



## RESEARCH PAPER

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## Prevalence of *Fasciola hepatica* in domesticated cattle of Distt: Lower Dir, Khyber Pakhtunkhwa, Pakistan

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### Abstract

The study was carried out from September 2012 to January 2013. Present study deals with the prevalence of liver fluke (*Fasciola hepatica*) in domesticated cattle of distt lower Dir. The liver flukes were recovered from adult buffaloes, cows, goats and sheep of either sex and were put in 10% formalin solution till identification. During the present study it was found out that the overall prevalence of liver fluke was higher in buffaloes that are 13.5% in cows it was 3.5% while it was 0% for goats and sheep. The average prevalence of liver fluke was 12.8%. The prevalence of liver fluke in goats and sheep was very low i.e. 0% throughout the study duration. Its most probable reason may be that the said animal groups are grazing in semi arid hilly areas where the intermediate hosts (snail) are very rare or totally absent.

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## Introduction

Before merging in Pakistan in 1969 the whole Dir district was ruled Princely by Nawab Shah Jehan Khan and his ancestors. On 13-08-1996 Lower Dir was declared as full-fledged District of Malakand division. District Lower Dir composed of two subdivisions i.e. Jandool and Timergara. These subdivisions are further divided in to six Tehsils i.e. Samarbagh, Lal Qillah, Munda, Balambat, Timergara and Adenzai. It is located from 34°37' to 35°07' North latitudes and from 71°31' to 72°14' East longitudes. It is bounded on the North by Upper Dir district and on the East side it is bounded by Swat district. On the West by Afghanistan and Bajaur agency and on the South by Malakand protected area. The total area of District Lower Dir is 1583 sq.km. The topography of Lower Dir District is mainly dominated by hills and mountains which are the part of the range of Southern Hindu Kush. These mountains ranges, in general, run from North to South, with highest peaks in the upper Northern part of the district where they reach more than 3000 meters in height. In central part, the height range from 1800-2000 meters. In the South at the junction of River Panjkora and River Swat the height show a rapid decrease where it is about 600 meters. These ranges have been deeply cut by Panjkora River and its tributaries. Most of the people live in these narrow valleys practice agriculture. The water in Rivers and Nallahs is in abundance but due to mountains on both sides of banks, it is not easy to utilize it for irrigation. The major valleys include Jandoll, Adinzay, Samarbagh, Maidan, Timergara, Asban. The most important rivers of District Lower Dir is river Panjkora, which enter in the district from North-East and flows South West along the boundary with Bajaur agency up to its confluence with Swat river. On its Western banks, it is joined by two major Nallahs namely "Kunai and Jandool" flowing from North West. It is joined by the Asegai Nallah, from the South East. Finally, the Panjkora River joins the Swat River. The Swat River flow from the Southern boundary of the district and also joined by some Nallahs flowing down from the southern and western slopes. The note worthy being

the Shewa Nallah. The geography of Lower Dir is shown in Fig.1.

The above all data about distt: Lower Dir is obtained from (Tehsils & Unions in the District of Lower Dir - Government of Pakistan).

The summer season of the District Lower Dir is moderate and warm. June and July are the hot months. In June the mean maximum and minimum temperature has been recorded as 32.52°C and 15.67°C respectively. During spring season, the wind storms from Lowari Top known as Badama, occur in afternoon which are quite in tolerable and chilly. The winter season is severe and cold. Temperature rapidly falls from November and onwards. December, January and February are very cold months. During this period the temperature falls below freezing points. The mean maximum and minimum temperature in the month of January has been recorded as 11.22°C and -2.39°C respectively. The Rainfall is received throughout the year. During winter season the average rainfall, received due to western disturbances, is more than that of summer season. The maximum rainfall has been recorded in March is 242.22 mm. The relative humidity is quite high throughout the year.

*Fasciola hepatica*, also known as the common liver fluke or sheep liver fluke, is a parasitic flatworm of Phylum Platyhelminthes, Class Trematoda, Sub class Digenea, Order Echinostomida, Sub order Distomata, Family Fascioloidea, Genus *Fasciola* and Species *hepatica*, that infects the livers of various mammals, including humans. The disease caused by the fluke is called fascioliasis (also known as fasciolosis). *Fasciola hepatica* species is distributed worldwide, and causes great economic loss for hundreds of years. Because of its size and economic importance, it has been the subject of many scientific investigations and may be the best known of any Trematode species. (Mirza and Sulehria, 2012).

