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EVALUATION OF *FASCIOLA SPP* INFECTION IN CATTLE AND SHEEP IN MOSUL CITY

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ABSTRACT

This study was conducted for the purpose of evaluating infection with the parasite *Fasciola spp* in the city of Mosul for the period from June 2020 to June 2022. The results showed that a total of 12.30% of cattle and sheep had *Fasciola* eggs in their feces, with a significant difference between cattle and sheep, and the infection was high in cattle 16%. The eggs of the *Fasciola species* are oval, brown to yellow in color, and have an operculum. There was no significant difference in the rate of infection with the *Fasciola* parasite and the sex of cattle and sheep. Regarding the relationship between the rate of infection and the age of the animals infected, there were no significant differences between the infection and the age groups of the examined sheep. Whereas there was a significant difference between the cattle whose age was less than one year, one to two years old and more than two years old. The results of the serological examination of 90 blood samples of cattle and sheep showed that the seroprevalence of *Fasciola* in both cattle and sheep was 22.22% and 8.88%, respectively, with no difference in the incidence of infection between all the examined cattle and sheep.

Keyword: *Fasciola spp*, cattle, sheep, ELISA Test.

INTRODUCTION

Cattle and sheep are regarded as the most important types of livestock for human meat consumption. Numerous diseases, such as *Fasciola*, are exposed to these animals (Mostafa *et al.*, 2021, Almashhadaeny, 2021, Ismael and Omer, 2021, Suleiman *et al.*, 2022).

One of the most significant digenetic trematodes is the *Fasciola* genus or liver fluke, which causes the extremely harmful condition known as fasciolosis or fascioliasis.

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Fasciola comes in two species, *F.hepatica and F.gigantica* (Santans *et al.*, 2013). *Fasciola* blocks the bile ducts of its victims, causing serious liver damage and eventual death (Legesse *et al.*, 2007). Domesticated and wild animals can be infected with *Fasciola species*, although cattle, sheep, and even humans are particularly vulnerable (Amer *et al.*, 2016, Belete, 2017).

In order for *Fasciola* to complete its life cycle, species of snails from the Lymnaeidae family, which inhabit marshy and standing water environments, must serve as intermediate hosts. *Fasciola* eggs shed with feces, hatch in water, and produce an infectious stage (metacercaria) that is attached to a plant host. Once animals consume the metacercaria, juvenile flukes migrate from the liver to the bile ducts, where adult stages emerge and begin to lay

eggs after an eight to ten week prepatent period (Caron *et al.*, 2014).

Due to the migration into the liver, the damage and acute phase of fascioliasis are more common in sheep than in cattle during the biliary phase (Amer *et al.*, 2016, Legesse *et al.*, 2007). Clinical signs and fecal examination using the sedimentation method, which is easy and confirmatory, were previously used to make the diagnosis of *Fasciola*. However, both methods are ineffective when adult parasite burden is low and they cannot detect the infection during the pre-patent stage. Recently, a number of serological assays have been created to identify circulating antibodies against a fluke excretory-secretory antigen produced during the early stages of infections and used to diagnose infections early (Munita *et al.*, 2019, Acici *et al.*, 2017, Salami *et al.*, 2005, Nossair *et al.*, 2014, Yamchi, 2005)

By identifying the eggs in the feces and also identifying seropositive animals for the infection, this study sought to ascertain the morbidity rate of *Fasciola* in cattle and sheep in the Nineveh governorate.

MATERIALS AND METHODS

Collection of samples

In the Nineveh governorate, 650 fecal samples (250 from cattle and 400 from sheep) and 90 blood samples (45 from cattle and 45 from sheep) were gathered through numerous field trips to numerous herds of cattle and sheep, as well as from the cases of death from liver fluke infections were recorded and delivered from private clinics and from the teaching hospital of the College of Veterinary Medicine at the University of Mosul. The data of each sample, including sex and age, were recorded between June 2020 and June 2022.

Laboratory examination

1- Fecal sample collection

Animals' rectums were directly sampled for feces using disposable plastic gloves. Once the glove was labeled and brought to the parasitology lab, it was processed and inspected using the sedimentation technique to determine whether *Fasciola* eggs were present (Brown *et al.*, 2019).

2- Blood sample collection

To check for antibodies against the *Fasciola* genus, 5 ml of blood from some sheep and cattle was aseptically collected in sterile tubes. Serum was then collected, labeled, and stored in a deep freezer before being tested using an indirect ELISA test utilizing a Diagnostic /Automtic/ Cortez. Diagnostic /Inc/ USA kit.

Statistical analysis

Chi-square was used, at a significance level of $P \leq 0.05$.

