

# The Differences Between Direct Examination and Enzyme Linked Immunosorbent Assay (ELISA) Test, During the Diagnosis of Fasciolosis in Jaundiced Slaughtered Sheep in Duhok Abattoir, Kurdistan Region of Iraq

Azad A. Meerkhan and Dr. Alaa H. Razak

**Abstract**—The efficiency of Enzyme-linked immunosorbent assay (ELISA) in sheep infected with *Fasciola hepatica* was studied. 232 jaundiced sheep among 5208 sheep slaughter in the Duhok abattoir (regardless of the age and gender) between the period of May. 2012 to Oct. 2012 were examined by direct examination (searching of adult flukes in the bile duct) and by Enzyme-linked immunosorbent assay (ELISA) to detect the incidence of fascioliasis in the studied population which showed a high observed infection ratio in Sep. 2012 (12.2%) with the high (ELISA) result of infection in May. 2012 (25.36%).

Significant Differences were found between the two ways in all of the months with the highest Difference in May. 2012 and the net difference between the both ways was 6.91%.

**Keywords**— Fascioliasis, *Fasciola hepatica*, layers, liver fluk, ELISA, direct examination.

## I. INTRODUCTION

FASCOLIASIS is an important disease of domestic animals and humans worldwide, causing significant economic losses and public health concern [1],[2]. This liver fluke disease is an economically important disease of sheep and cattle worldwide. It is estimated to cost the global agricultural sector approximately US \$2 billion [3],[4],[5].

Fascioliasis is of considerable public health relevance in Bolivia, Cuba, Egypt, the Islamic Republic of Iran, Peru and Vietnam. An estimated 91 million people are at risk and 2.4–17 million people are infected [6],[7].

Although several species have been described within the genus *Fasciola*, only *Fasciola hepatica* and *Fasciola gigantica* have been recognized taxonomically as the causative agents of fascioliasis in animals and humans [8],[9].

Azad Abdullah Meerkhan Al-Doski, Head of Pharmacy Department, Duhok Technical Institute, Duhok Polytechnic University, (e-mail: [azad.meerkhan@gmail.com](mailto:azad.meerkhan@gmail.com) Telephone: +964-750-471-1478).

Dr. Alaa Hani Razak, M.B.Ch.B., M.Sc. (Path.), M.I.B.M.S., Assistant Professor in Pathology, Pathology Department, School of Medicine, Faculty of Medical Sciences, University of Duhok, Duhok-Iraq (e-mail: [ala\\_hani@yahoo.com](mailto:ala_hani@yahoo.com) Telephone: +9647504801310).

Infection with *Fasciola gigantica* is regarded as one of the most common single helminth infection of ruminants in Asia and Africa [10],[11]. Its economic importance is mostly obvious when the disease causes mortality, but even subclinical infections have been shown to cause high losses from reduced feed efficiency, weight gains, milk production, reproductive performance, carcass quality and work output in draught animals, and from condemnation of livers at slaughter [12].

According to a World Health Organization (WHO) report in 2007 [13], the infection was limited in the past to specific and typical geographical areas (endemiotores), but is now widespread throughout the world, with human cases being increasingly reported from Europe, the Americas and Oceania (where only *F. hepatica* is transmitted), and from Africa and Asia (where the two species overlap). As a consequence, human fascioliasis should be considered as a zoonosis of major global and regional importance [13].

In Iraq, there are high infection percentages with this parasite in sheeps and goats at last years [14],[15],[16].

No doubt that there is now a need to control the human infection along with the veterinary infection, doubtless, understanding the epidemiology of parasitic diseases and the factors affecting them provides the foundation upon which effective prevention and control programs should be established [17].

At present there is no vaccine available for the prevention of fascioliasis [18], and hence chemotherapy is the current mainstay of control.

Triclabendazole is the drug of choice as it is safe and efficacious against both juvenile and adult flukes. Triclabendazole has been marketed since 1983 as a veterinary drug (Fasinex) and, three years later, was used for the first time in humans during an epidemic in the Islamic Republic of Iran [6]. The human formulation of triclabendazole (Egaten) is registered in only four countries [6].