The adult mature and gravid fluke is flat with its body shaped like a leaf. The size range is 25 to 30 mm and

8 to 15 mm in length and width respectively, depending upon the species. The adult parasitizes the liver/or gallbladder of the final hosts (Despommier and Karapelou, 1987, Andrews and Dalton, 1999).

The fluke has an elongated anterior end known as a cephalic cone in which has an oral and ventral sucker. The intestines are highly branched and present throughout the Body. The male and female reproductive organs are present near the posterior sucker in the center of the body. The female reproductive tract is a dense ovary and is located just above the testes and is linked to a short convoluted uterus that opens in to a genital pore above the ventral sucker. The vitellaria are highly dispersed and divided in the lateral and posterior region of the body. In addition, the cephalic cone of *F. Hepatica* is shorter than *F. Gigantica*. The shape of the eggs of the two flukes is also very similar (Soulsby, 1982). The measurement of *F. Hepatica* and *F. Gigantica* being approximately 150µm x 90µm and 200µm x 100 µm, respectively. (Dunn, 1978).

To complete its life cycle, *F. hepatica* requires a freshwater snail as an intermediate host, such as *Galba truncatula*, in which the parasite can reproduce asexually. Species in the family Lymnaeidae that serve as naturally or experimentally intermediate hosts of *Fasciola hepatica* include: *Austropeplea tomentosa*, *Austropeplea ollula*, *Austropeplea viridis*, *Radix peregra*, *Radix lagotis*, *Radix auricularia*, *Radix natalensis*, *Radix rubiginosa*, *Omphiscola glabra*, *Lymnaea stagnalis*, *Stagnicola fuscus*, *Stagnicola palustris*, *Stagnicola turricula*, *Pseudosuccinea columella*, *Lymnaea viatrix*, *Lymnaea neotropica*, *Fossaria bulimoides*, *Lymnaea cubensis*, *Lymnaea* species from Colombia, *Galba truncatula*, *Lymnaea cousini*, *Lymnaea humilis*, *Lymnaea diaphana*, *Stagnicola caperata* and *Lymnaea occulta*. (Correa *et al*, 2010).

Several drugs are effective in chemotherapy of fascioliasis, both in humans and in domestic animals. One of these, Rafoxanide, apparently acts by uncoupling oxidative phosphorylation in the fluke.

The drug of choice in the treatment of fasciolosis Istriclabendazole, a member of the Benzimidazole family of Anthelmintics. The drug works by preventing the polymerization of the molecule Tubulin into the Cytoskeletal structures, microtubules. However, resistance of *F. hepatica* to triclabendazole has already been recorded in Australia. (Overend and Bowen, 1995), and Ireland. (Mulcahy and Dalton, 1998). Artemether has been shown to be effective in a rat model of fascioliasis. (Keiser *et al*, 2007).

The present study was carried out to determine the level of liver fluke (parasite) in domestic livestock of Lower Dir KPK and to find out that what the reason that some animals are infected more by liver fluke as compared to other animals.

## Materials and methods

### Collection

The liver flukes were recovered from adult buffaloes, cattle, goat and sheep of either sex. The liver, gall bladder, and the bile duct were examined. The bile ducts were incised longitudinally through the gall bladder in to the liver and the parasites were removed with the help of fine forceps, taking all necessary precautions to avoid any damage to the parasite.

A total of 200 hundred samples were checked for *Fasciola hepatica* from different cattle groups including buffalo 80, cow 40, sheep 40 and goat 40 samples.

