

Original Research Article

Epidemiological study of liver fluke (Trematoda : Digenea) in Domestic Ruminants of Udaipur District

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ABSTRACT

In this study the main epidemiological aspects of domestic ruminants; cow, buffaloes and goat with liver fluke infection in Udaipur district. Infection of liver fluke cause mortality in domestic ruminants and lead to great economic losses. An epidemiological study was conducted in Udaipur district from April 2013 to march 2014. Total 379 samples, 255 stool samples and 124 liver samples of freshly slaughtered domestic ruminants were collected from different villages of Udaipur district. The stool examinations determine eggs counts per gram of feces to identify liver fluke spp., *Fasciola hepatica* and *Fasciola gigantica* and focusing on control procedures of infection in domestic ruminants. Out of 379 samples of domestic ruminants, 42 buffaloes were found infected with liver fluke, resulting rate of 11.08%. And this study showed infection of *F. gigantica* was more harmful as compared to *F. hepatica*. The appearance of infection of liver fluke also fluctuates seasonally. The infection also found throughout the year in different seasons, in summer (6.67%), winter (11.70%) and autumn (6.38%) and maximum in monsoon (14.11%). Sex wise occurrence revealed that the female of domestic ruminants (12.04%) were more susceptible to the infection as male of domestic ruminants (10.11%). Appearance with breed showed that buffalo had highest *Fasciola* infections (12.68%), followed by cow (9.70%) and goat (7.5%). The study showed that the infection in domestic ruminants with liver fluke depends on sex, season and breed also. These parasites were an accompanying infection in nearly all domestic ruminants. The present investigation shows that there is a need not only to intensity but also improve the control methods of fascioliasis in domestic ruminants of Udaipur district in order to minimize the economic losses and also to educate the public so that they are aware of its importance.

Keywords

Epidemiological,
liverfluke,
Fascioliasis,
Fasciola hepatica;
Fasciola gigantica,
domestic ruminants.

Introduction

The state of Rajasthan is famous for its cattle wealth. The economy of rural people largely depends on domestic ruminants like cow, buffalo and goat.

Gastrointestinal parasitism is one of the major health problems severely limiting the productivity of dairy animals (Jithendran and Bhat, 1999). The domestic

ruminants have been found to suffer from various diseases because of liver fluke. Adult flukes of both species are localized in the bile duct of the liver or gallbladder cause mortality in domestic ruminants and lead to great economic losses (Kaplan, 2001; Attallah *et al.*, 2002; Phiri *et al.*, 2005 and Kuchai *et al.*, 2011).

In worldwide, liver fluke disease (Fascioliasis) is measured one of the most important parasitic diseases of domestic ruminants (Ramos *et al.*, 1993; Claxton *et al.*, 1997; Keyyu *et al.*, 2005; Kantzoura *et al.*, 2011 and Massoud *et al.*, 2012). It is also known as distomatosis and liver rot (Aliyu *et al.*, 2014). This diseases transmitted by intermediate host lymnaeid snails and infects many livestock species as well as man (Itagki and Tsutsumi, 1998; Mas-coma *et al.*, 1999; Mannan *et al.*, 2001; Mas-coma, 2004; Ashrafi *et al.*, 2004; Pfukenyi *et al.*, 2005 Hammami *et al.*, 2007; Soliman, 2008; Walker *et al.*, 2008; Amer *et al.*, 2011; Damwesh & Ardo, 2012 and Omar *et al.*, 2013). This disease is characterized by weight loss, anemia and hypoalbuminemia. Blood feeding habit of adult liver fluke can cause severe anemia and poor productivity, reduced fertility, reduced milk, meat and skin quality in domestic ruminants and it was observed when the animal are slaughtered this disease damaged liver tissue, economic losses due to condemned livers (Vassilev and Jooste, 1991; Gaasenbeek *et al.*, 1992; Maqbool *et al.*, 2002; Marques and Scroferneker, 2003; Mason, 2004; Ahmed *et al.*, 2005; Faria *et al.*, 2005; Ali *et al.*, 2011; Ardo *et al.*, 2013; Martinez- Valladares *et al.*, 2013; Mir *et al.*, 2013; Raza *et al.*, 2013; Aliyu *et al.* 2014 and Khanjari *et al.* 2014). This disease is infectious and spread from one animal to another by contact with infected feces or ingestion of infected tissue. The

largely liver fluke infections may lead to the death of the infected animals.

