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Prevalence of *Fasciola hepatica* in Domesticated Cattle of District Karak, Khyber Pakhtunkhwa, Pakistan

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ABSTRACT

Fascioliasis is one of the water and food born zoonotic disease caused by *Fasciola hepatica*, spread by various sources particularly containing water through various organisms ultimately to humans. The present study determines the prevalence of *Fasciola hepatica* in domestic animals (cow, sheep and goat) in district Karak, Khyber Pakhtunkhwa, Pakistan, from January through July, 2013. The study area is located at located 70-40° to 71-30° North latitude and 32-48° to 33-23° East longitudes, with the mean annual precipitation over 300 mm. A total of 150 animals (cow, sheep, goat) were selected from the specified areas of district Karak and liver samples of 70 cows, 50 sheep and 30 goats were collected. The collected samples were preserved in 10% formalin, stained with borax carmin-ethanol for microscopic observations. The overall prevalence of the pathogen was 24.2, 16 and 6.6% in cow, sheep and goat, respectively. Monthly dataset showed the highest prevalence recorded in June (40.7%), while the minimum was in January. Cluster analysis showed the frequency was high in B.D. Shah region than Karak and Takht-E-Nasrati. This study will provide a base for further related research and aware the people about fascioliasis.

Key words: *Fasciola hepatica*, zoonotic, fascioliasis, parasite, district Karak

INTRODUCTION

Fasciola hepatica (liver fluke) is a type of helminth under class of trematoda, well known parasitic flatworm in the livers of different herbivorous mammals with cosmopolitan distribution is the main cause of fascioliasis (Yildirim *et al.*, 2007). Fascioliasis is one of the parasitic worm diseases in cattle. Human can also infected by this disease but the ruminants are the main target. It may cause the inflammation of bile duct, gall bladder, gall stone as well as fibrosis (Farrar *et al.*, 2013). Fascioliasis is one of the water and food born zoonotic disease caused by *Fasciola hepatica*, spread by various sources particularly containing water through various organisms ultimately to humans. Recently fascioliasis has been exposed to be a re-emerging and prevalent zoonotic disease, disturbing human populations worldwide through the food chain. Human become infected by the ingesting of contaminated food and water or watercress. The human infection rate has been increased over the past of twenty years (Cabada and White Jr., 2012).

The two parasites of class trematoda cause fascioliasis are *F. hepatica* and *F. gigantica* (Mas-Coma *et al.*, 2009). Liver fluke may cause most prominent parasitic fascioliasis disease in ruminants and major reason for great economic losses worldwide (Esteban *et al.*, 2003). This disease occurs worldwide but prevalence is higher particularly in the areas practicing animal

husbandry and cattle farming (Tolan, 2011; Furst *et al.*, 2012). It has been estimated that approximately 750 million people are at risk of infection with food born trematodes (Keiser and Utzinger, 2009). Recently the prevalence of fascioliasis has increased significantly in 2000-2009 in the United Kingdom and in Switzerland prevalence rate approached 21.4% (Schweize *ret al.*, 2003; Rapsch *et al.*, 2006; Fox *et al.*, 2011). Fascioliasis is one most common cause of economic loss in the region where sheep and cattle are rear. Approximately 50,000,000 Euros annual economic loss is estimated due to bovine fascioliasis in Switzerland only (Schweizeret *al.*, 2005).

The situation in many other countries is not much different for instance, 63-90% of donkey and horses in Ireland, and 48% ponies in Australia has been reported to be suffered by this nuisance disease (Pankhurst, 1963; Kerney, 1974). In Japan and France it has been reported from equines (Akahane *et al.*, 1974; Pandey, 1983). The prevalence of *F. hepatica* in 1978 and 1983 was 5.4 and 5.9%, respectively in Morocco (Pandey, 1983). The animals with chronic infection of the pathogen may die, while the animals with acute infection may retard growth and reproductive efficiency (McIlroy *et al.*, 1990; Rapsch *et al.*, 2008). Fascioliasis is one of the serious problems in the development of cattle industry in Pakistan. But unfortunately there is no authentic data about the fascioliasis in Pakistan. Some authors has done the related study in different region of Pakistan. The present study was carried out to determine the prevalence of liver fluke in domestic animals (Cow, sheep and goat) of District Karak, Khyber Pakhtunkhwa, Pakistan and find out the cause of infection. It will provide a base for such type study to cure the prevalence in this area to save millions of herbivorous heads. Ultimately the study will in longer terms save the public health due to reduction in the disease by awareness of such studies.