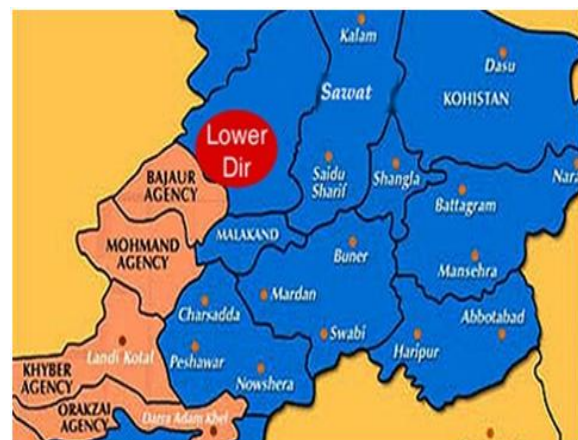


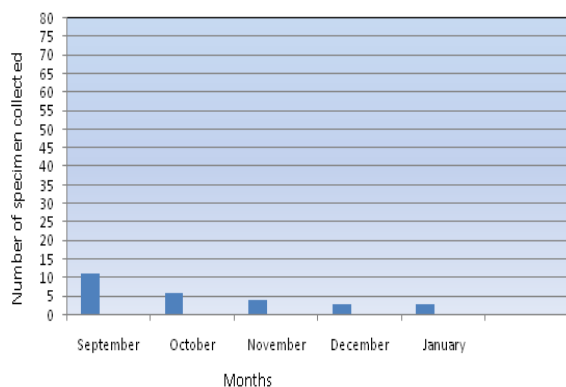
Fig. 1. Showing Distt: Lower Dir in Pakistan Map.

### Preservation

The collected samples of liver flukes were preserved in 10 % formalin solution in small fine preservation bottles, and transported to the parasitological laboratory department of Zoology, Islamia College University Peshawar for identification and further studies. Flukes were stained with Borax Carmine and then dehydrated in ethanol, cleared in carbol-xytol (1:3) and mounted in Canada balsam.

### Results and discussion

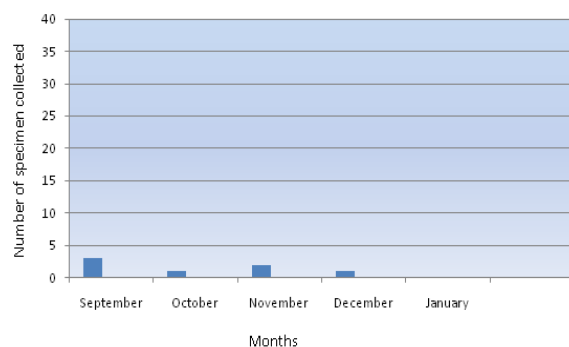
Present study was carried out from September 2012 to January 2013. Present study deals with the prevalence of liver fluke (*Fasciola hepatica*) in domesticated cattle of Distt Lower Dir. The liver flukes were recovered from adult buffaloes, cows, goats and sheep of either sex. During the present study it was found out that the overall prevalence of liver fluke was higher in buffaloes that is 13.5% in cows it was 3.5% while it was 0% for goats and sheep. The average prevalence of liver fluke was 12.8%. The prevalence of liver fluke in goats and sheep was very low i.e. 0% throughout the study duration. Its most probable reason may be that the said animal groups are grazing in semi arid hilly areas where the intermediate hosts (snail) are very rare or totally absent.



**Fig. 2.** Showing number of specimen collected in study period from Buffaloes.

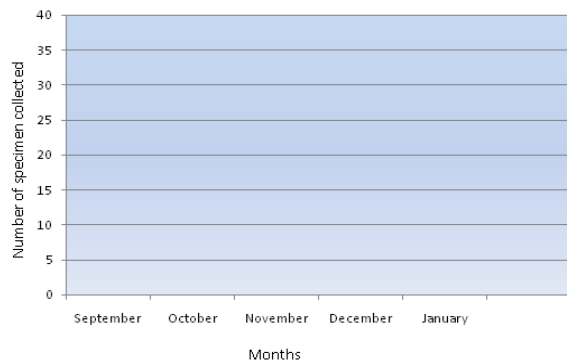
A total of 200 hundred samples were checked for *Fasciola hepatica* from different cattle groups including buffalo 80, cow 40, sheep 40 and goat 40 samples.

In buffaloes during the five months of study period total number of *Fasciola hepatica* determined was 27 out of 80 samples. The highest number of *Fasciola hepatica* determined in the month of September which was 11, and the lowest number was in the month of January and December which was 03, 03 respectively. The percentage of *Fasciola hepatica* in buffaloes of Lower Dir KPK is 33.75%. The result of collected *Fasciola hepatica* in studied period from buffaloes is shown in Fig.2. Different other people also work on prevalence of *Fasciola hepatica* in buffaloes in different region of Pakistan whose results are, the prevalence of liver flukes in the same area was recorded as 30% in buffaloes. The reason for the incidence of disease in the area may be due to conducive factors like presence of marshy places with grasses at the canal banks to which cercariae (The parasitic larva of a Trematode worm, having a tail that disappears in the adult stage) is attached and presence of snails in the area. (Durrani *et al*, 2007). The prevalence of liver flukes in the same area was recorded as 30% in buffaloes. These findings are in accordance with (Tahir 2002, Dipeolu and Eruvbetine 2000). (El-Shazly *et al*, 2002) reported the overall rates of infection in buffaloes, 9.73%. (Haridy *et al*, 1999) reported 1.58% prevalence of *Fasciola hepatica* in buffaloes. (Yuling and Zang, 1997) reported that outbreaks of fascioliosis occurred after flooding. (Chaudhry *et al*, 1993) reported a higher percentage of fascioliosis in buffaloes than cattle. (Bilquees and Alam 1988) reported only 8.50% incidence of fascioliosis in buffaloes in Karachi Pakistan. (Sabri *et al*, 1981) observed prevalence of fascioliosis as 9.40% in buffaloes.