However, no research has been carried out so far on the identification of species of *Fasciola* in Udaipur district (Rajasthan).Therefore, present study have been undertaken on epidemiological study of liver fluke (Trematoda : Digenea) in domestic ruminants of Udaipur district.

Materials and Methods

Geographical area of investigation:

Different villages of Udaipur district, Udaipur district is located in southern Rajasthan. It is situated between 23°46' and 25°5' north latituded to 73°9' and 74°35' east Longituded. Its Geographicaly area is 1388255 hectares.

Stool sample collection

255 stool samples of liver fluke were collected from different villages of Udaipur district, Rajasthan (from April, 2013 to March, 2014) for identification of liver fluke first of all collect the stool samples with a forceps. Then stool samples were transferred into labelled poly bags and packed. One gram stool sample of domestic ruminants was taken and mixed with more salt solution (15 – 20 ml.) in cylinder and stir well with glass rod and eggs were collected on slide and examine under stereo microscope.

Sample collection from liver

124 samples of liver fluke were collected from the liver of freshly slaughtered domestic ruminants; cow, buffaloes and goat at the slaughter houses of different villages of Udaipur district. Liver fluke were examined to record the prevalence of

the parasites in a systematic survey of various slaughter houses of Udaipur district. It was carried by visiting the slaughter houses of Udaipur district at regular intervals during the study.

The livers of slaughtered animal were subjected to examination. At first the lesion were examined for gross examination specific for liver fluke infestations. The gross lesions of the liver like cyst, abscesses, necrosis, white spot, hemorrhages etc. were investigated and recorded by bringing to the laboratory (Hossain *et al.*, 2010).

In the beginning, the bile ducts were opened for obtaining flukes. For generalized liver fluke infections incisions were given in different parts of the bile duct to detect fluke in the liver. In order to obtain flukes from liver, gall bladder was incised and then bile duct opened, starting from common bile ducts to smaller ones. Flukes were carefully picked up with the help of needle and forceps, washed thoroughly with tap water and transferred in saline solution and fixed in hot AFA (Alcohol 85 ml, formalin 10 ml and acetic acid 5ml.) at 80 to 85° C for few second then pressed between two slides (to make them flat) left in cold AFA, bleached in chlorinated alcohol for twelve hours. Bleached liver flukes were washed in 70% alcohol, stained with alcoholic borax carmine for 5 min, dehydrated in alcoholic series and cleared in clove oil for twelve hours. Cleared liver flukes were mounted in DPX on glass slides and examined under light microscope to identify the species and some flukes transferred to 10% formalin for preservation.

Results and Discussion

During the study 124 samples of liver fluke were collected from liver of the freshly

slaughtered domestic ruminants (fig. 1 and 2) and 255 stool samples from house hold domestic ruminants april 2013 to march 2014. Out of 379 domestic ruminants, 42 buffaloes were found infected with liver fluke, resulting rate of 11.08%. Two species of *Fasciola* i.e. *Fasciola hepatica* and *Fasciola gigantica* were recorded in present investigation. The domestic ruminants were highly infected with *Fasciola gigantica* 32 out of 42 followed by *Fasciola hepatica* 10 out of 42. Table 1 revealed that *F. gigantica* was more harmful as compared to *F. hepatica*. These findings are in accordance with Sabokbar (1968) and Ashrafi *et al.* (2004). 9.68% liver flukes were observed in liver of domestic ruminants at slaughter house and 11.76% eggs of liver flukes were observed in stool of domestic ruminants at house hold. So prevalence of liver fluke was thus higher in domestic ruminants at slaughter than ruminants at house hold (Maqbool *et al.*, 2002 and Aliyu *et al.* 2014). Study of monthly and seasonal trends and influences of climatic factors are very important to know the epidemiology of a disease. Environment factors equally affect the fluke prevalence in all the host species. In fluke population could possibly have positive relationship with rainfall, humidity and minimum temperature. Rainfall helps in increasing the fluke prevalence (Tamloorkar *et al.*, 2002 and Mir *et al.*, 2013). The highest incidence of liver fluke (14.11%) in domestic ruminants were recorded in monsoon during the year (Table 2), which were very much related to the work of Nwosu *et al.*, 2007; Sreedhar *et al.*, 2009; Bhat *et al.*, 2012 & Swarnakar and Kumawat, 2013 on gastrointestinal parasites. The reason was that this season was the most conducive to the breeding of snail species. Moderate infection recorded in summer (6.67%) which was then followed by winter (11.70%) and autumn (6.38%).

