was found to be 60 percent (Table 11) .

Economic losses due to metacestode infection were also calculated and estimated to be 0.55 percent (Table 12).

SHEEP

The study of metacestodes in 1350 sheep of both sexes revealed the overall occurrence to be 11.26 percent (Table 1, fig.2) but in male it was 10.28 percent and in female 13.05 percent (Table-6). Metacestode infection in mesentry was 41.2 percent in male while in female it was 39.32 percent (Table 6.1). Similarly in liver and lung it was 22.4 percent and 14 percent respectively in male; where as in female it was 21.40 percent and 12.8 percent respectively (Table 6.1). Average number of cyst per animal was 2.41, but in male it was 2.80, while in female 1.88 (Table 6). Hydatid infection in mesentry of intermediate host was 29.66 percent, while that of cysticercus was 38.54 percent (Table 4). Metacestode infection was highest in September and October, 21.9 percent and 20.7 percent respectively, while lowest in December and January, 5.36 percent and 6.43 percent respectively (Table 9). Percentage of infection goes on increasing from July to September and October and then gradually decreases to January and February (Table 9). This may be due to hot humid condition favourable for development of larval and adult stages of parasite. Economic losses due to metacestode infection were also calculated and estimated to be 1 percent approximately (Table 13).

Occurrence of taeniasis in street and pet dogs and its zoonotic impact :

In the present study a total of 95 street dog faeces were examined, comprising of 63 males and 32 females. Out of which 13 (20.64%) and 9

(28.12%) males and females were found positive for taeniasis respectively (Table 15.1) with the overall occurrence of 23.2% in dogs (Table 15) . At the same time 230 pet dogs were also examined comprising of 160 males and 70 females. Out of which 12 (7.5%) and 8 (11.43%) males and females were found infected with taeniasis respectively (Table 15.1). With a overall occurrence of 8.7% in pet dogs (Table 15). Occurrence of taeniasis in dog was highest in September (20.7%) and October (18%) respectively, while lowest in December, (7.32%) (Table 16).

According to the hospital records of Indira Gandhi Institute of Medical Sciences (IGIMS) Patna Medical College and Hospital (PMCH), Nalanda Medical College and Hospital (NMCH) and New Magadh Hospital, occurrence of cysticercosis/hydatidosis in man was highest in September and October 4.08 percent and 4.29 percent respectively while it was lowest in January and February 1.15 percent and 1.13 percent respectively. (Table 19). This trend of infection shows positive co-relation with the infection in dog (definite host) with respect of month (Table 19).

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Table No. – 1 : Occurrence of Metacestode infection in Sheep & Goat.

Species	No. of examined		$\chi^2_{1d.f.}$
	Examined	Positive of metacestode (%)	
Goat	3450	495 (14.35)	6.12*
Sheep	1350	152 (11.26)	

* = Significant at P<0.05

Table – 2 : Different occurrence of Hydatid Cyst & Cysticercus Cyst in Sheep & Goat.

Metacestode	Total	Goat (%)	Sheep (%)	$\chi^2_{1d.f.}$
Hydatid Cyst	654	455 (69.57)	199 (30.43)	15.64**
Cysticercus Cyst	768	600 (78.12)	168 (21.88)	0.065

** = Significant at P<0.01

Table No. -3 : Occurrence of Metacestode Infection in different organ of Goat & Sheep.

Sl. No.	Name of Organ	Goat (percentage)	$\chi^2_{7d.f.}$	Sheep (percentage)	$\chi^2_{7d.f.}$
1.	Mesentry	190 (38.38)	454.89**	45 (29.6)	117.39**
2.	Thoracic wall	45 (9)		10 (6.6)	
3.	Abdominal wall	15 (3.1)		5 (3.28)	
4.	Liver	95 (19.2)		40 (26.42)	
5.	Lung	75 (15.1)		30 (19.7)	
6.	Spleen	10 (2)		3 (1.9)	
7.	Liver & Lung	40 (8.1)		10 (6.5)	
8.	Liver Lung & Mesentry	25 (5.12)		9 (5.9)	
Total		**495 (100)**		**152 (100)**	

** = Significant at P<0.01

Table – 4 : Occurrence of Hydatid Cyst & Cysticercus Cyst in various organ of Goat and sheep (intermediate host).

Sl. No.	Name of Organ	No. of Hydatid Cyst (%)	$\chi^2_{7d.f.}$	No. of Cysticercus Cyst (%)	$\chi^2_{7d.f.}$
1.	Mesentry	194 (29.66)		296 (38.54)	
2.	Thoracic wall	52 (7.95)		44 (5.72)	
3.	Abdominal wall	20 (3.06)		11 (1.45)	
4.	Liver	171 (26.15)		99 (12.89)	
5.	Lung	105 (16.05)	469.81**	175 (22.79)	789.81**
6.	Spleen	12 (1.83)		2 (0.26)	
7.	Liver& Lung	59 (9.02)		72 (9.37)	
8.	Liver,Lung & Mesentry	41 (6.28)		69 (8.98)	
Total		**654 (100)**		**768 (100)**	

** = Significant at P<0.01

Table No. – 5 : Sex wise occurrence of Metacestode infection in different organ of Goat.

Sex	Total no. of Goat examined	Total No. of Goat infected with Metacestode	Total No. of Cyst found	Average per Animal
Male	2250	295 (13.11%)	710	2.40
Female	1200	200 (16.66%)	345	1.73
Total	**3450**	**495 (14.35%)**	**1055**	**2.13**

Sl. No.	Name of Organ	No.of Cyst in Male (%)	No. of Cyst in Female(%)	$\chi^2_{1d.f}$
1.	Mesentry	220(31)	121(35.06)	1.77
2.	Thoracic wall	40(5.63)	35(10.14)	7.15**
3.	Abdominal wall	5(0.70)	15(4.34)	16.57**
4.	Liver	149(20.98)	40(11.60)	12.63**
5.	Lung	180(25.35)	50(14.5)	16.06**
6.	Spleen	6(0.85)	4(1.16)	0.24
7.	Liver& Lung	50(7.04)	60(17.4)	26.62**
8.	Liver, Lung & Mesentry	60(8.45)	20(5.8)	2.33
Total		**710(100)**	**345(100)**	

** = Significant at P<0.01

Table No.-6 : Sex wise occurrence of Metacestode infection in different organ of Sheep.

Sex	Total no. of Sheep examined	Total No. of Sheep infected with Metacestode	Total No. of Cyst found	Average per Animal
Male	875	90 (10.28%)	250	2.80
Female	475	62 (13.05%)	117	1.88
Total	**1350**	**152 (11.26%)**	**367**	**2.41**

Sl. No.	Name of Organ	No. of Cyst in Male (%)	No. of Cyst in Female(%)	$\chi^2_{1d.f}$
1.	Mesentry	103(41.2)	46(39.32)	0.15
2.	Thoracic wall	14(5.6)	7(6)	0.02
3.	Abdominal wall	7(2.8)	4(3.42)	0.10
4.	Liver	56(22.4)	25(21.40)	0.03
5.	Lung	35(14)	15(12.8)	0.07
6.	Spleen	4(1.6)	-	1.9
7.	Liver & Lung	15(6)	6(5.1)	0.11
8.	Liver, Lung & Mesentry	16(6.4)	14(11.96)	3.29
Total		**250(100)**	**117(100)**	

Table No. – 7 : Occurrence of Hydatid cyst/ Cysticercus cyst in Sheep & Goat(intermediate host) in different months.

Sl. No.	Month	Goat				Sheep		
		Hydatid Cyst (%)	Cysticercus cyst (%)	$\chi^2_{1d.f.}$	Coenurus cereberalis	Hydatid Cyst (%)	Cysticercus cyst (%)	$\chi^2_{7d.f.}$
1.	July	65 (14.28)	44 (7.33)	13.9**	2	24 (12.06)	18 (10.71)	6.56
2.	August	80 (17.58)	74 (12.33)	5.72	1	30 (15.07)	17 (10.12)	14.2**
3.	September	73 (16.04)	72 (12)	3.57	-	48 (24.12)	15 (8.93)	37.5**
4.	October	64 (14.06)	69 (11.5)	1.55	-	33 (16.58)	20 (11.90)	14.5**
5.	November	46 (10.11)	84 (14)	3.63	-	14 (7.03)	23 (13.70)	0.04
6.	December	40 (8.79)	95 (15.84)	11.5**	-	13 (6.53)	27 (16.07)	0.92
7.	January	35 (7.69)	107 (17.84)	22.8**	-	17 (8.54)	29 (17.26)	0.13
8.	February	52 (11.45)	55 (9.16)	1.45	-	20 (10.07)	19 (11.31)	2.70
9.	**Total**	**455**	**600**		**3**	**199**	**168**	

** = Significant at P<0.01

Table No. – 8 : Occurrence of Metacestode infection in goat in different months.