MATERIALS AND METHODS

Study area: There are 25 districts in Khyber Pakhtunkhwa. This study was carried in one of Southern district (Karak) of Khyber Pakhtunkhwa Pakistan. The total population of district Karak is 457,000. The Rural and Urban ration is 72:28. The total area is 3,372 km². There are 21 Union councils and three Tehsil in district Karak. The total land is 264,662 ha. The cultivable land is 77,443 ha. The average annual rain fall is above 300 mm. it is located in 70°-40° to 71°-30° North latitude and 32°-48° to 33°-23° East longitudes. The altitude (Elevation) of district Karak is 600-1482 m, with a literacy rate about 47.86%.

The *F. hepaticas* (liver flukes) were recovered from adult cattle, goat and sheep of either sex. The liver, gall bladder and the bile duct were also examined. For the collection of parasites the bile ducts were incised longitudinally through the gall bladder in to the liver. The flukes were collected from the bile ducts and liver parenchyma. The parasite was removed with the help of a fine forceps and taking all required safety measures to avoid any damage to the parasite. A total of 150 samples were checked for *Fasciola hepatica* from different cattle groups of both sexes. The samples were collected and preserved in 10% formalin solution in small fine preservation bottles, and transported to the parasitological laboratory veterinary hospital Peshawar for identification and further studies. Borax carmine and ethanol were used for staining and then dehydration respectively, cleared in Carbol-Xylol (1:3) and mounted in Canada balsam.

RESULTS

The present study was started from January 2013 up to July 2013. A total 150 samples were collected from the whole district of both sexes (cow, goats and sheep) because mostly these animals are domesticated in district karak. A total of 70, 50 and 30 samples were collected from different

domesticated animals' cow, sheep and goat, respectively. The whole district was divided into three clusters (Band Daud Sha, Karak and Takht-e-Nasrati).

Distribution of infected animal in each group: The total number of samples collected from cow, sheep and goat were 70, 50 and 30 respectively. During the six months study it was determined that 17 out of 70 samples was infected by liver fluke collected from cow. In case of sheep the total 8 specimens were collected out of 50 samples. In the present study the total number of *Fasciola hepatica* in goat was 2 out of 30. The percentage of *Fasciola hepatica* was high in cow in whole study (Table 1).

Cluster wise distribution of liver fluke in whole district: During the seven month study period 70, 50 and 30 sample were collected from cow, sheep and goat correspondingly. The total numbers of infected animals were 17 (24.2%), 8 (6.6%) and 2 (6.6%) of cow, sheep and goat respectively. The percentage of liver fluke in cow in B.D. Shah, Karakand Takht-e- Nasrati was 11.4, 7.1 and 5.7%. Similarly the overall frequency of liver fluke was high in B.D. Shah. It was recorded that the prevalence of liver fluke was higher in cow than sheep and goat. It most probably reason may be the people leave their cow in mountainous area for several days. They drink water from ditches where the intermediate hosts (snails) are present. The prevalence in sheep was same in Karak and Takht-e-Nasrati. The total percentage was also high (8.6%) in B.D. Shah region (Table 2).

Monthly distribution of specimen from cow, sheep and goat: The number of collected specimens was different in different months according the environmental condition. The frequency of liver fluke was high in moth of June 40.7% and July 14.8%. The percentage of liver fluke in cow during Jun and July was 41.1 and 23.5% respectively. The most probable reason may be the raining in the months of June and July because the rainfall was more at the months of Jun and July (Table 3).