Table.1 Prevalence of liver fluke in domestic ruminants at slaughter and house hold

S. No.	Domestic ruminants	No. of examined	<i>Fasciola hepatica</i>	<i>Fasciola gigantica</i>	Total no. of positive	Percentage (%)
1.	Liver examination at slaughter house	124	3	9	12	9.68
2.	Stool examinations from house hold	255	7	23	30	11.76
		379	10	32	42	11.08

Fig.1 Showing infection of liver fluke in liver of buffalo

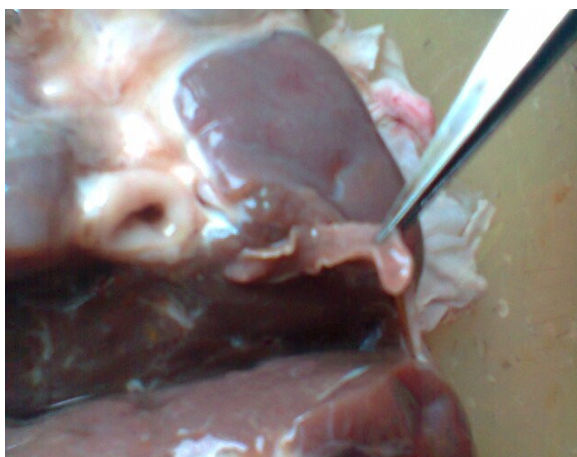


Fig.2 Liver fluke collected from infected liver of buffalo



Table.2 Seasonal prevalence of liver fluke in domestic ruminants of Udaipur district

