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Prevalence of Fasciolosis and Cystic Echinococcosis in Slaughtered Cattle in Abattoir of Al-Nassiriyah City

Wesam J.Hansh
General Directorate of EducationinThi-Qar Province / Ministry of Education
Thi-Qar/ Iraq
wjhansh81@gmail.com.

QasimM.Al-Taher
Dept. Science (Biology)
College of Basic Education / University of Sumer
Thi-Qar/ Iraq
qasim20020@gmail.com

Muthenna M.T.Alebady
General Directorate of Education in Thi-Qar Province / Ministry of Education
Thi-Qar/ Iraq
Muthenna96@gmail.com

***Abstract*—Thepresent study was conducted from January to May 2018 to identify the infection rate of fasciolosis and cystic echinococcosis in cattleslaughtered in the slaughterhouse of Nassiriyah Municipality, Thi-Qar province. During this study, 524 (247 males and 277 females) cattle were submittedfor postmortem inspection. Chi-square is used to analyze the data. The prevalence of fasciolosis in the examined cattle was (7.25%) while the rate of infection with cystic Echinococcosis was (8.40%) with no significant difference.Infection with fasciolosis and cystic echinococcosis was higher infemales than males.The current study showed significant relevance between the sex of cattle andthe prevalence of both fasciolosis and cystic Echinococcosis (P≤0.05). The prevalence of fasciolosis and cystic Echinococcosis were significantly affected among the age groups in cattle (P≤0.05).**

***Keywords*—Prevalence,Fasciolosis, Cystic Echinococcosis.**

I. INTRODUCTION

Parasitism is vital in many agroecologicalareas and a critical issue to the agriculture sector and, thus, the global economy (Vercruysse and Claerebout, 2001).Parasitic diseasescan decreasedomestic animals'productivityin ruminants and cause death, which diminishes the supply of available human food,is a critical financial issueforbreeders,and cause local economic losses (AchaandSzyfres, 2001). The high infection of diseases of helminthiases (including lungworms,hydatidosis, andfasciolosis) in domestic animals iscausing considerabledamageto disposed of organs and carcasses anddecreasing theoutput and performance ofanimals (Getachew*et al.*, 2012).Liver trematodes is one of the widespread parasitic diseases of humans and animals caused by*the Dicrocoeliumdendriticum*and *Fasciola*genus, whichlive in the bile ducts of ruminants and humans (Martinez *et al.*, 2013).Fasciolosis is a zoonotic disease induced by *Fasciolahepatica* and *Fasciolagigantic*, which is stillan economically severe parasitic infection of animals (Hodzic*et al.*, 2013). Sheep, cattle, and humans are definitive hosts, while snails from the Lymnaea genus act as intermediate hosts (KaryakarteandDamle, 2004).Fasciolosisin cattle and buffaloes is caused by Fasciolagigantica in the Thi-Qar province, identified by polymerase chain reaction (PCR), while Fasciola hepatica is not diagnosed in the same province (AL-Salhey, 2009).Cystic echinococcosis, also known (as hydatidosis) is a global parasitic disease induced by the larval stage (metacestode or hydatid cyst) of tapeworms belonging to the *Echinococcus*genus.There are four species within this genus. These are called*E.granulosus*, *E..multilocularis*, *E.oligarthrus*, and *E.vogeli* (Nakao*et al.*, 2007). In Iraq, cystic echinococcosis is induced by *E.granulosus*, which is considereda hyperendemicdisease(Molan, 1993). The definitive host is a dog (also other canines), and the intermediate host is sheep, cattle, pigs, goats, camels, and humans are accidental intermediate hosts(KaryakarteandDamle, 2004).The study demonstrates in Thi-Qar province that the majority of hydatid cysts samples which are isolated from humans, sheep, cattle, buffaloes, and camels, are caused by sheep strain (genotype 1) of *E.granulosus*using polymerase chain reaction (PCR) and sequence analysis ofribosomal DNA internal transcribed spacer subunit 1*(rDNA – ITS1)* andmitochondrial Cytochrome c oxidase subunit 1*(mtCOX1)* genes (Hansh, 2016).Inspection records of slaughtered animals have been applied as valuable sources for estimating epidemiological aspects of assured diseases in some countries (Miran*et al.*, 2000; Kara *et al.*, 2009).Previous studies show that fasciolosis and cystic echinococcosis are endemicdiseases in some parts of Iraq. Therefore the present study aims to identifythe prevalence of fasciolosis and cystic echinococcosis in cattleslaughtered in the abattoir of Nassiriyah municipality.