DISCUSSION

The present study determines the prevalence of *Fasciola hepatica* in district Karak, Khyber Pakhtunkhwa, Pakistan. The liver fluke were collected from domesticated animals i.e. cow, sheep and goat from regions of district Karak. The overall frequency of liver fluke in district Karak was 27% in different domestic animals. The prevalence was high in cow than other animals. The percentage of liver fluke in cow was 24.6% in district Karak. Many workers reported the prevalence

Table 1: Distribution of infected animal in each group

Animals	Infected (%)	Non-infected (%)	Examined
Cow	17 (24.6)	53 (75)	70
Sheep	8 (16)	42 (84)	50
Goat	2 (6.6)	28 (93.3)	30

Table 2: Distribution of liver fluke in whole district

Animals	Area			Total	Sample size
	Banda DaudSha (%)	Karak (%)	Takht-e-Nasrati (%)		
Cow	8 (11.4)	5 (7.1)	4 (5.7)	17 (24.2)	70
Sheep	4 (8)	2 (5)	2 (4)	6 (16)	50
Goat	1 (3.3)	00	1 (3.3)	2 (6.6)	30
Total	13 (8.6)	7 (4.6)	7 (4.6)	27 (18)	50

Table 3: Distribution of specimen from cow, sheep and goat during study periods

Animals	Study period							Total
	January	February	March	April	May	June	July	
Cow	01	00	00	02	03	07	04	17
Sheep	00	00	02	00	03	03	00	08
Goat	00	00	01	00	00	01	00	02
Total	1 (3.7)	0 (00)	3 (11.1)	2 (7.4)	6 (22.2)	11 (40.7)	4 (4.8)	27

of *Fasciola hepatica* in cows from different region of Pakistan, in lower Dir KPK it was 17.5% (Ullah *et al.*, 2013), 6.95% in Karachi (Bilqees and Alam, 1988) and 16.16% prevalence in Quetta (Kakar and Kakarsulemankhel, 2008). El-Shazly *et al.* (2002) also reported the prevalence of *F. hepatica* in cow was 12.31% from nine center of Dakahlia. It was found that the prevalence was high in small hilly Banda Daud Sha region, which might be due to the storage of rain water in hilly area for long time may promote growth of grasses and sedges that shelter cercariae and snails. Grazers can ingest snails or eggs/larvae during grazing and taken the pathogen in their bodies hence life cycle started leading to infection. The percentage of liver fluke in sheep and goat was 6 and 2% respectively, in district Karak, but Ullah *et al.* (2013) reported that the frequency of liver fluke in sheep and goat was 0% in district Dir KPK, Pakistan. On the contrary, an alarming higher percentage of fascioliasis infection was reported in goat (32.0%) and sheep (30.91%) from Kishoregonj, Bangladesh (Al-Mamun *et al.*, 2011), while in highlands of Mexico it was recorded upto 37.5% in sheep only (Nahed-Toral *et al.*, 2003). Similarly, higher frequency of fascioliasis was reported for sheep (26.5%) and cattle (52.2%) in Australia (Molloy *et al.*, 2005). The overall infection rate of fascioliasis in sheep was 17.84% in nine center of Dakahlia Governorate (El-Shazly *et al.*, 2002). Comparing to these reports regarding the infection frequency of fascioliasis, our data showed that it is in controlled range. During the seven months study, we found that the incidence of liver fluke was higher particularly during post study periods of June and July, 2013. The highest number of infected specimen of *F. hepatica* was 7 out of 17 in the month of June from cow. The range of fascioliasis infection was varied considerably with highest during September but the lowest in January (Ullah *et al.*, 2013). In sheep the fascioliasis infection was highest during May and June with least infection rates in January. Al-Mamun *et al.* (2011), argued that the prevalence of fascioliasis was higher during summer and autumn season, similarly our results are in confirmation that the fascioliasis prevalence was higher during post study periods i.e., June and July. The most possible reason for increased fascioliasis infection may be the high precipitation in post study period where the ditches filled up by water thus making favorable niches for cercariae and snails to flourish their populations in grasses, sedges and in forbs. Moist condition is more suitable for the reproduction and survival of intermediate host of *F. hepatica* like snails (Ahmed *et al.*, 2007). The cercariae and snails become ingested by the grazers as grasses and forbs are among the most desirous food stuff, hence the pathogen get its entry into the body of animals. Many workers gave similar findings and suggested that fascioliasis mostly occur after flooding, high rainfalls or when the humidity level increased in the area and is thought to be the main cause of the fascioliasis in cattle farming areas (Yuliang and Zang, 1997; Dipeolu *et al.*, 2000; Tahir, 2002; Ahmed *et al.*, 2007; Al-Mamun *et al.*, 2011; Ullah *et al.*, 2013).