Summer	Monsoon	Winter	Autumn
6.67%	14.11%	11.70%	6.38%

Fig.3 Egg of *Fasciola hepatica*

Fig.4 Egg of *Fasciola gigantica*

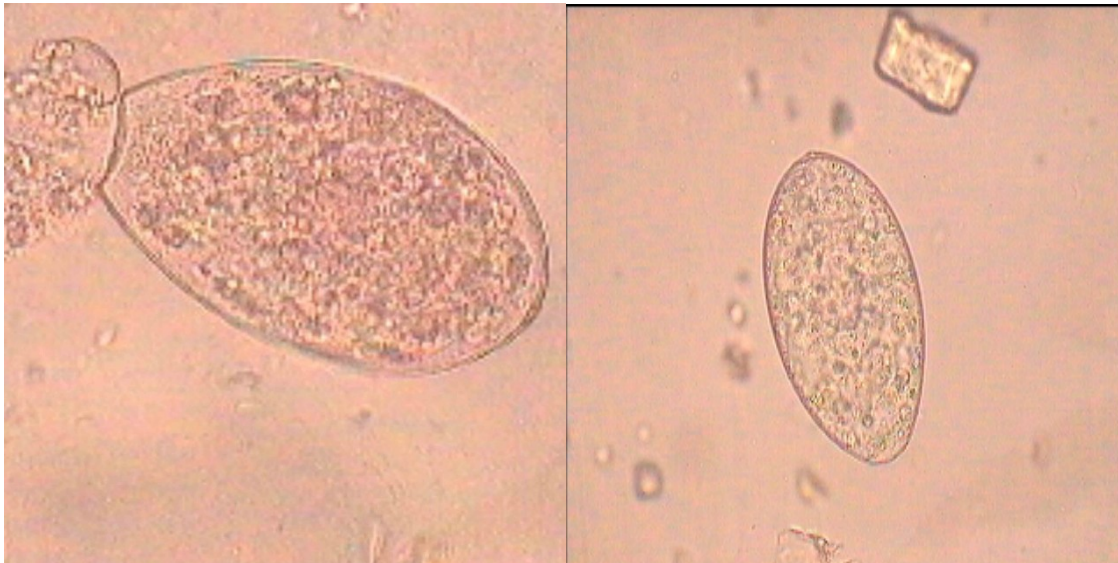


Table.3 Sex depended prevalence of liver fluke in domestic ruminant

Sex	No. of examined	No. of positive	Percentage (%)
Male	188	19	10.11
Female	191	23	12.04
Total	379	42	11.08

Table.4 Prevalence of liver fluke in relation to breed specific

Domestic ruminants	No. of examined	No. of positive	Percentage (%)
Cow	134	13	9.70
Buffalo	205	26	12.68
Goat	40	3	7.5
Total	379	42	11.08

Monthly observation showed the highest infection in liver of slaughtered domestic ruminants and abundance of eggs were present in stool samples of household domestic ruminants (fig. 2, 3 and 4) in monsoon & winter and lowest in summer &

spring, our observations were also similar with other records of different scientists in various places (Maqbool *et al.*, 2002; Pfukenyi *et al.*, 2006 and Qureshi *et al.*, 2012).

In Udaipur, coming of monsoon season snails were reactivated and spread throughout area and become infected with miracidium larva of liver fluke. The infection takes place in early monsoon season, that is the reason mature liver fluke are prevalent in monsoon. As metacercaria remain viable for 2-3 months (Soulsby., 1982) so the infection seen in winter also.

In this study, female of domestic ruminants had a higher prevalence rate compared to their male. Table 3 shows the sex wise occurrence of liver fluke, male (10.11%) were found to be more infected as comparison to female ruminants (12.04%). This could be because females are slaughtered at ageing, may change the physiological peculiarities of female animal, which usually constitute stress factors thus, reducing their immunity to infections and for being lactating mothers (Hossain *et al.*, 2010; Kuchai *et al.*, 2011 and Ardo *et al.*, 2013). This higher prevalence in females than males could also be attributed to the fact that more females were sampled than the males (Dhar *et al.*, 1988; Fatima *et al.*, 2008; Damwesh & Ardo, 2012 and Aliyu *et al.*, 2014).

Whereas, some scientists observed that males were more susceptible as compared to females due to lesser resistance and poor look after (Maqbool *et al.*, 2002; Mir *et al.*, 2013 and Raza *et al.*, 2013).

Table 4 shows the infection in different breed group of domestic ruminants. Out of 205 buffalo samples, 26 (12.68%) had highest *Fasciola* infection. Followed by out of 134 cow samples, 13 (9.70%) and out of 40 goat samples, 3 (7.5%) had *Fasciola* infection. Heavy infection was found in buffaloes as compared to cow and goat. The difference in the percentage of

infection in various breed groups may depend on the exposure to the source of infection. Mir *et al.*, 2013 recorded goat higher prevalence than others ruminants in Jammu. But present investigation shows goats are less susceptible to other domestic ruminants in Udaipur district. And cow and buffalo had higher prevalence rate with liver fluke (Mannan *et al.*, 2001; Kaplan, 2001; Marques and Scroferneker, 2003; Keyyu *et al.*, 2005; Faria *et al.*, 2005; Pfukenyi *et al.*, 2006; Bakele *et al.*, 2010; Tsegaye *et al.*, 2012 and Raza *et al.*, 2013).

The above investigation revealed that infection of liver fluke in domestic ruminants is one of major problem for the cattle farmers of Udaipur district and its impacts on multiple productivity like milk, meat etc. are very much harmful for animals. The study showed that the infection in domestic ruminants with liver fluke depends on sex, season and breed also. The above information on the prevalence of liver fluke in domestic ruminants important for controlling fluke infection in Udaipur district. Seasonally anthelmintic treatment should be given to get the maximum benefits from domestic ruminants. There is a need not only to intensity but also improve the control methods of fascioliasis in domestic ruminants of Udaipur district in order to minimize the economic losses and also to educate the public so that they are aware of its importance.

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