RESULTS

The current study recorded the overall percentage of *Fasciola* infection in 650 fecal samples (250 from cattle and 400 from sheep), which was 12.30%. There were discernible changes between sheep and cattle, with the infection rate with *Fasciola* eggs in cattle and sheep being 16% and 10%, respectively (Table 1).

Table 1: Number of animals investigated, infected animals with *Fasciola* eggs, and the percentage of infection.

Animals	number of animals investigated	Animals infected	percentage	P-value
Sheep	400	40	10	0.0466 significant
Cattle	250	40	16	
Total	650	80	12.30	

Both male and female sheep had an infection rate of 10%, whereas male cattle had a higher infection rate of 17.27%. There were no discernible variations in the infection rates of males and females of either sheep or cattle (Table 2).

Table 2: Connection between the percentage of animals with *Fasciola* egg infection and their gender.

Sex of animals	Animals							
	Sheep				Cattle			
	No. of examined samples	No. of positive samples	Percentage of infection	P- value	No. of examined samples	No. of positive samples	Percentage of infection	P- value
Male	100	10	10	1	110	19	17.27	0.67
Female	300	30	10	No	140	21	15	No
total	400	40	10	significant	250	40	16	significant

There were no differences (P> 0.05) found between any sheep age groups examined. However, there was a significant difference (P < 0.05) in the infection between cattle aged less than one year, 1-2 years and more than two years. The highest infection appeared in sheep aged more than two years 12.5% and in cattle aged less than one year 31.25%. Whereas, the lowest infection appeared in sheep aged 1-2 years was 6.66 and in cattle aged more than 2 years 8% (Table 3)

Table 3: The association between the percentage of animals with *Fasciola* eggs infected and the animals' age.

Age of animals	Animals					
	Sheep			Cattle		
	No. of examind samples	+ ve samples	% of infections	No. of examind samples	+ ve samples	% of infections
Less than one year	72	6a	8.33a	80	25 a	31.25
1-2 years	120	8a	6.66a	70	7b	10
More than 2 years	208	26a	12.5a	100	8cb	8
Total	400	40	10	250	40	16

Similar letters mean there is no significant difference, while different letters mean there is significant difference

The eggs of the *Fasciola* species are oval, brown to yellow in color, and have an operculum (Figure 1).

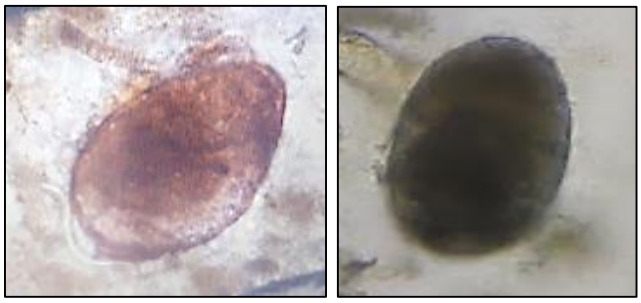

Figure 1: Egg of *Fasciola spp*. in fecal sample of cattle and sheep 10X by using digital amer

Examining 90 serum samples from each sheep (45 samples) and cattle (45 samples), the results showed that the rate of seropositive sheep and cattle was 8.88% and 22.22%, respectively. There was no difference (P > 0.05) in the infection between the sheep and cattle examined (Table 4).

Table 4: The percentage of ELISA test for *Fasciola* spp in sheep and cattle.

Animals	number of samples analyzed	Samples with infection count	Infection percentage	P= value
Sheep	45	4	8.88	0.1351 No significant
Cattle	45	10	22.22	
Total	90	14	15.55	

DISCUSSION

Fasciola spp. infection is considered among the great important diseases in the world. (Alemneh and Ayelign, 2017)

The findings of this study indicate that there was 12.30% total rate of *Fasciola* eggs in fecal samples from cattle and sheep, with sheep having a substantially lower frequency than cattle 16%.

Numerous investigations were undertaken in Iraq to find *Fasciola* infections in sheep, goats, cattle, and buffaloes. The percentages of infection ranged from 0.17 to 34%. (Mahdi and Al-Baldawi, 1987, Kadir and Rasheed, 2008), the number of samples analyzed, the climatic circumstances in each region, the degree of exposure to the intermediate host, and the manner of management and treatment are just a few variables that contribute to the contrast in the incidence of *Fasciola spp.* infection.

In our work, a significant difference in the incidence of infection between sheep and cattle was found, which is consistent with (Khademvatan *et al.*, 2019, Khan *et al.*, 2010). The infection was higher in cattle, which may be because the chronic form of the disease affects cattle more frequently (Khan *et al.*, 2010). Unlikely, Khademvatan *et al.*, (2019) reported that the incidence of the disease appeared high in sheep because their grazing habits are primarily focused on herb where metacercaria are present.

