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PREVALENCE OF BOVINE FASCIOLIASIS IN HAWLER MODERN ABATTOIR, ERBIL, KURDISTAN REGION, IRAQ

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ABSTRACT

Fascioliasis in Iraq is prevalent and causes critical economic losses. The aim of this study were to evaluate and determine the prevalence of bovine fascioliasis in Hawler modern abattoir in Erbil province, Iraq, also to evaluate the host related risk factors on the occurrence of fascioliasis and to access the hematological and biochemical changes in infected animals. Hematological and biochemical parameters of 21 infected cattle were compared with 30 parasite-free cattle. Out of 850 slaughtered cattle in the abattoir from July to October 2019, the prevalence rate of fascioliasis infection was 2.471%. The study revealed significantly higher bovine prevalence in female than male ($P < 0.05$). The infection was higher significantly in local breeds than imported ones ($P < 0.05$). There were statistically significant differences in the prevalence of the fluke among different body conditions ($P > 0.05$), the highest infection rate occurred in the poor body conditions. Age groups didn't show significant difference in the prevalence of bovine fascioliasis. Significantly lower red blood cell (RBC), hemoglobin (Hb) and hematocrit (Hct), reported in infected cattle when compared to non-infected ones. Values of each of White blood cells (WBC), mean corpuscular volume (MCV) and mean corpuscular hemoglobin (MCH) were significantly higher in infected cattle than non-infected cattle. There was no significant difference between the mean cellular hemoglobin concentration (MCHC) in the infected cattle and the non-infected animals. Infection with fascioliasis induced biochemical changes in infected cattle, values of each of aspartate aminotransferase (AST), alkaline phosphatase (ALT) and alanine aminotransferase (ALP) were significantly higher in infected animals than parasite free animals ($P > 0.05$).

Keywords: Prevalence, Bovine, Fascioliasis, Erbil

Introduction

Fascioliasis is a common disease of the bile duct of domestic ruminants and wildlife caused by two main liver flukes, *Fasciola hepatica* and *Fasciola gigantica*. *Fasciola* spp. use freshwater snails' species from the family Lymnaeidae to be its intermediate hosts to complete their lifecycle (Walker *et al.*, 2008). These snails live along the river banks.

F. hepatica has a worldwide distribution but more dominates in temperate regions, while *F. gigantica* occurs in tropical parts in just two continents (Africa and Asia) (Mas-Coma *et al.*, 2009). Both *F. hepatica* and *F. gigantica* are found in Iraq (Wajdi and Nassir, 1983; Ridha and Al-Sadi, 1992). The disease is capable to cause damage in the livestock sector in many countries worldwide, through liver censure, decreased the production of each of milk, meat and wool, in addition to mortality (Schweizer *et al.*, 2005; Charlier *et al.*, 2014). The Migration of young liver flukes results in the damage of liver. Liver lesions occur could lead to massive liver insufficiency (Machicado *et al.*, 2016). However, studies have shown that it is also a serious public health issue, because human infection cases have recorded in 51 countries. This situation include human infection statistics of till 17 million persons, and more than that higher, based on the cases in the continents of Asia and Africa so far unknown

because fascioliasis is considered neglected tropical disease (Hopkins, 1992).

The objective of this study was to determine the infection prevalence and evaluate the hematological and biochemical profile resulted from the parasite of *Fasciola* spp. in the slaughtered cattle in Hawler Modern Abattoir.

Materials and Methods

This study was carried out from July to October 2019 in Hawler Modern Abattoir in Erbil city in Iraq. The abattoir was visited three times a week. During visits, from a total of 850 cattle presented for abattoir, 21 livers, excluded by the veterinarian because of the suspicion of fascioliasis infection, were inspected for the existence of *Fasciola* spp. The remaining livers were judged to be free from the fluke. The rejected livers were macroscopically inspected for the presence of adult *Fasciola* spp. Identification of the species based on the morphological characteristics of the parasite and classify into *F. gigantica* and *F. hepatica* (Soulsby, 1986).

During monitoring of the abattoir, the data of each animal of the (21) infected Vs. (30) non-infected (control) cattle with fascioliasis, were recorded, including, sex, age, origin of the animal (local or imported) and body condition score.

Records obtained from 30 cattle negative for infection were included as control. In the control group, the livers with other common diseases were excluded with the supervision of an experienced veterinarian.