**Fig. 3.** Showing number of specimen collected in study period from Cows.

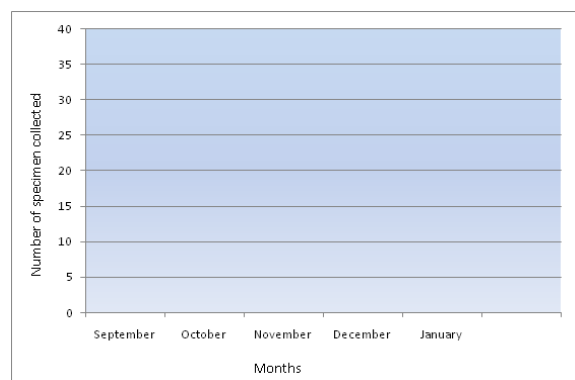
In case of cows a total of seven specimen were recovered from 40 observed samples. The highest number of *Fasciola hepatica* determined in the month of September which is 03 and the lowest number of *Fasciola hepatica* determined in the month of January which is 0. The percentage of *Fasciola hepatica* in cow in Lower Dir KPK is 17.5%. The collected specimen *Fasciola hepatica* from cow in Lower Dir KPK is shown in Fig.3. Other workers determine the prevalence of *Fasciola hepatica* included: (Kakar and Kakarsulemankhel, 2008) determine that in cows, the prevalence of *F. Hepatica* was highest (16.16%). (El-Shazly *et al*, 2002) reported the overall rates of infection of *Fasciola hepatica* in cows, is 12.31%. (Bilquees and Alam, 1988) reported only 6.95% incidence of fascioliasis in cows from Karachi, Pakistan.



**Fig. 4.** Showing number of specimen collected in study period from Sheep.

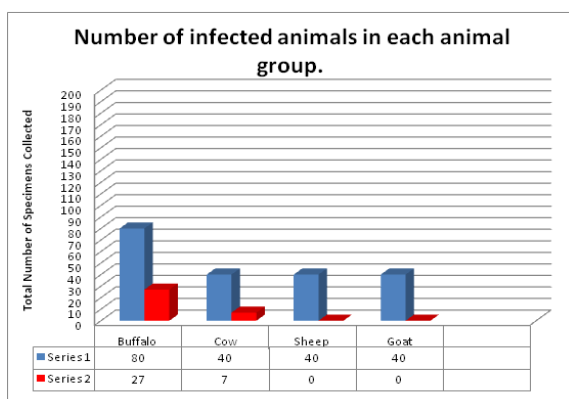
During the five months of study total number of *Fasciola hepatica* in sheep was 0 out of 40 samples. The percentage of *Fasciola hepatica* in sheep of Lower Dir KPK is 0%. The collected specimen of *Fasciola hepatica* from sheep in Lower Dir KPK is shown in Fig.4. Others workers determine the prevalence of *Fasciola hepatica* were: In Australia, the prevalence recorded was 26.5% in sheep and 52.2% in cattle (Molloy *et al*, 2005). (Nahed-Toral *et al*, 2003) showed 37.5% infection with *F. Hepatica* in fecal analysis of sheep of Tzotzil communities in the highlands of Chiapas, Mexico. (El-Shazly *et al*, 2002) reported the overall rates of infection in sheep are 17.84%. (Razzaq *et al*, 2002) determine lower incidence of 6 and 5% infection with *F. Hepatica* in sheep of range livestock research station and private

