

Seasonal dynamics of *Fasciola hepatica* burdens in sheep: A diagnostic study from Hazara Division, Pakistan

Anwar Khalid*, Abdul Samad, Manzoor Ahmad

Department of Biochemistry, Hazara University Garden Campus Mansehra, KPK, Pakistan

ABSTRACT: The present survey was carried out in order to determine seasonal dynamics of *Fasciola hepatica* burdens in sheep at a diagnostic laboratory in Abbottabad, Pakistan using microscopic technique. In this study, 106711 fecal samples were examined during 01.06.2010-31.05.2011. The overall prevalence of *Fasciola hepatica* was 0.9%. Based on results, *Fasciola hepatica* prevalence was significantly ($p < 0.05$) high (4.51%) during mid of July to the end of August, while the prevalence (%) was 0.59%, 0.22%, 0.12% and 2.01% in August, September, October and November respectively. No parasites were observed during December-February and May. In March and April, the prevalence was 0.18% and 0.41%. Thus it can be concluded that the *Fasciola hepatica* prevalence in sheep is highest in most hot days of the year, thus the meat of sheep during these days should be avoided.

KEYWORDS: Fecal samples, Prevalence, Flotation techniques, Sedimentation techniques.

I. INTRODUCTION

In developing countries, fascioliasis is one of the most prevalent diseases of domesticated animals (1) and has highly been described as the most important single helminthes infection of domestic animals (2) resulting in great economic losses to the animal industry (3). This infection prevails most widespread in extremely endemic regions of East, West and central Africa (4-6). Previously, many studies have been conducted regarding the evaluation and prevalence studies of *Fasciola hepatica*. To clarify the role of the nutria *Myocastor coypus* in the epidemiology of domestic fasciolosis in Loire-Atlantique (department of western France), experimentation has been conducted previously (3). Ovine fascioliasis takes part in major constraints to small ruminant production in Ethiopia. To assess the prevalence of *Fasciola* species infections of sheep in Middle Awash River Basin, and to compare *Fasciola* species, the fecal samples have been tested using the ethyl-acetate centrifugation technique to identify eggs of *Fasciola* species (5). The fasciolosis can be easily controlled by understanding genetic structure and status of genetic variation of the *Fasciola hepatica* populations. A group of researchers has genetically evaluated *Fasciola hepatica* isolates from various hosts, employing sequence analysis of ribosomal ITS1 and RAPD-PCR (7). Another group of researchers determined the efficiency of treatment against *Fasciola hepatica* on a sheep and goat farm during an eruption of fasciolosis, in which a high proportion of deaths occurred (8). Immunological testing of bulk tank milk has also been used to assess fasciolosis by employing ELISA (9). Meat scrutiny documentation in an abattoir located in Ahwaz, Iran, from 20.03.1999 to 19.03.2008 has been used to assess the prevalence and enduring drift of liver fluke disease in sheep, goats and cattle in the constituency (10). Using the indirect ELISA and Benedek's sedimentation tests, the prevalence of *Fasciola hepatica* in cattle, goats and sheep from the municipalities of Guaymas and Cajeme, Sonora State, Mexico has been estimated (11). Tasawar et al., (12) have also determined prevalence of *Fasciola hepatica* in goats and relationship between body weight, age, breed of the host and also effect of parasite on the litter size of the host in Pakistan. Even though substantial worldwide studies have been, literature survey showed no publication from Mansehra, one of the important districts of Pakistan. So keeping in view, the importance of parasite the project was designed to collect information on the seasonal dynamics of *Fasciola hepatica* burdens in sheep at a diagnostic laboratory in Abbottabad, Pakistan using microscopic technique.

II. METHODOLOGY

This study was carried out during 01.06.2010-31.05.2011 in a diagnostic laboratory in Abbottabad, Pakistan under the supervision of a veterinary physician. In order to collect information on the seasonal dynamics of *Fasciola hepatica* burdens in sheep, the collected fecal samples were stored in bottles containing 5% formaline and examined using flotation and sedimentation techniques. In flotation technique, 2 g of fecal sample was mixed with 15-30 ml of flotation solution (normal saline having 8.5 g sodium chloride/1000 ml distilled water) to make a homogeneous mixture. A drop of this mixture is placed on a glass slide, covered with a cover slip and then examined the prepared slide using a microscope for the examination of liver fluke eggs.

In sedimentation technique, 1 g of fecal sample was mixed with 30 ml of tap water in beaker. The mixture was strained through the strainer into another beaker and was allowed to remain undisturbed for 20-30 min. The liquid in the top of the beaker was poured off without disturbing the sediment at the bottom. A drop from the sediment was placed on the slide, covered with cover slip and examined under the microscope.