The age of the animal was estimated depending on the records from owners and dentition (Pace and Wakeman, 2003). The cattle were divided into three age groups such as young (<3 years), adult (3-5 years) and old (> 5 years) age. Category of body condition score for each cattle was determined based on (Zielke *et al.*, 2018) ranging from the lowest score 1 (skinny) to the highest score 5 (corpulen). No animals were slaughtered at score 1.

Hematological and Biochemical Analysis

Blood samples for complete blood count and liver function analysis had been collected from the jugular vein of (21) infected and (30) non-infected (control) cattle. Values of red blood cell (RBC), white blood cells (WBC), hemoglobin (Hb), hematocrit (Hct), mean corpuscular volume (MCV) mean corpuscular hemoglobin (MCH), mean corpuscular and hemoglobin concentration (MCHC) were measured by hematology analyzer (SWE Lab, Germany). Alanine aminotransferase (ALT), aspartate aminotransferase (AST) and alkaline phosphatase (ALP) were measured using fuji dry chem analyzer (Fujifilm Holdings Corporation, japan).

Statistical Analysis

The obtained data were entered in to Microsoft Excel, then the data were statistically analyzed by STATA 12.0 software (Stata Corp. 2011). The prevalence of fascioliasis was evaluated as the number of infected cattle with *Fasciola* spp. exhibited as a percent rate from the total number of slaughtered cattle at the time of visits to the Abattoir. Results of hematological and biochemical analysis are explained as mean \pm standard deviation (SD). The Pearson's chi-squared (χ^2) test were applied to determine the variables of origin, sex, age and body condition score of the animal in relation to disease occurrence. The t test was used to find the significant differences on the hematological and biochemical parameters between the infected and control group. Significances were considered when $P < 0.05$.

Results and Discussion

The prevalence of *Fasciola* spp. infection was 21 (2.471%) in 850 examined cattle in Hawler Modern Abattoir. The prevalence rate of current study was slightly higher than that reported in cattle which were 2.30% in Koya Abattoir in Erbil province, Iraq (Hassan, 2015). The infection rate in the present study was lower than that recorded in sheep in the middle Black Sea region of Turkey (31.4%) by serologic detection of antibodies against *F. hepatica* (Acici *et al.*, 2017).

Occurrence of bovine fascioliasis in local slaughtered animals (95.24%) was significantly higher than that in imported ones (4.76%) (Table 1). The high level of infection in local cattle may be due to that they may be raised in traditional old farming method which may increase their chance for infection in contrary to imported animals which may be raised in modern farming methods with the use of antihelminthics.

In regard to the host sex, significant differences were observed in infection rate, the prevalence of fascioliasis was significantly higher in females (61.90%) than males (38.10%). In a study of fascioliasis prevalence with emphasis on sex in Zambia, female cattle showed significantly higher prevalence rates of infection than males (Phiri *et al.*, 2005a), indicating that there are differences in susceptibility between males and females (Phiri, *et al.*, 2005b)

There was a statistically no significant difference in the prevalence of bovine infection with *Fasciola* spp. in age groups considered. The highest prevalence (52.38%) was found in animals > 5 years and the lowest (19.05%) were found in < 3 years. In spite of the results of the current study indicated that the infection with fascioliasis have increased with the increase in age, there were no significant differences between the age groups of infected cattle, this agrees with the results of (Mohammed *et al.*, 2018) but it contradicts with the study of (Amsalu, 2017).

There was a significant difference in the prevalence of bovine fascioliasis within different body condition scores. The highest prevalence (76.19%) and (23.81%) were found in animals with poor body condition scores (2 and 3 respectively). Animals with good body conditions (4 and 5) were not found to be infected with fascioliasis.

Table 1: Prevalence of bovine fascioliasis depending on origin, gender, age, and body condition score categories.