Month	No. of animal examined			No. of animals Positive		
	M	F	T	M (% positive)	F (% positive)	T (% positive)
July	350	180	530	47 (13.40)	27 (15.00)	74 (13.90)
Aug	320	160	480	62 (19.40)	31 (19.40)	93 (19.40)
Sept	230	110	340	54 (23.50)	29 (26.40)	83 (24.40)
Oct	170	120	290	40 (23.50)	35 (29.20)	75 (25.90)
Nov	150	130	280	21 (14.00)	19 (14.60)	40 (4.30)
Dec	450	180	630	31 (6.90)	24 (13.30)	55 (8.73)
Jan	300	150	450	16 (5.33)	13 (8.66)	29 (6.44)
Feb	280	170	450	24 (8.60)	22 (12.90)	46 (10.20)

Note : M=male F=female T= total

Table No. : 8.1 : Occurrence of metacestodes infection in different sex of Goat in different month.

Sex	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	$\chi^2_{7d.f}$
Male positive	47	62	54	40	21	31	16	24	85.3**
Female positive	27	31	29	35	19	24	13	22	32.6**

** = Significant at P<0.01

Table No. – 9 : Occurrence of Metacestode infection in Sheep in different months.

Sl No.	Month	No. of animal examined			No. of animals Positive			% Positive		
		M	F	T	M	F	T	M	F	T
1.	July	140	80	220	11	8	19	7.8	10	8.6
2.	Aug	120	65	185	18	7	25	15	10.8	13.5
3.	Sept	100	55	155	23	11	34	23	20	21.9
4.	Oct	70	46	116	14	10	24	20	21.7	20.7
5.	Nov	85	49	134	7	4	11	8.23	8.2	8.2
6.	Dec	150	55	205	8	3	11	5.33	5./45	5.36
7.	Jan	95	45	140	6	3	9	6.3	6.66	6.43
8.	Feb	115	80	195	12	7	19	10.4	8.75	9.75

Note : M=male F=female T= total

Table No. – 9.1 : Occurrence of metacestodes infection in different sex of sheep in different month.

Sex	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	$\chi^2_{7d.f}$
Male positive	11	18	23	14	7	8	6	12	33.1**
Female positive	8	7	11	10	4	3	3	7	13.2**

** = Significant at P<0.01

Table No. – 10 : Month wise Fertility of Hydatid Cyst.

Sl. No.	Month	Total Cyst examined	No. of Fertile Cyst (%)	No. of Sterile Cyst (%)	$\chi^2_{7d.f.}$
1.	July	20	13 (65.00)	7 (35.00)	8.6**
2.	August	22	17 (77.27)	5 (22.73)	
3.	September	25	21 (84.00)	4 (16.00)	
4.	October	25	20 (80.00)	5 (20.00)	
5.	November	20	14 (70.00)	6 (30.00)	
6.	December	22	13 (59.00)	9 (41.00)	
7.	January	20	11 (55.00)	9 (45.00)	
8.	February	20	12 (60.00)	8 (40.00)	

** = Significant at P<0.01

Table No. – 11 : Experimental(in vivo)design for confirmation of viability of Cysticercus in dog (Pups).

Sl. No.	Animal No.	Sex	Date of Infection	Date of appearance of eggs in faeces	Prepatent period (days)	Viability percentage
1.	Pup No.1	Male	21st Nov. 07	23rd Jan. 08	62	60%
2.	Pup No.2	Female	21st Nov. 07	20th Jan. 08	59	
3.	Pup No.3	Male	23rd Nov. 07	-	-	
4.	Pup No.4.	Female	23rd Nov. 07	-	-	
5.	Pup No.5.	Male	23rd Nov. 07	23rd Jan. 07	60	

Table No.-12 : Economic Loss due to metacestode infection in Goat.

Sl. No.	Organ	Rate	Details	No. of organs Condemned	Weight in Kg.	Economic Loss (Rs-)	Cost (Rs- 800) per Goat	% Loss
1.	Liver	200/-Kg.	Totally Condemned Liver	40	20	4000	800 × 3450 = 2760000	0.55
2.	Liver	200/-Kg.	Partially Condemned Liver	85	21.25	4250		
3.	Lung	40/-Piece	Totally Condemned Lung	35	-	1400		
4.	Lung	20/-Piece	Partially Condemned Lung	65	-	1300		
5.	Mesentry	160/-Kg.	-	-	21	3360		
6.	Attached muscle	160/-Kg.	-	-	6	960		
7.	**Total**					**15270**		

Note :1.Average weight of totally condemned Liver is taken as 0.5Kg.
2. Average weight of partially condemned Liver is taken as 0.25 Kg
3. Average weight of Mesentry condemned per infection is taken as 0.1 Kg
4. Average weight of attached muscle condemned per infection is taken as 0.1Kg

Table No. – 13 : Economic loss due to Metacestode infection in Sheep.

Sl. No.	Organ	Rate	Details	No. of organs Condemned	Weight in Kg	Economic Loss (Rs-)	Cost (Rs- 500 per Goat	% Loss
1.	Liver	200/-Kg.	Totally Condemned Liver	17	8.5	1700		
2.	Liver	200/-Kg.	Partially Condemned Liver	30	15	3000		
3.	Lung	40/-Piece	Totally Condemned Lung	10	-	400	500×1350= 675000	1.00
4.	Lung	20/-Piece	Partially Condemned Lung	30	-	600		
5.	Mesentry	160/-Kg.	-	-	5	800		
6.	Attached muscle	160/-Kg.	-	-	1.5	240		
7.	Total					6740		

Note :1. Average weight of totally condemned Liver is taken as 0.5Kg.
2. Average weight of partially condemned Liver is taken as 0.25 Kg
3. Average weight of Mesentry condemned per infection is taken as 0.1 Kg
4. Average weight of attached muscle condemned per infection is taken as 0.1 Kg

Table No. – 14 : Occurrence of Metacestodes infection in Goat and Sheep in different localities of Patna.

S. No.	Locality	Goat						Sheep					
		Male		Female		Total		Male		Female		Total	
		Examined	Infected	Examined	Infected	Examined	Infected	Examined	Infected	Examined	Infected	Examined	Infected
1.	Raja Bazar	350	30	150	26	500	56	105	10	65	8	170	18
2.	Danapur	220	24	120	17	340	41	90	7	60	5	150	12
3.	Anishabad	240	26	100	13	340	39	80	10	40	7	120	17
4.	Digha	210	19	125	19	335	39	95	11	50	4	145	15
5.	Bakarganj	210	19	125	19	335	38	95	11	50	4	145	15
6.	Patna City	170	33	90	13	260	46	65	5	40	4	105	9
7.	Mithapur	190	28	120	21	310	49	100	18	30	5	130	23
8.	Hajipur	140	31	80	18	220	49	55	7	35	5	90	10
9.	Masodhi	150	35	90	17	240	52	65	7	40	4	105	11
10.	Sampatchak	170	24	800	13	250	37	60	5	25	3	85	6
11.	Phulbarisharif	200	26	120	24	320	50	65	7	40	5	105	12

Table No. 15 : Occurrence of Taeniasis in Street & pet dogs.

Sl. No.	Dog	No. Examined	No. Found Positive	$\chi^2_{1d.f.}$	Percentage Positive
1.	Stray	95	22	12.08**	23.2
2.	Pet	230	20		8.7

** = Significant at P<0.01

Table No. – 15.1 : Sex wise occurrence of Taeniasis in Street & Pet Dogs.

Sl. No.	Parameter	Street dog examined		$\chi^2_{1d.f}$	Pet dog		$\chi^2_{1d.f}$
		Male	Female	0.66	Male	Female	
1.	Total examined	63	32		160	70	
2.	Positive for Taeniasis	13	9		12	8	0.95
3.	PercentageTaeniasis	20.64	28.12		7.5	11.43	

Table No. – 16 : Occurrence of Taeniasis in dog in different month.