II. MATERIALS AND METHODS

A. Study Area

The present study was conducted in the abattoir of Nassiriyah Municipality,located on the riverside of Euphrates in Thi-Qar province/Iraq, to investigate the

prevalence of Fasciolosis and Cystic Echinococcosis in slaughtered cattle. The period of study was conducted from January to May 2018. Abattoir was visited weekly (once a week)during the study period.

B. Data Collection

Five hundred twenty-four cattle (247 males and 277 females) were examined during the study period. The number of livers infected with Fasciolosis and livers and lungs infected with cystic echinococcosis of slaughtered cattle at the abattoir were recorded. Each organ in slaughtered cattle was examined macroscopically by visual inspection to detect hydatid cysts and sometimes to usean incision to investigate small hydatid cysts or by palpating bile ducts through using an incision to detect the infection of fasciolosis—other information on the slaughtered cattle including recording sex and age of the examined cattle.The prevalence of infection was calculated as a proportion by dividing the number of infected cattle by the total number of examined cattle.

C. Statistical Analysis

The registered data and the relevance between the impact of sex and age on the infected organs in cattle presented in the findings were analyzed using Chi-square tests in SPSS software. Differences were considered significant at P-value (≤0.05).

III. RESULTS

Prevalence of Fasciolosis and Cystic Echinococcosis
During this study, 524 slaughtered cattle were inspected at postmortem examination to detect the prevalence of infection.The total number of fasciolosis and cystic echinococcosis infections was 38(7.25%) and 44(8.40%),respectively. Statistically, no significant difference (P≥0.05) was noticed between the prevalence of both diseases,Table (1).

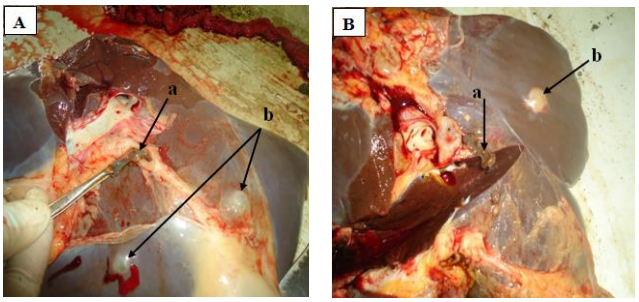
TABLE 1: PREVALENCE OF FASCIOLOSIS AND CYSTIC ECHINOCOCCOSIS IN CATTLE.

Disease	No. Examined Cattle	No. infected Cattle	% of Infection
Fasciolosis	**524**	**38**	**7.25**
Cystic Echinococcosis (Liver and Lungs)		**44**	**8.40**

The present study showed combined infections with fasciolosis and cystic echinococcosis in cattle livers; sometimes, the liver is infected with fasciolosis, and the lungs are infected with cystic echinococcosis.(Macroscopic image 1, Table 2). According to statistical analysis, there is no significant difference between mixed infections.

TABLE 2: PREVALENCE OF COMBINED INFECTIONS IN CATTLE.

No. Examined Cattle	Infection of the liver with Fasciolosis and Cystic Echinococcosis	Infection of the liver with Fasciolosis and lung with Cystic Echinococcosis
524	**8(1.53)%**	**3(0.57)%**



Macroscopic image 1(A and B) combined infections of *Fasciolagigantica* (a) and hydatid cysts (b).

The present results showed that the Infection with fasciolosis was higher in females 35(12.64%) than in males 3(1.21%) with a significant statisticaldifference.Similarly, the prevalence of cystic echinococcosis was higher in females 43(15.52%) than in males 1(0.40%)with clear statistical variation, Table (3).

TABLE 3: THE EFFECT OF SEX ON CATTLE'S PREVALENCE OF FASCIOLOSIS AND CYSTIC ECHINOCOCCOSIS.

Sex	No. Examined Cattle	Fasciolosis		Cystic Echinococcosis	
		No. Infected	% of Infection	No. Infected	% of Infection
Male	**247**	**3**	**1.21**	**1**	**0.40**
Female	**277**	**35**	**12.64**	**43**	**15.52**

The present study indicated that the age group above >4 years recorded a high rate of infection 29(20.86%) in cattle infected with fasciolosis, and the age group< 2 years recorded a low rate of infection 4(1.67%) with an obvious statistical variation. Similarly,cystic echinococcosis occurred at a significantly higher rate in the age group above

>4 years 38(27.34%) compared to the infection within other age groups,Table (4).

TABLE 4: THE EFFECT OF AGE ON THE PREVALENCE OF FASCIOLOSIS AND CYSTIC ECHINOCOCCOSIS IN CATTLE.