Factor		Cattle infected with fascioliasis (%)	Cattle non-infected with fascioliasis (control) (%)	Y ²	P-value
Origin	Local	20 (95.24)	20 (66.67)	5.9610	0.015
	Imported	1 (4.76)	10 (33.33)		
Gender	Male	8 (38.10)	20 (66.67)	4.0728	0.044
	Female	13 (61.90)	10 (33.33)		
Age	Young	4 (19.05)	10 (33.33)	2.0961	0.351
	Adult	6 (28.57)	10 (33.33)		
	Old	11 (52.38)	10 (33.33)		
Body condition score	2	16 (76.19)	0 (0)	40.6786	<0.001
	3	5 (23.81)	5 (16.67)		
	4	0 (0)	20 (66.67)		
	5	0 (0)	5 (16.67)		

Hematological and biochemical analysis

Fascioliasis causes hematological and biochemical disorders in infected animals. The results of the

hematological analysis indicated that the infected cattle with fascioliasis showed significant reduction in values of RBC, Hb and Hct compared to the group of controls. In a study of

fascioliasis effect on hematological and biochemical changes in sheep, there were decreases in of RBC and Hb levels (Matanovi *et al.*, 2007). The results reported in this study are similar to that observed by others in cattle infected with *Fasciola* (Egbu *et al.*, 2013), their study revealed significant decrease in the RBC and Hb of infected cattle. Accordingly, the results of (Yesuf *et al.*, 2020) indicated that Hb and Hct were significantly reduced in *Fasciola* infected sheep compared to non-infected groups. Natural infection of local breed sheep with fascioliasis in Ethiopia showed reduction in the values of Hct compared to non-infected animals (Yesuf *et al.*, 2020). The low level of RBC, Hb and Hct may be related to the damage of liver which is caused by the invading parasite.

There was significant increase in WBC, MCV and MCH of infected cattle with fascioliasis compared to the

group of controls. Higher levels of WBC in infected cattle may be due to the high levels of eosinophil as a reaction to the parasitic infection (Matanović *et al.*, 2007). Also, significant statistical increase was observed in the levels of MCV and MCH of the infected cattle with fascioliasis, when compared to the control group (Egbu *et al.*, 2013).

Levels of MCHC in the infected animals did not significantly differ from those of the control group. These results are in agreement with the results of (Egbu *et al.*, 2013).

Blood biochemical parameters (ALT, AST and ALP) of infected cattle were significantly higher than those of the control group. Elevations in liver enzymes were reported in experimentally infected Balami sheep with fascioliasis, because of liver damage resulted from the parasite (Ahmed *et al.*, 2006).

Table 2: Hematological and biochemical parameters (mean \pm S.D.) for *Fasciola* spp. infected and control group cattle

Parameter	Non infected cattle with fascioliasis (n=30)	infected cattle with fascioliasis (n=21)	P-value
RBC ($\times 10^{12}/l$)	8.504 \pm 1.008	5.461 \pm 1.536	<0.001
WBC ($\times 10^9/l$)	9.499 \pm 2.571	12.643 \pm 2.870	<0.001
Hb (g/dl)	14.783 \pm 1.715	10.042 \pm 2.403	<0.001
HCT (%)	43.195 \pm 5.274	28.790 \pm 6.291	<0.001
MCV (fl)	50.887 \pm 4.083	54.038 \pm 6.239	0.034
MCH (pg)	17.443 \pm 1.366	18.695 \pm 1.819	0.007
MCHC (g/dl)	34.26 \pm 1.104	34.786 \pm 2.261	0.276
ALT (U/l)	30.62 \pm 10.171	52.924 \pm 27.980	<0.001
AST (U/l)	60.047 \pm 19.680	96.386 \pm 32.217	<0.001
ALP (U/l)	100.602 \pm 44.279	156.057 \pm 36.558	<0.001

n: size of sample, RBC: red blood cell, WBC: white blood cells, Hb: Hemoglobin, Hct: hematocrit, MCV: mean corpuscular volume, MCH: mean corpuscular hemoglobin, MCHC: mean corpuscular and hemoglobin concentration, ALT: alanine aminotransferase AST: aspartate aminotransferase and ALP: alkaline phosphatase.

Conclusions and Recommendations

The findings of this study showed that there were differences between the infected and non-infected cattle with fascioliasis related to origin, sex and body condition score, but the differences were not observed regarding the age of the animals. Infection with fascioliasis causes changes in hematological and biochemical parameters in cattle. According to the results of present study, we recommend some suggestions that may help people to reduce the infection of Fascioliasis in humans and animals.

- Farmers will be mindful of and informed of the importance of disease prevention programs.
- Treatment of livestock with anti-parasite treatment and prophylactic anti-helment dosage for all livestock.
- Swampy area should be drained and the use of molluscicide should be promoted.
- Healthy management of the products of the slaughterhouse.
- Build a diagnostic laboratory in any slaughterhouse.

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