Data analysis: Using SPSS version 17.0, the collected data was analyzed with a probability level set at $P < 0.05$.

III. RESULTS AND DISCUSSION

During the study of seasonal dynamics of *Fasciola hepatica* burdens in sheep, 106711 fecal samples of sheep were examined during 01.06.2010-31.05.2011 in a diagnostic laboratory, Abbottabad, Pakistan. The parameters studied were the overall prevalence (prevalence in a year) and monthly variation in the prevalence of this parasite. According to these results, the overall prevalence of *Fasciola hepatica* in sheep was 0.9%. Based on results, *Fasciola hepatica* prevalence was significantly ($p < 0.05$) high (4.51%) during mid July to the end of August as confirmed in Figure 2, while the prevalence (%) was 0.59%, 0.22%, 0.12% and 2.01% in August, September, October and November. No parasites were observed during December-February and May. In March and April, the prevalence was 0.18% and 0.41%. There is an important role of ovine fascioliasis from the major constraints to small ruminant production in Ethiopia. Diego et al., (2008) assessed the prevalence of fascioliasis in sheep in Middle Awash River Basin, Ethiopia. They tested 3,697 fecal samples using the ethyl-acetate centrifugation method to recognize eggs of *Fasciola* species. The overall prevalence of fascioliasis was found to be 13.2%. The results exhibited that *Fasciola* species illness was higher among Afar (13.5%) than blackhead breed (9.1%). Regarding the seasonal aspects, the highest infection rate was found during the cool period (6.9%), while lowest infection rate was observed during the rainy time (0.8%) (5). It has been observed that liver fluke infections in herbivores are widespread worldwide, including Iran. Nayeb et al., (2010) used meat examination documentations in an abattoir located in Ahwaz (Iran), from 20.03.1999 to 19.03.2008 to elaborate the prevalence and enduring drift of liver fluke disease in sheep, goats and cattle in this area. The authors collected data of 3186755 livestock including 2490742 sheep, 400695 goats and 295318 cattle 20.03.1999 to 19.03.2008 and overall 144495 (4.53%) livers were observed affected including 35.01% fascioliasis. The prevalence of liver condemnations due to fasciolosis decreased each year during 1999-2000 and 2007-2008 for cattle, sheep and goats. In some animals, there were statistically non-significant ($p > 0.05$) differences with respect to season. More prevalent liver damage due to fasciolosis was observed in slaughtered cattles during summer. This study may act as a useful baseline data for the future scrutiny of these potentially vital parasitic infections in this area (10).