S.N.	Month	No. of animal examined			No. of animal positive			Percentage positive		Average in (%)
		Male	Female	Total	Male	Female	Total	Male	Female	
1.	July	7*+17**	4*+7**	11*+24**	1*+2**	-+-	1*+2**	12.5	00	8.57
2.	August	6*+19**	5*+6**	11*+25**	1*+1**	1*+1**	2*+2**	18	18.2	11.1
3.	September	10*+30**	3*+10**	13*+40**	4*+3**	3*+1**	7*+4**	17.5	30.8	20.7
4.	October	12*+25**	4*+9**	16+34	3*+2**	2*+2**	5*+4**	12.5	30.8	18
5.	November	7*+18**	5*+11**	12*+29**	2*+-	1*+2**	3*+2**	8	18.7	12.2
6.	December	8*+17**	6*+10**	14*+27**	1*+1**	1*+-	2*+1**	8	6.25	7.32
7.	January	7*+18**	3*+9**	10*+27**	1*+2**	-+1**	1*+3**	12	8.33	10.8
8.	February	6*+16**	2*+8**	8*+24**	-+1**	1*+1**	1*+2**	4.5	20	9.4
	Total	**63*+160****	**32*+70****	**95*+230****	**13*+12****	**9*+8****	**22*+20****	**11.2**	**16.7**	**12.9**

Note :- (*) Indicates Stray dog, (**) Indicates Pet dog

Table No. – 17 : Occurrence of Taeniasis in Dog in different localities of Patna.

S. No.	Locality	Stray						Pet					
		Male		Female		Total		Male		Female		Total	
		Examined	Infected	Examined	Infected	Examined	Infected	Examined	Infected	Examined	Infected	Examined	Infected
1.	Raja Bazar	8	3	4	1	12	4	20	2	10	1	22	3
2.	Danapur	7	2	4	1	11	3	23	2	12	2	35	4
3.	Anishabad	7	2	2	0	9	2	22	1	8	1	30	2
4.	Digha	4	1	3	1	7	2	10	1	7	1	17	2
5.	Bakarganj	4	1	2	1	6	2	8	1	5	1	13	2
6.	Patna City	5	1	3	1	8	2	19	2	4	1	23	3
7.	Mithapur	5	0	2	0	7	0	10	1	3	1	13	2
8.	Hajipur	5	1	2	0	7	1	12	1	4	0	16	1
9.	Masodhi	6	0	3	1	9	1	6	1	5	0	11	1
10.	Sampatchak	4	0	4	1	8	1	10	0	3	0	13	0
11.	Phulbarisharif	8	2	3	2	11	4	20	0	9	0	29	0

Table No. – 18 : Occurrence of Cysticercosis /Hydatidosis in Man among Neurological Patients examined in different diagnostic & medical institute in different months.

Sl. No.	Months	IGIMS Examined (Positive)	PMCH Examined (Positive)	NMCH Examined (Positive)	NEW MAGADGH HOSPITAL	Total Patient examined (Positive)
1.	July	160 (5)	370 (8)	290 (7)	280 (5)	1100 (25)
2.	Aug	112 (4)	310 (7)	318 (9)	310 (3)	1050 (23)
3.	Sep	175 (8)	512 (20)	410 (18)	350 (13)	1447 (59)
4.	Oct	190 (10)	615 (23)	520 (21)	375 (19)	1700 (73)
5.	Nov	121 (4)	290 (7)	310 (8)	280 (5)	1001 (24)
6.	Dec	153 (3)	305 (11)	223 (6)	223 (4)	904 (24)
7.	Jan	114 (2)	414 (5)	294 (4)	218 (1)	1040 (12)
8.	Feb	155 (2)	295 (3)	240 (3)	197 (2)	887 (10)

Note:(-) indicates No. of Patients Positive for Cysticercosis/Hydatidosis

* Average occurrence of cysticercosis/hydatidosis in human beings – 2.52 percent.

Table No. – 19 : Occurrence of infection in different animal in different month.

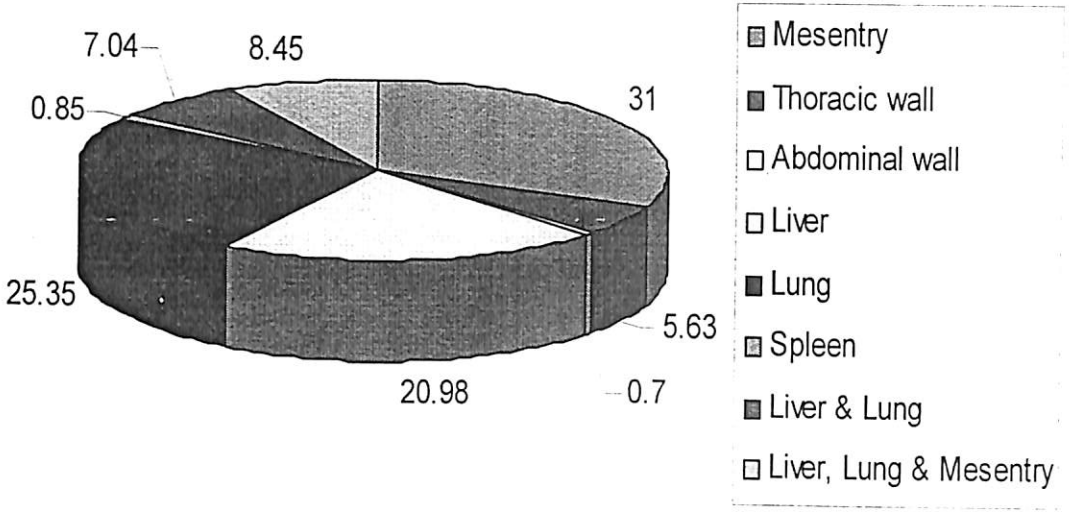
- **Metacestode infection in sheep and goat**
- **Taeniasis in dog**
- **Cysticercosis/Hydatidosis in human beings**

S.N.	Month		Sheep & Goat	Dog	Human being	$\chi^2_{2\ d.f.}$
1.	July	Infected	93 (12.4%)	3 (8.52%)	25 (2.27%)	76.42**
		Non-infected	657	32	1075	
2.	August	Infected	118 (17.74%)	4 (11.11%)	23 (2.19%)	146.98**
		Non-infected	547	32	1047	
3.	September	Infected	117 (13.07%)	11 (20.75%)	53 (4.08%)	186.39**
		Non-infected	778	42	1388	
4.	October	Infected	99 (24.38%)	9(18%)	73 (4.29%)	179.72**
		Non-infected	307	41	1627	
5.	November	Infected	51 (12.32%)	5 (12.2%)	24 (2.39%)	59.16**
		Non-infected	363	36	977	
6.	December	Infected	66 (7.9%)	3 (7.32%)	24 (2.65%)	24.52**
		Non-infected	769	38	880	
7.	January	Infected	36 (6.10%)	4 (10.81%)	12 (1.15%)	37.94**
		Non-infected	554	33	1028	
8.	February	Infected	53 (8.22%)	3 (9.37%)	10 (1.13%)	48.6**
		Non-infected	592	29	877	

** = Significant at P<0.01

Fig. No. -1 : Sex wise Occurrence of Metacestode infection (%) in different organ of Goat.

Male



Female

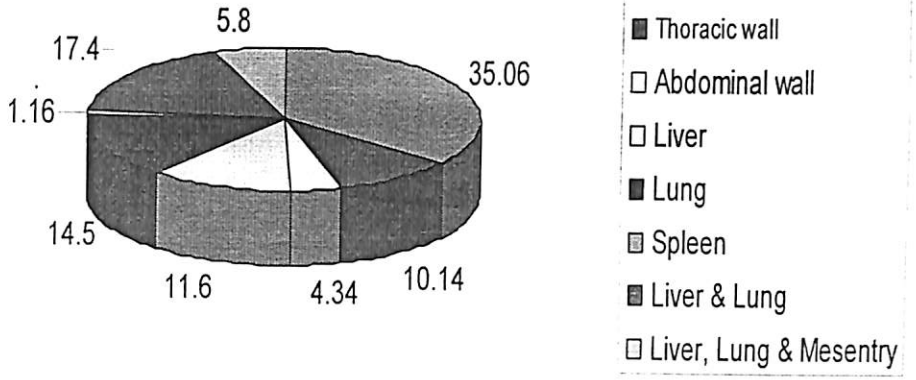


Fig. -2 : Sex wise Occurrence of Metacestode infection (%) in different organ of Sheep.