Some authors reported the significant correlation between humidity and prevalence of fascioliasis and was no any significant correlation with rainfall (Bhutto *et al.*, 2012), but the prevalence was high after rainy season (Ahmed *et al.*, 2005). The frequency of fascioliasis was high in winter than summer. The high percentage in winter may be due to suitability of climate and presence of canal and ponds for intermediate hosts (snail) and their eggs. The infection of

fascioliasis throughout the year may be due to the continued exposure of animals to encysted metacercariae at the bank of ponds and canal particularly in dry season. There is no proper control on movement of animals from infected region to non-infected zone (El-Bahy, 1998). Maqbool *et al.* (1994) suggested that the rainy season in month of July change the temperature and humidity is suitable for the emergence of cercariae from snail. The fascioliasis infection was also recorded in month of January after rain at low temperature. It may be due to the presence of water bodies for Lymnaeid host population and can abide low temperature (Valero *et al.*, 2002; Mas-Coma *et al.*, 2001). Ghoneim *et al.* (2011) determined the highest percentage of prevalence in different seasons of the year e.g. Autumn (cow, 5.56% and buffalo, 7.78%), Spring (cow, 3.33% and buffalo, 5.56%), Summer (cow, 3.33% and buffalo, 5.56%) and Winter (cow, 2.22% and buffalo, 3.33%), in the liver of slaughtered animals. The high prevalence in autumn may be due to the suitable temperature 20-25°C for *F. cercaria* and lymnaeid snail. But the most important factor which influences the prevalence of *F. hepatica* is temperature and moisture. Periodic anthelmintic treatment should be given to animals could be a possible remedy (Bhutto *et al.*, 2012). The prevalence rate of fascioliasis is different in different animals as well as in different geographical region due to the diverse grazing habitat, breed and resistance capability against infection caused by the pathogen. Fascioliasis infection is the most common cause of the loss of meat and milk production, and socio-economic status of the country. The host (Snail) of the *F. hepatica* is mostly present at bank of water ditches. The prevalence of fascioliasis was high in buffalos and cow because they used to drink water from ditches directly. In hilly areas, the cows and buffaloes left freely for few days to few months during summer seasons where they drink water from these ditches filled due to monsoon. The possible way to lessen fascioliasis in domesticated animals is water feeding at home and at the same time reduce unnecessary water reservoirs. Forage selection will also be effective remedy to reduce fascioliasis but will difficult for most of the ordinary cattle farmer. For control measure destruction of the intermediate host (snail) should be taken into account. Upon any slight symptoms of fascioliasis appear in animals, should be taken seriously and to contact with veterinary doctor immediately to control further infection. The government should manage some seminars and workshops for cure and proper vaccination campaigns about zoonotic diseases on regular basis. Because fascioliasis not only infect animals but also human beings. Fascioliasis is one the major problem for animal's health that may cause reduced productivity. There is no proper documented date and no method of handling of animals and control measurement of fascioliasis.

CONCLUSION

The study of 150 animals (70 cows, 50 sheep and 30 goats) in district Karak, showed higher fascioliasis prevalence by 24.2, 16 and 6.6% in cow, sheep and goat, respectively. The highest prevalence recorded in June (40.7%), while the minimum was in January. It is recommended that more scientific studies with large scale surveys and more number of samples are a dire need to eradicate the disease. The present study will provide awareness in people about fascioliasis and will provide the basic information for animal health planner. It is recommended that more scientific studies with large scale surveys and more number of samples are a dire need to eradicate the disease.

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