Diagnosis of *Fasciola hepatica* infection has traditionally relied on detecting the presence of eggs in fecal samples, but this method is unreliable and complicated [19],[20]. At

present, the routine diagnosis of human fascioliasis is based on the detection of antifluke antibodies in serum. Methods such as immunoelectrophoresis [21] and counterimmunoelectrophoresis [22], although they are very specific, have limited sensitivity.

The diagnosis was improved by the development of enzyme-linked immunosorbent assay (ELISA), using crude extracts [23].

## II. MATERIALS AND METHODS

The study was conducted at the Duhok abattoir between the period of May. 2012 to Oct. 2012. A total of 5208 samples (slaughtered sheep), only 232 (4.45%) sheep were found as suspected (Jaundiced).

Liver, bile duct and gall bladder of each of suspected sheep were examined for the presence of flukes. To this end, each bile duct, gall bladder and liver was cut transversely two to three times and squeezed to expel flukes from the bile ducts [24]. Blood and corresponding faecal samples from naturally infected sheep were collected immediately post-slaughter from Duhok abattoir. Fluke infection was confirmed, immediately, by the presence of adult *Fasciola hepatica* within the liver of sheep. Blood samples were centrifuged at 3000<sub>x</sub> at 20 °C for 15 minutes and sera were stored at -20 °C until used. Faecal samples were stored in 10% formalin at 1 to 3 ratios. Serum samples were tested with indirect ELISA and faecal samples were tested by Clayton Lane method [25].

## III. RESULTS

The table I shows the number and the incidence of fascioliasis in Duhok abattoir slaughtered sheep.

Among the 5208 slaughtered sheep during six months (the period of the research), only 232 were found jaundice which were 4.45% with the highest jaundice ratio in Sep. 2012 which was 4.68 % of the slaughtered sheep in that month.

TABLE I  
THE NUMBER AND THE INCIDENCE OF FASCIOLIASIS IN DUHOK ABATTOIR  
SLAUGHTERED SHEEP

Months	Slaughtered Sheep		Jaundiced Sheep	
	Number No.	No.	No.	%
May. 2012	629	28		4.39
Jun. 2012	771	35		4.51
Jul. 2012	1002	42		4.19
Aug. 2012	811	36		4.44
Sep. 2012	1052	49		4.68
Oct. 2012	943	42		4.45
Total	5208	232		4.45

The table II shows the incidence and the comparison between direct examination and Enzyme-Linked Immunosorbent Assay (ELISA) in slaughtered sheep.

From the 232 jaundiced sheep, only 23 (9.93%) sheep were found as infected in direct examination with the highest ratio in Sep. 2012 (12.2%). While the number increased to 39

(16.8%) with the highest ratio in May. 2012 which was 25.36% in the case of (ELISA) method (table 2).

On the other hand, there is deference in 6.91% between direct examination and (ELISA) method (9.93% and 16.8% respectively).

TABLE II  
THE INCIDENCE COMPARISON BETWEEN DIRECT EXAMINATION AND ENZYME-  
LINKED IMMUNOSORBENT ASSAY (ELISA) IN SLAUGHTERED SHEEP

Months	Jaundiced Sheep	Observed in Direct Examination			ELISA Test Positive Result		Deference Between the Two Methods	
	No.	No.	100%	No.	100%	No.	100%	
May. 2012	28	2	7.25%	7	25.36%	5	18.11%	
Jun. 2012	35	4	11.49%	5	14.37%	1	2.88%	
Jul. 2012	42	5	11.9%	6	14.29%	1	2.39%	
Aug. 2012	36	4	11.11%	6	16.6 %	2	5.56%	
Sep. 2012	49	6	12.2%	7	14.23%	1	2.03%	
Oct. 2012	42	2	4.76%	8	19.05%	6	14.29%	
Total	232	23	9.93%	39	16.8 %	16	6.91%	

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