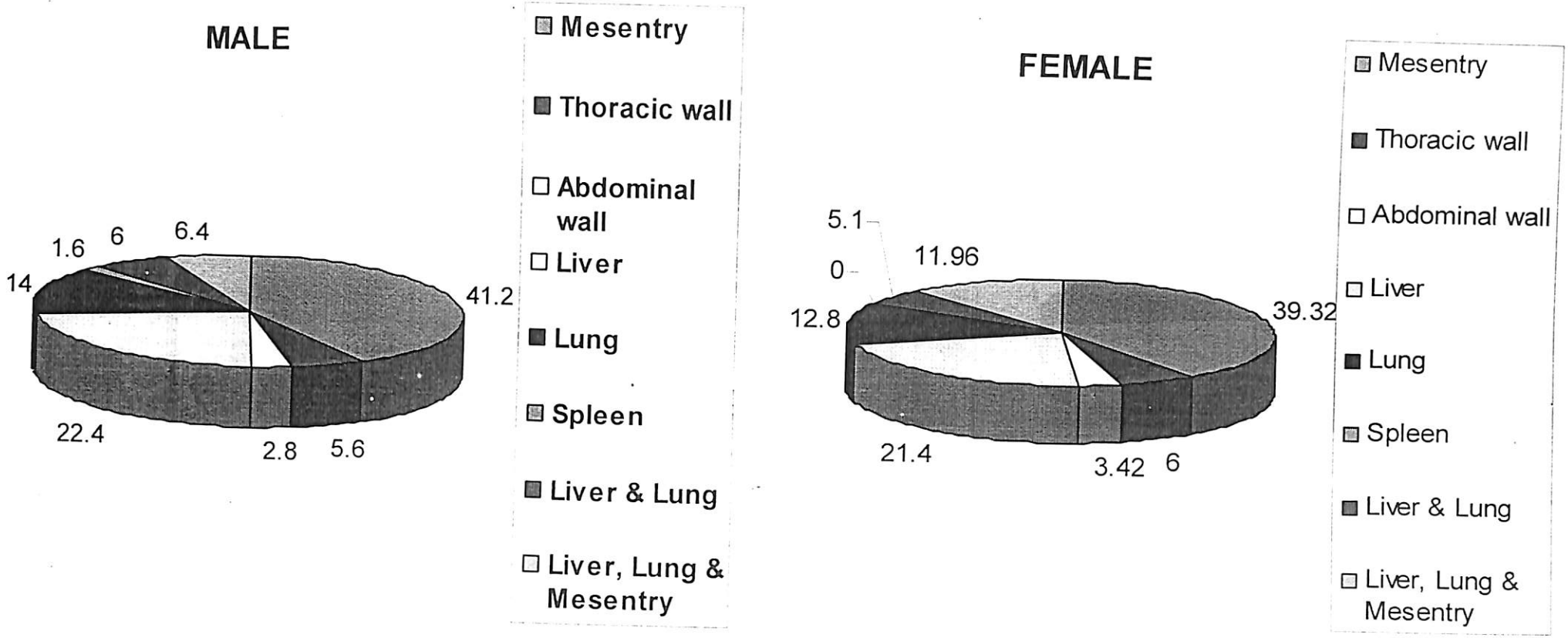
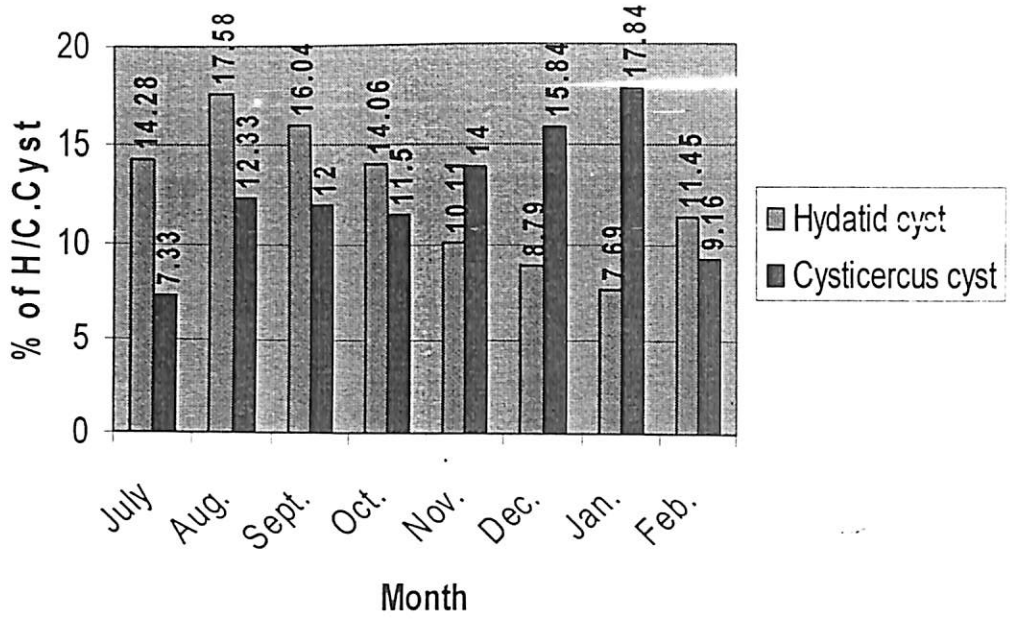
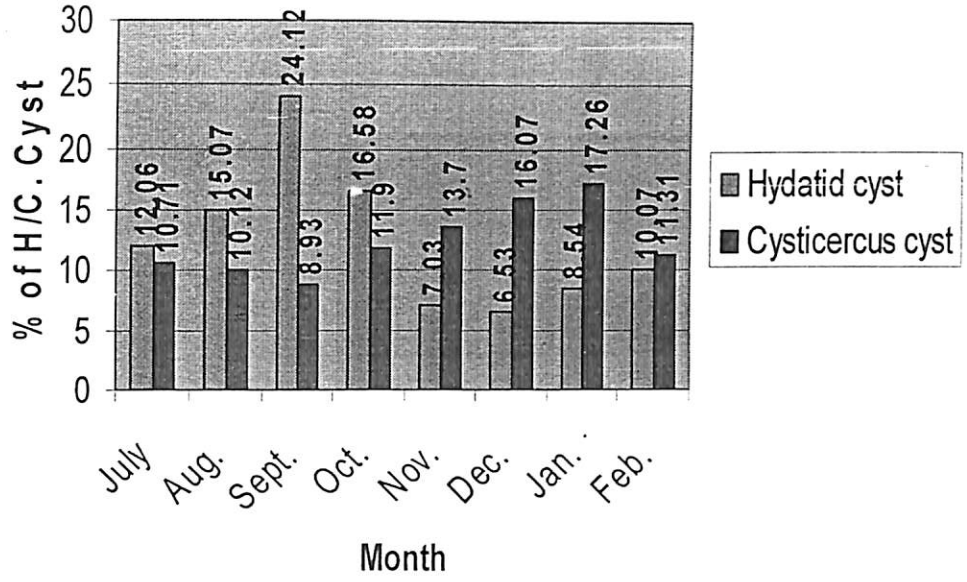


Fig.-3 : Percentage occurrence of Hydatid Cyst (H)/Cysticercus cyst (C) in intermediate host (Goat & Sheep) in different months.



GOAT



SHEEP

Fig. – 4 : Sex wise occurrence of Taeniasis in dog in different month.