flock holders. (Cringoli *et al*, 2002) determine a cross sectional serological survey found 4% prevalence of sheep farms of the southern Italian Apennines to be infected with this parasite *Fasciola hepatica*. (Torgerson and Claxton, 1999). In sheep highest intensity of *F. Hepatica* per liver was 34%. The occurrence of fascioliasis in European countries is also noteworthy. Spain (29.5%), Ireland (45%), United Kingdom (10%) and Portugal (unknown value) are countries with high frequency of *F. Hepatica* infections and the main infected animals are cattle, sheep and goats (Torgerson and Claxton, 1999). The Andean altiplano comprises a region strongly affected by fascioliasis. In fact, in Chile, Bolivia and Peru the incidence of *F. Hepatica* can range up to 87% in sheep, (Grock *et al*, 1998 and Mas-Coma *et al*, 1998). (Malik *et al*, 1995) studied the prevalence of *F. Hepatica* in sheep in Punjab is 40%. (Khan *et al*, 1988a) determine the prevalence of *Fasciola hepatica* in Kovak valley in sheep is 32.8%. (Khan *et al*, 1988b) determine the prevalence of *Fasciola hepatica* in sheep is 26% in upland districts of Balochistan. (Hayat *et al*, 1986 and Iqbal *et al*, 1986) determine 5.67 and 4% incidence, respectively in sheep of Faisalabad. (Iqbal *et al*, 1986) determine that in sheep, overall infection with *F. Hepatica* was 7.66%. This finding is in agreement with Saleem, 1985 who found 8% incidence of the same trematode in sheep at Lahore. (Boray, 1982) studied the prevalence of *F. Hepatica* in goats, sheep, horses and pigs, in Cuba, the prevalence recorded was 4–43%. (Durrani *et al*, 1981). Determine very high incidence has also been reported in Jhelum valley in sheep, as 35%.



**Fig. 5.** Showing number of specimen collected in study period from Goats.

During the five months of study total number of *Fasciola hepatica* species determine was 0 out of 40 samples. Other workers determine the prevalence of *Fasciola hepatica* species in goat were : (Tasawar *et al*, 2007) Out of 80 animals examined, 23 were infected with *F. Hepatica*. The prevalence of the parasite was 28.75%. (Razzaq *et al*, 2002) determine 5% fasciolosis (disease caused by *Fasciola hepatica*) in goat range livestock research station of arid zone research centre in ashgara valley of ziarat, while 10% fasciolosis was reported in the goats of private farmers grazing the same pastures. (El-Shazly *et al*, 2002) reported the overall rates of infection in goat are 5.40%. (Mazyad and El-Nemr, 2002) in Egypt determine 12.70% prevalence in fecal of goat. (Aysen *et al*, 1999) report 0.04% prevalence of fascioliasis in goats of turkey. (Haridy *et al*, 1999) determine 2.02% prevalence of *Fasciola hepatica* in goats. (Torgerson and Claxton, 1999). In goats highest intensity of *F. Hepatica* was 32%. (Iqbal *et al*, 1986) determine only 3% infection in goat caused by *Fasciola hepatica*. (Boray 1982) studied the prevalence of *F. Hepatica* in goats, sheep, horses and pigs, in Cuba, the prevalence recorded was 4–43%. (Durrani *et al*, 1981 and Malik *et al*, 1995), on the other hand, reported very high prevalence of fasciolosis in Jhelum valley and Punjab. (Ashraf 1977) reported 12 specimens from gall bladder of a goat that also carried *F. hepatica* from Peshawar. The collected specimen of *F. hepatica* from goat in Lower Dir KPK is shown in Fig.5.



**Fig. 6.** Showing number of infected animals by *Fasciola hepatica* in each studied groups.

The result of my study concludes that the liver fluke are found enormously in buffaloes and cows of

district Lower Dir KPK. As the spores of this parasite are present in bank of river, moist places and on grasses. Mostly buffaloes and cows of lower dir are grazing on the bank of river Panjkora and other Nallahs .so during grazing these spores are ingested in to their body. These spores than germinates inside the liver and grown into a mature parasite (liver fluke).

On the other hand no liver fluke are found in the sheep and goat of Lower Dir district KPK. The main reason of absence of liver fluke in sheep and goat may be of not grazing on bank of river and Nallahs , as sheep and goat in lower dir KPK are mostly grazing in mountain , where no spores of liver flukes are present.

As a whole result of collected specimen and infected specimen of *F.hepatica* in Distt Lower dir KPK is shown in Fig.6.

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