Although male cattle had a higher infection rate 17.27% than female cattle 15% and male and female sheep had the same infection rate 10% in this study, the difference of fascioliasis relative to the sex of cattle and sheep was not significant ($P > 0.05$). This is consistent with the reports of other studies (Kipyegen *et al.*, 2022; Piri *et al.*, 2018). According to Tilaham *et al.* (2014), domestic animals' male and female sexes were both exposed to the same risk factors for infection, such as contaminated grass.

There were no differences ($P > 0.05$) in age groups of sheep examined, but there was a difference between cattle less than a year old, cattle aged 1-2 years old, and cattle older than 2 years. This relevance between the infection with *Fasciola* eggs and age of animals was also not found

Kipyegen *et al.* (2022) revealed that the infection was higher in animals under one year old 62.7% and lower in those between one and four years 23.2%. The infection in the animals under one year old was more than those above five years old. Piri *et al*., (2018) reported no significant difference between infection rate and age. Belete (2017) stated that the increase of the infection rate of *Fasciola* in young animals may be due to underdeveloped immunity, as opposed to older animals, who have grown accustomed to *Fasciola* infection and have thus established a certain level of immunity. The primary detection of diagnosing *Fasciola* eggs is usually unacceptable and the clinical signs may be present in early weeks before eggs are passed with fecal samples. Thus, the serological tests are another technique of supported primary infection (Molloy *et al*., 2015). Seropositive sheep and cattle were 8.88% and 22.22%, respectively. These numbers are lower than

those of Kooshan *et al*., (2010) who found 90% seropositive and mentioned that the sensitivity and specificity of ELISA in detecting fascioliasis in sheep and cattle were 90% and 80%, respectively. This test is based on IgG antibody detection. In the middle of the Black Sea, Acici *et al*. (2017) reported an overall percentage of ovine fascioliasis of 31.4% using ELISA. They suggested that diagnoses of fascioliasis can be done using a serodiagnostic assay, which depends on Excreation/Secreation antigens of *Fasciola* and ELISA as a screening and confirmation technique, and this test is enough in serological and epidemiological studies. Molloy *et al*., (2015) demonstrated that the capability to early detect and treat fascioliasis is a high advantage of the ELISA, which will minimize liver damage in infected cattle and sheep, by immature flukes as they wander in the liver, and prevent the shedding of *Fasciola* eggs in feces. This contributes to effective hygiene and care by lowering the percentage of the disease.

CONCLUSION

Fasciolosis is an important parasitic disease that must be diagnosed and treated early to avoid contamination of the pasture with the eggs of the *Fasciola* species.

CONFLICT OF INTEREST

The authors confirm no conflicts of interest in the publication of this paper

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تقييم الاصابة بانواع طفيلي الفاشيولا في الابقار والاغنام في مدينة الموصل

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اجريت هذه الدراسة لغرض تقييم الاصابه بطفيلي Fasciola *spp* في مدينة الموصل للفترة من حزيران ٢٠٢٠ الى حزيران ٢٠٢٢ اذ اظهرت النتائج أن معدل الاصابة الكلية ببيوض طفيلي الفاشيولا في عينات براز الأبقار والأغنام المفحوصة كانت ١٢,٣٠٪ مع اختلاف معنوي بين الابقار والأغنام وكانت الاصابة مرتفعة في الأبقار بنسبة ١٦٪. امتازت بيوض طفيلي الفلشيولا بانها بيضوية ذات لون قهوائي الى اصفر مع وجود الغطاء لم يكن هناك اختلاف معنوي في نسبة الاصابة بطفيلي الفاشيولا وجنس الأبقار والأغنام المفحوصة وفيما يخص علاقة نسبة الاصابة بعمر الحيوانات المفحوصة فلم يكن هناك فروقات ذات دلالة إحصائية بين الإصابة والفئات العمرية للأغنام التي تم فحصها ، بينما كان هناك فرق معنوي بين الأبقار التي كان عمرها أقل من سنة و الأبقار التي كان عمرها من سنة إلى سنتين وأكثر من سنتين. اما فيما يخص نتائج الفحص المصلي ل٩٠ عينة دم جمعت من الابقار والاغنام فلقد كانت نتائج الانتشار المصلي للفاشيولا في كل من الابقار والاغنام ٢٢,٢٢%،٨,٨٨% على التوالي مع عدم وجود فرق معنوي في نسبة الاصابة بين كل الابقار والاغنام المفحوصة.