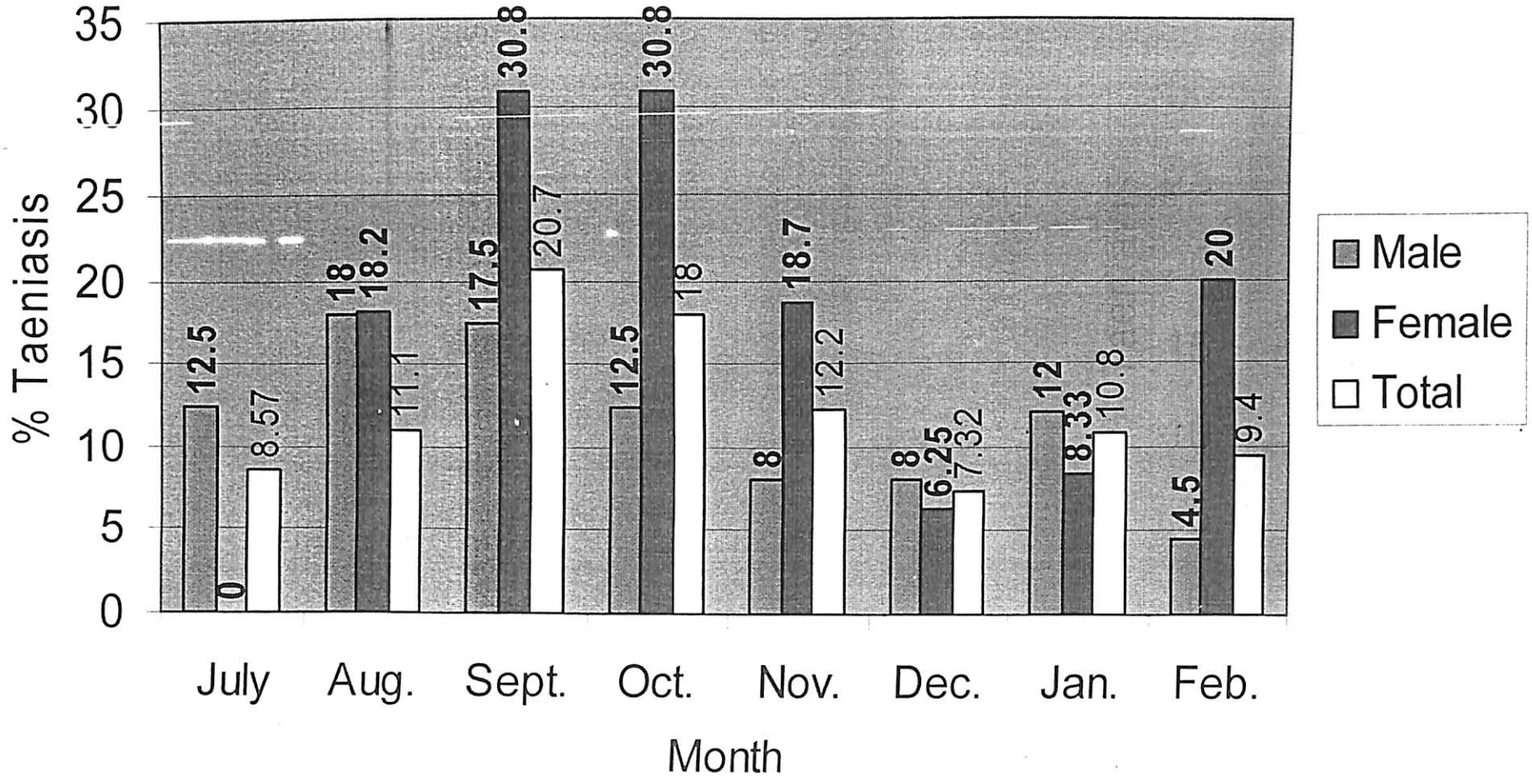


Fig. – 5: Month wise occurrence of Cysticercosis/Hydatidosis in Man.

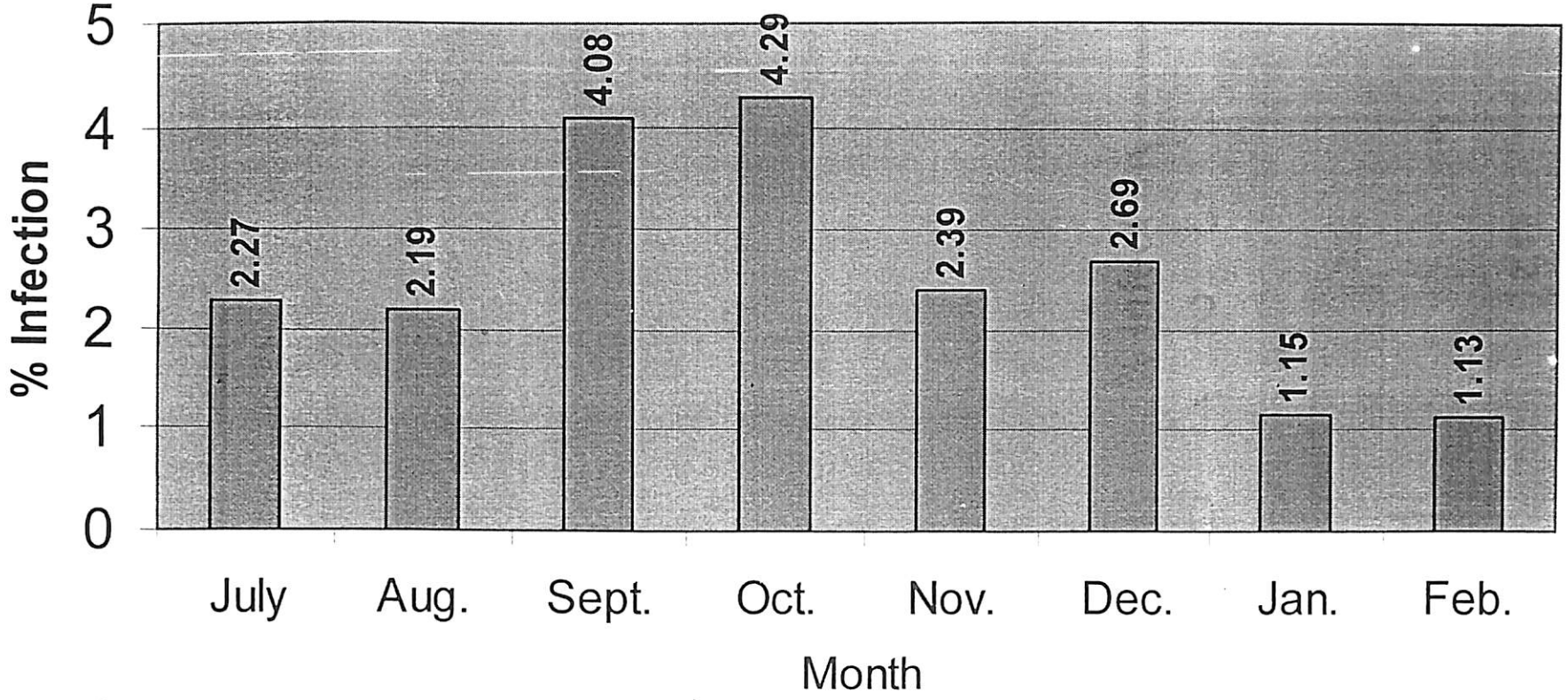
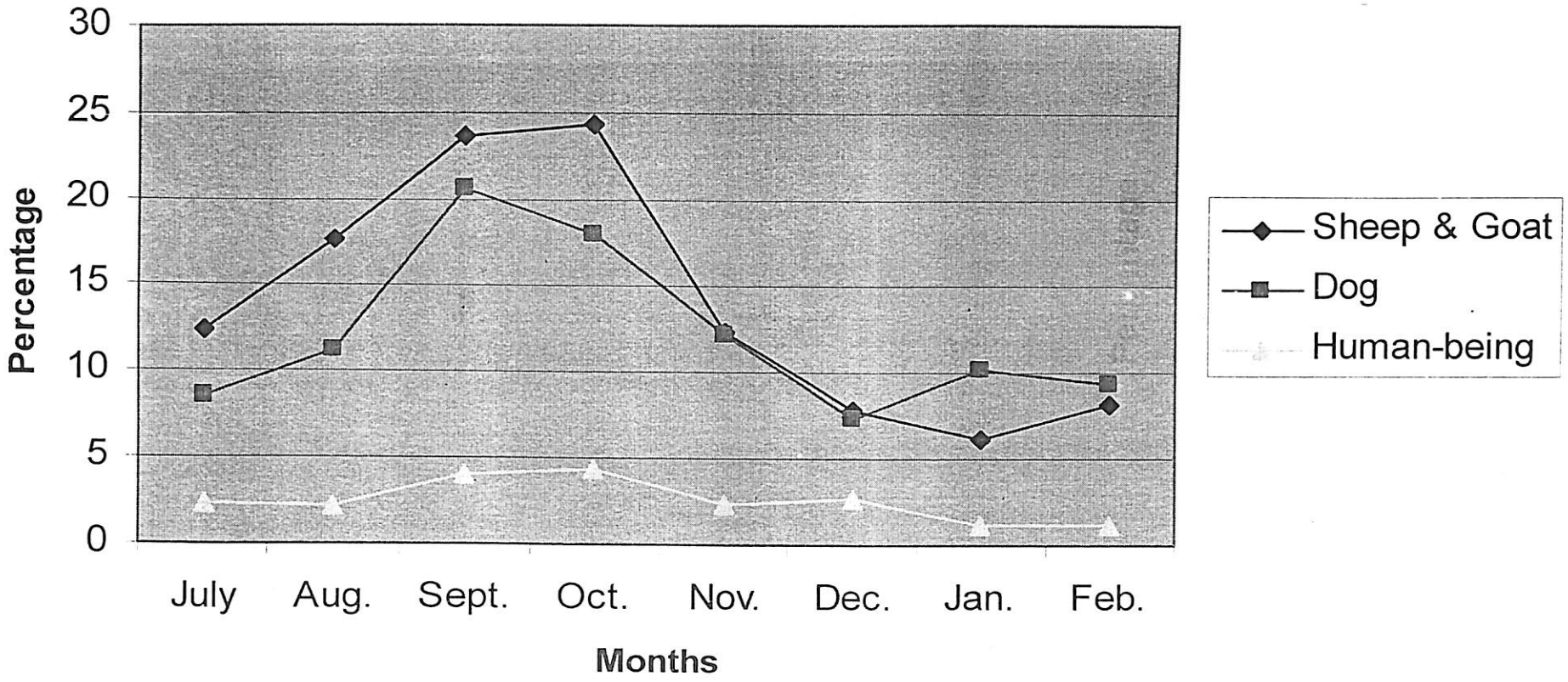