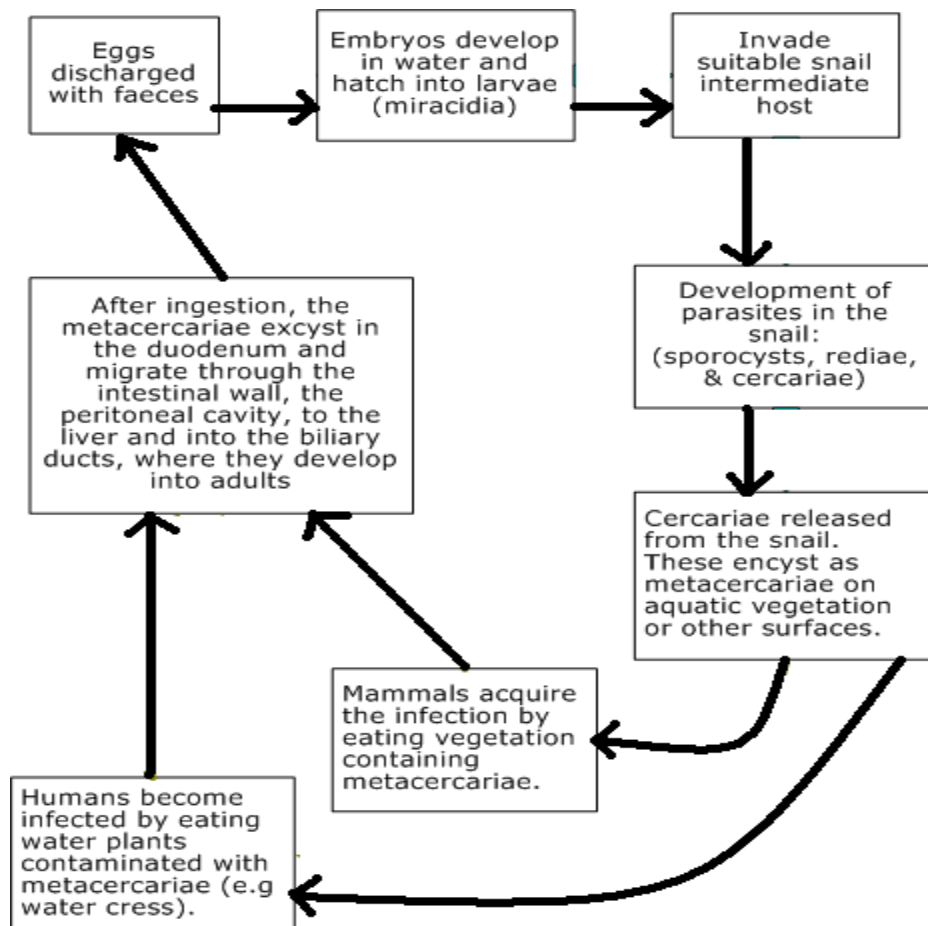
Ghazani et al., (2008) determined the prevalence of liver fluke infection in sheep in the northwest area of Iran. It is reported that the prevalence rate of *Fasciola hepatica* was 8.57% in livers of 140 sheep that were collected by systematic random sampling (13). Munguía-Xochihua et al., (2007) proposed this study to assess the prevalence of *Fasciola hepatica* in cattle, goats and sheep from the municipalities of Guaymas and Cajeme, Sonora State, Mexico employing the indirect ELISA and Benedeck's sedimentation tests. A total of 2,936 serum and fecal samples from 1,346 bovines, 1,199 goats and 381 sheep were tested. It was observed from the results that the prevalence for fasciolosis was moderate in these municipalities. In bovines, a prevalence of $11.4 \pm 0.9\%$ was observed employing the sedimentation test and $24.4 \pm 1.2\%$ for the indirect ELISA method. In goats, a prevalence of $24.5 \pm 1.2\%$ was observed for the fecal analysis and $43 \pm 1.5\%$ for the indirect ELISA test. In sheep, the prevalence for sedimentation and indirect ELISA tests was $19.4 \pm 2.0\%$ and $30.6 \pm 2.7\%$, respectively (11). Tasawar et al., (2007) collected bimonthly the faecal Samples of 80 goats belonging to Nachi and Teddy breeds from neighboring areas of Multan, Pakistan. The overall prevalence of *Fasciola hepatica* was observed to be 28.75%. More significant ($p < 0.05$) rate of parasite infection was observed in Teddy (42.10%) than in Nachi goats (16.67%). Highest prevalence (35.71%) of parasite was observed in age group of 13-24 months, while lowest (18.18%) in age group of greater than 36 months. Significantly ($P < 0.05$) different prevalence was observed in different age groups.

IV. CONCLUSION

It can be concluded that the *Fasciola hepatica* prevalence in sheep is highest in most hot days of the year, thus the meat of sheep during these days should be avoided.

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Figure 1. Life cycle of *Fasciola hepatica*

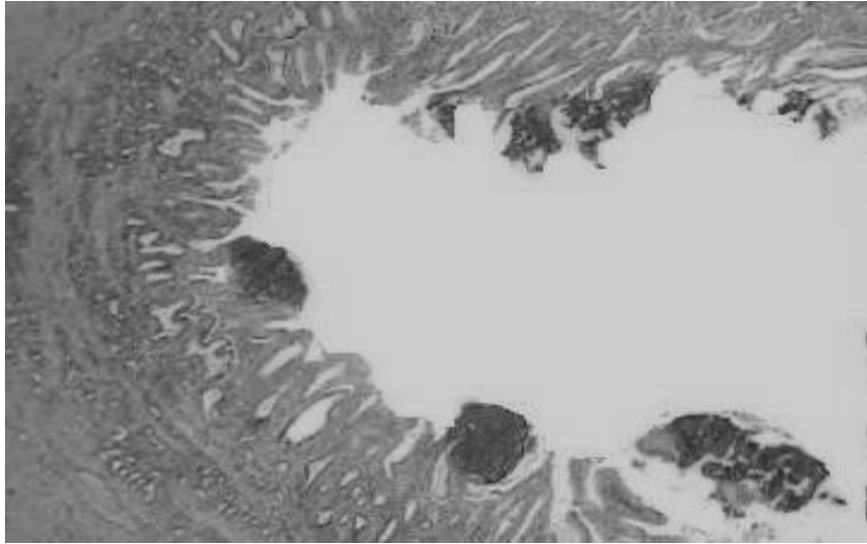


Figure 2. Hyperplasia of the bile duct in a sheep liver infected with *Fasciola hepatica* in the first week of August