Fig. – 6 : Occurrence of infection in different animal in different month

- Metacestode infection in sheep and goat
- Taeniasis in dog
- Cysticercosis/Hydatidosis in human beings



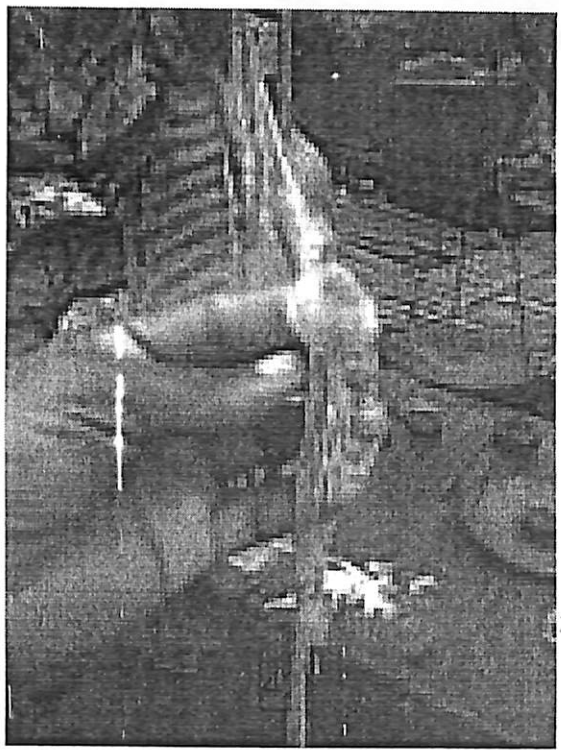


Photo No.-1 : Infection of carcass at street Butchery.

Photo No.-2 : Cyst collected from the mesentry of goat carcass.

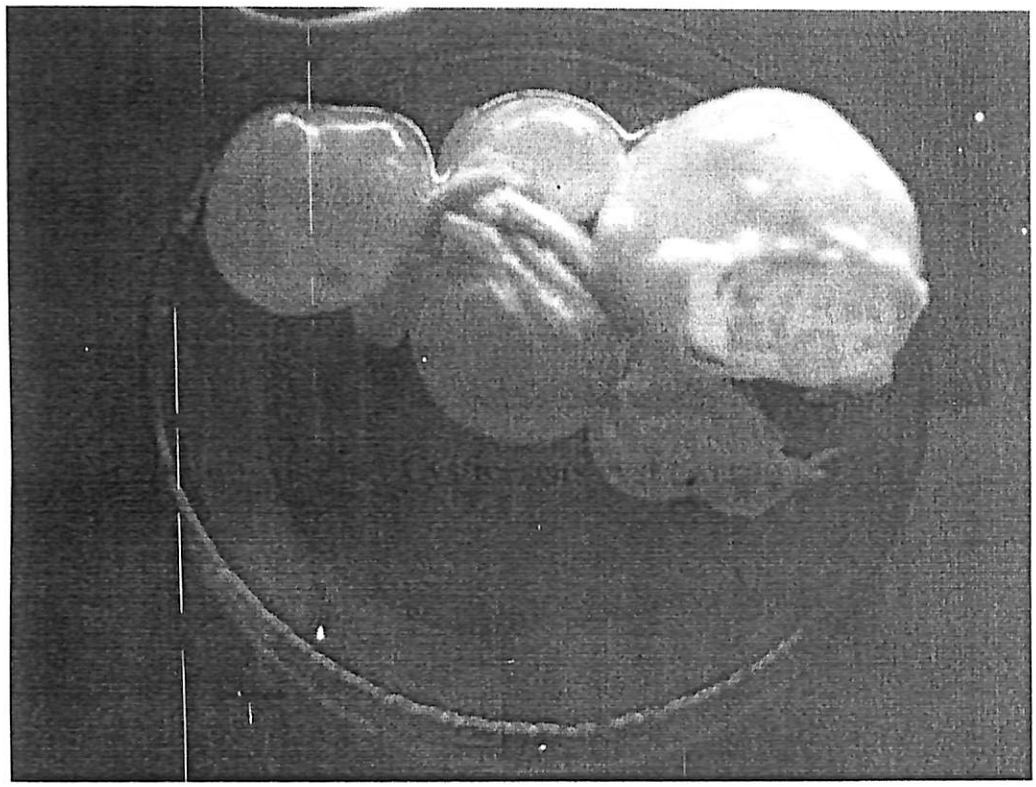


Photo No. – 3 : Cysticercus cyst collected from carcass of sheep.

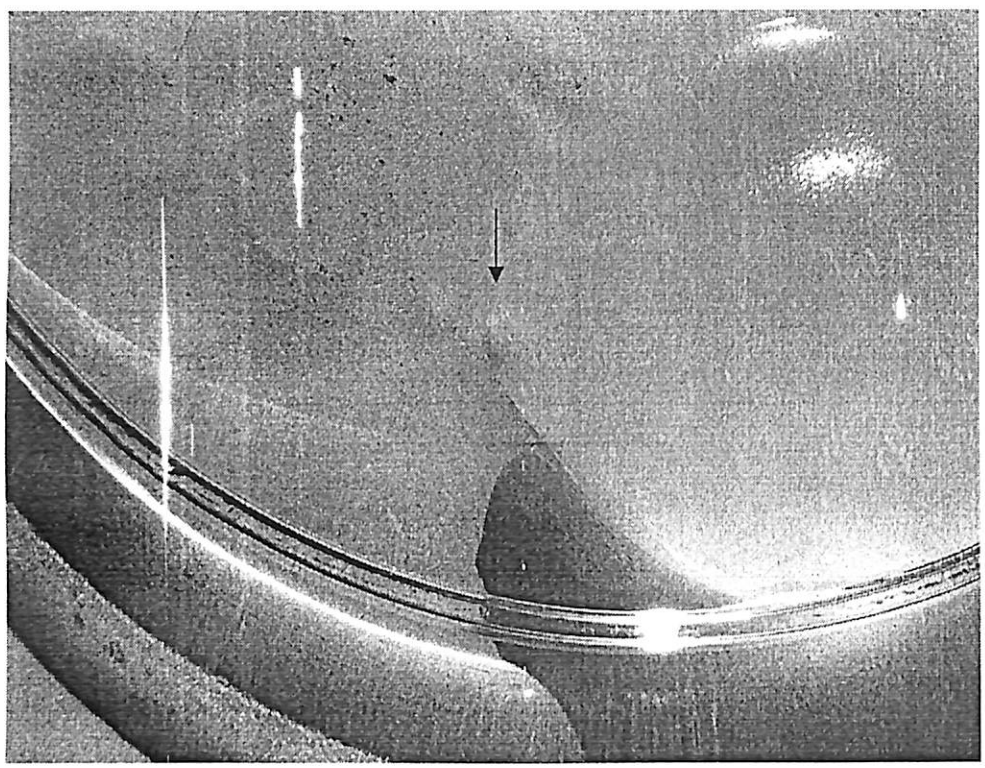


Photo No. – 4 : Cysticercus cyst (Arrow).

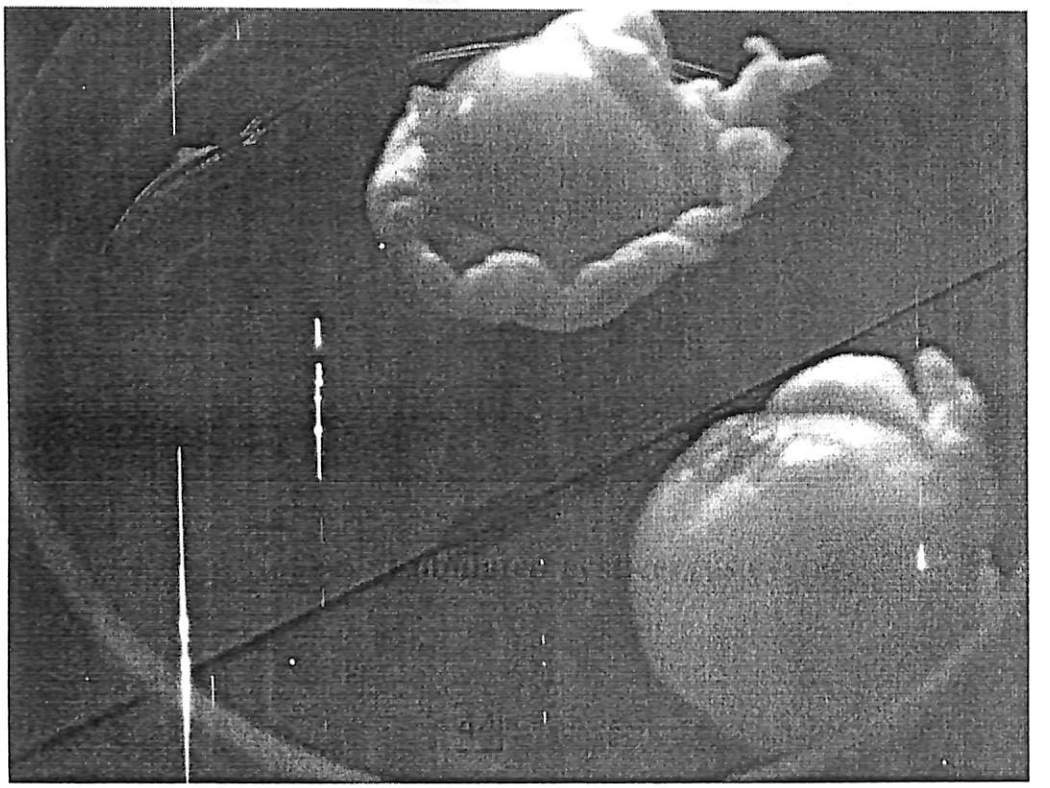


Photo No. – 5 : Hydatid cyst collected from the thoracic wall of goat carcass.

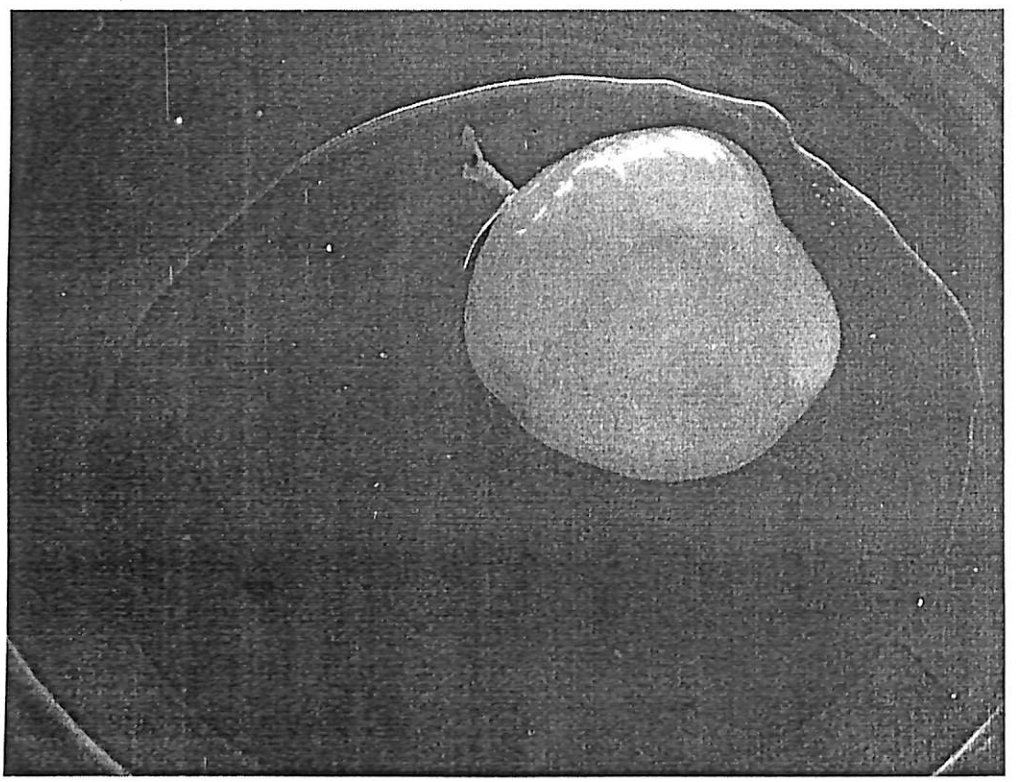


Photo No. – 6 : Lobulated cysticercus cyst.

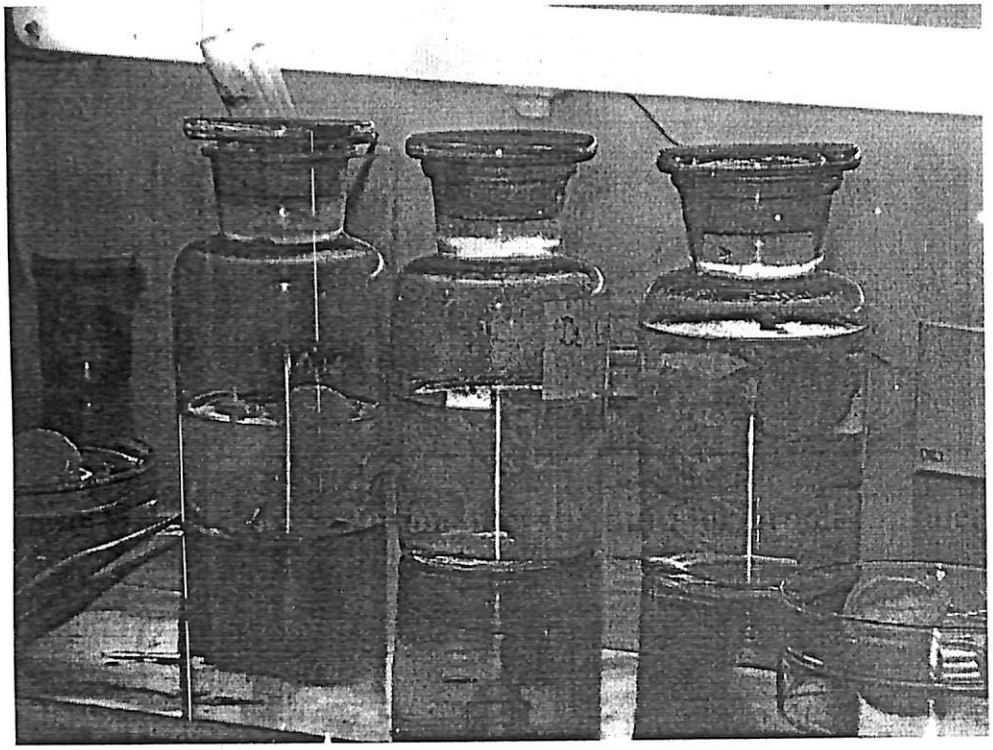


Photo No. – 7 : Various cysts collected from carcasses of goat for their identification.

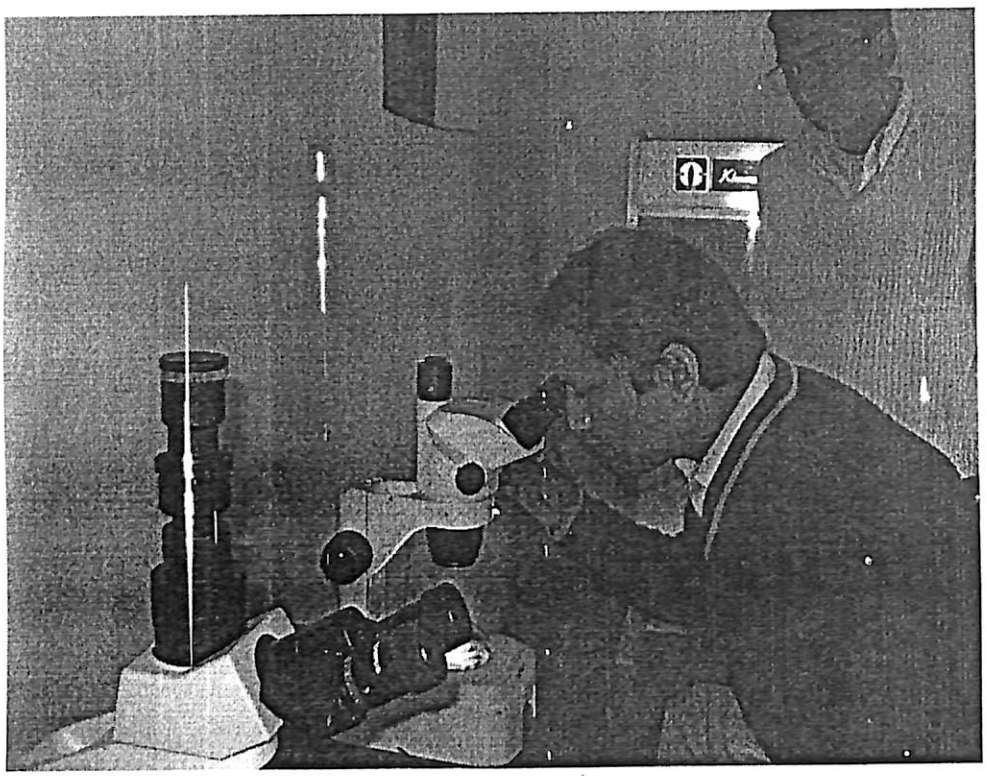
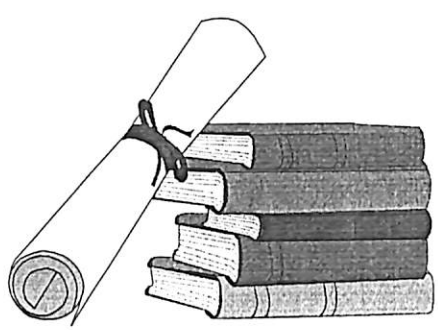


Photo No. – 8 : Examination of cystic fluid for brood capsule.

Photo No. – 9 : Two month old pups found positive for Taeniasis.

Chapter - V

DISCUSSION



DISCUSSION

GOAT :

In the present study, overall occurrence in goat was 14.35 percent and the organ mostly affected was mesentry.. But according to Pandey (1971) metacestode infection in goat in Bihar was 6.5 percent and organs mostly affected were lung and liver. This increased occurrence might be due to decrease in hygienic and managemental practices. In present study mesentry mostly affected may be due to change in habit of metacestode, making mesentry, highly preferred organ for attachment.

The occurrence rate of metacestode infection in goat seemed to be closely related with that of the findings of Rao (1980) i.e 16 percent in Karim nagar district of Andhra Pradesh. But El-metenaway (1999) reported 27.5 percent metacestode infection in Saudi Arabia. This may be due to the various geographical factors or the worker examined the old age animals.

There was no literature which revealed the effect of month on the occurrence of metacestode. But in the present study, it was highest in September and October which may be due to hot humid condition.

The fertility rate of hydatid cyst was 84 percent in September which is very close to the finding of other workers (Das and Krishnan, 1998 and Yildiz and Gurcan, 2003).

The economic losses due to metacestode infection in goats were estimated to be Rs. 15270 (0.55%). But Gathura and Gathama (1991) reported economic loss due to condemnation of livers of sheep and goats to be Rs. 60453 in Kenya. Moreover Togerson and Dowling (2001) reported

annual loss of US $ 7.9 million in Wales, U.K. due to metacestode infection in sheep, goat and human.

SHEEP :

The available literature did not reveal the sex wise work done by any worker but overall metacestode infection in sheep was reported to be 18.51 percent by Rana *et al.* (1986) and in the present study overall occurrence in sheep was 11.26 percent and the organ mostly affected was mesentry. This difference might be due to geographical effect as well as of hygienic and managemental practices. Change in the organ mostly affected may be due to change in habit of metacestode, making mesentry highest preferred organ of attachment.

The occurrence rate of metacestode infection in sheep seemed to be closely related with El-metenaway (1999) in Burcidasi, Saudi Arabia. This might be due to the various geographical factors or the worker may have examined the old age animals.

There was no literature which revealed the effect of month on the occurrence of metacestode, but in the present study, it was highest in the month of September and October.

The economic losses due to metacestode infection in sheep was estimated to be Rs. 6740 (1%). But Gathura and Gathama (1991) reported economic loss due to condemnation of livers of sheep and goats to be Rs. 60453.00 in Kenya. Moreover Togerson and Dowling (2001) reported annual loss of US $ 7.9 million in Wales, U.K. due to metacestode infection in sheep, goat and human.

Occurrence of taeniasis in street and pet dogs and its zoonotic impact :

Occurrence of taeniasis in street dogs was higher (23.2%) and pet dogs lower (8.7%), it may be due to indiscriminate feeding habit of street dogs and access to the offals disposed off near the street butchery. Moreover they were devoid of deworming. On the other hand pet dogs are less infected, may be due to deworming and improved managemental practices.

According to Tarish *et al.* (1986) the occurrence of taeniasis in street dogs were 25 percent in Baghdad. Islam *et al.* (2003) found both street and pet dogs showed high (50.65%) occurrence of taeniasis in Bangladesh. This varied results might be due to the several factors like improper disposal of infected carcasses/viscera, untimely deworming of pet dogs and different geographical distribution.

According to occurrence of human cysticercosis in China is 3-4 percent and in Indonesia 1.7-1.9 percent (Raj shekhar *et al.,* 2003). While in the present study occurrence of cysticercosis/hydatidosis in man was highest in September and October, 4.08 percent and 4.29 percent respectively. While it was lowest in January and February, 1.15 percent and 1.13 percent respectively. These observations showed that the occurrence of human cysticercosis/hydatidosis is present in fair percent in India as well as its neighbouring countries; which may become critical in the coming decade if proper attention is not taken regarding control programme for this disease.

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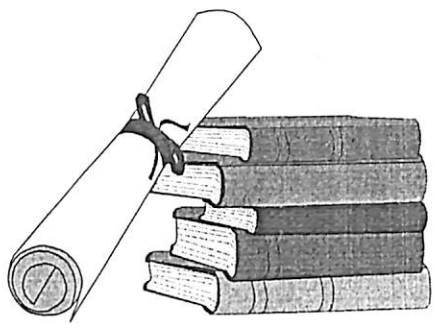
Chapter - VI

SUMMARY AND CONCLUSION



SUMMARY

Present survey was carried out between the month of July 2007 to February 2008 (A total of 8 month).

A total of 3450 carcasses of goat comprising of 2250 males and 1200 females were examined for occurrence of metacestode .

A total of 1350 carcasses of sheep, comprising of 875 males and 475 females were examined for occurrence of metacestode .

Faeces of 325 dogs comprising of 95 street dogs and 230 pet dogs were examined microscopically for taeniasis from different localities of Patna .

Occurrence of Cysticercosis/ Hydatidosis in Human-being was recorded from P M C H (Patna Medical College and Hospital), N M CH (Nalanda Medical College and Hospital), Indira Gandhi Institute of Medical Science (I G I M S) and New-Maghad Hospital, Patna.

All the recorded data of intermediate host (sheep & goat), definitive host (dog), and human cases were analysed in different months to find the effect of different month on infection and its zoonotic relation.

Visceral organs of dressed carcasses were thoroughly screened after unaided visual examination and palpation. Organ containing metacestodes were collected and fluid of metacestodes was examined under electrical stereoscope to identify the type of metacestodes.

Viability of the cysticercus was studied in pups comprising of 3 males and 2 females. Pup was infected by feeding cyst fluid containing scolices. After 55 days of giving infection to the pups, faecal examination of each pup was carried to find out cestode egg.

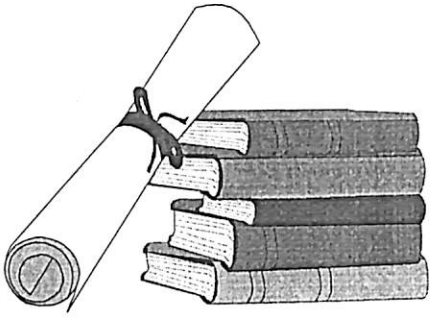
Secondary data of human infection was collected from the registers maintained in the Neurology Departments of Patna Medical College and Hospital (PMCH), Nalanda Medical College and Hospital (NMCH), Indira Gandhi Institute of Medical Science (IGIMS) and New Magadh Hospital, Patna

Overall occurrence of metacestode in goat was found to be 14.35 percent, while in sheep it was 11.26 percent. Effect of species on the occurrence of metacestode was significant (χ^2 at 1 d.f. 6.12*). Effect of organs in occurence of metacestode was found to be significant in both goat and sheep (χ^2 ; 45 4.89** and 117.39**, respectively at 7 d. f.) with highest percentage in mesentry. Effect of month July, December and January on occurrence of Hydatidosis/cysticercosis in Intermediate host was found significant (χ^2 ;13.9**, 11.5**, 22.8**, respectively) while in rest of month it was insignificant. Effect of month on occurrence of infection was also found significant separately in both male and female of goat (χ^2 ;85.3** & 32.6**, respectively) and of sheep (χ^2 33.1** and 13.2**, respectively). Effect of month on fertility of hydatid cyst was also found significant (χ^2; 8.6**). Occurrence of Taeniasis in street and pet dogs differ significantly (χ^2; 12.08**), but it doesn't differ significantly in male and female in both street dogs (χ^2; 0.66) and pet dogs (χ^2; 0.95).

Overall effect of month on occurrence in intermediate host (sheep & goat), definitive host (dog) and its zoonotic effect was significant with highest occurrence in September and October (χ^2; 186.39** & 179.72** respectively) and showing decreasing trend with minimum in December and January (χ^2; 24.52** and 37.94**, respectively).

Chapter - VII

BIBLIOGRAPHY



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