Age group (year)	No. Examined Cattle	Fasciolosis		Cystic Echinococcosis	
		No. Infected	% of Infection	No. Infected	% of Infection
< 2	239	4	1.67	1	0.42
2 – 4	146	5	3.42	5	3.42
>4	139	29	20.86	38	27.34

IV. DISCUSSION

The present study showed no significant difference between the prevalence of fasciolosis (7.25%) and cystic echinococcosis (8.40%) in cattle.This resultis comparable with studies of other workers. Kadir and Rasheed (2008) found that the highest rate of cystic echinococcosis was seen in cattle (4.38%), while the rate of liver fluke was (2.63%) in Kirkuk slaughterhouse, and also Ahmed and Rasheed (2013) reported that the rate of infection by hydatid cyst and liver fluke in cattle was (5.5%) and (3.2%) respectively in Kirkuk abattoir.Alatabi*et al.* (2017), in AL-Najaf slaughterhouse, recorded that the incidence of liver fluke was (0.71%) and hydatid cysts was (1.59%) and these results are less than the findings of the current study.Mohamadzadeh*et al.* (2016) revealed that the prevalence in cattle was (2.1%) and (1.65%) for cystic echinococcosis and fasciolosis, respectively, in Kazerun abattoir in Iran. The results of this study were relatively similar to the study of Ezatpour*et al.*(2014), who recorded in Iran the prevalence of cystic echinococcosis (9.4%) and fasciolosis (7.6%) in cattle. In Turkey, Balkaya and Simsek (2010) recorded a very high prevalence of cystic echinococcosis (34.3%), more than fasciolosis (21%). The current study disagrees with Mellau*et al.* (2010), who indicated in Tanzania that the prevalence was higher in cattle infected with fasciolosis (8.6%) than in cystic echinococcosis (3.2%).Borai*et al.* (2013) recorded that in Egypt, the prevalence of fasciolosisis 2.67 % in cattle, more than cystic echinococcosis (0.61%). The differences in the prevalence may be linked to geographical allocation, environmental variation, sample size, andstudy time.

The prevalence of fasciolosis and cystic echinococcosis in an area is influenced by several factors comprising hosts, parasites, and environmental effects. The parasites and their intermediate and definitive hosts facilitate the life cycle maintenance and can cause the incidence of these diseases. Environmental factors such as temperature, moisture, and rainfall especially affect the hatching of *Fasciolagigantica* ova,the viability of metacercaria, and the population of snails.Furthermore, temperature and moisture affect the survival of *Echinococcusgranulosus* ova. Phiri*et al.* (2005) mentioned that the seasonal variation affected the distribution pattern of*F. gigantica*. In addition, the prevalence of fasciolosis is increased in areas with a high rainfall rangethan in areas with very little rainfall.Getaw*et al.* (2010) referred to several factors which cause the prevalence of cystic echinococcosis, such as the random spread of abattoirs, the absence of the rigorous healthy condition in meat inspection, and the spread of stray dogs and their feeding on infected viscera with hydatid cysts and subsequent contamination of pasture and grazing fields.

The current study exhibited that the livers of cattle exposed to infection by *F.gigantica*together with hydatid cysts. Furthermore, the liver of the cattle isinfected with *F.gigantica* and the lungs withhydatid cysts. The reasons of combined infection may occur because the liver is an important site for these parasites, both metacercaria of *F.gigantica* and eggs of *E.granulosus*exocyst in the small intestine and penetrate the intestinal mucosa and then reach the liver by portal circulation and lodge in biliary tracts (*F.gigantica*) and formed hydatid cysts of *E.granulosus*.Another reason is that the mechanisms of immunological defense, which is stimulated against infection by *F.gigantica*, may not prevent the occurrence of infection by hydatid cysts and vice versa.Hussien*et al.* (2015) recorded the presence of both fasciolosis and cystic echinococcosis jointly in cattle livers, with arecorded prevalence rate (of 3.93%) in Ethiopia.

The current study showed that fasciolosis and cystic echinococcosis was prevalentat higher rates in females of the infected cattle than in the males, with a significant difference. This variation between the infection rates in females and males may be because the males are being slaughtered at an early age, nutrition type, and most male cattle are brought up in unique places. Therefore, all these reasons reduce the rates of infection in males.At the same time, the females remain for a longer period used for reproductive purposes.Rahmani*et al.* (2012) identified that females are most affected by cystic echinococcosisthan males due to living for long ages. Iqbal*et al.*(2012) stated other reasons which affect the susceptibility of the females, such as slaughtering at a late age and the stress of pregnancy, parturition, and lactation. The finding of the current study is comparable to results reported by Daryani*et al.* (2006) in Iran, which recorded prevalence of fasciolosis in female cattle (38.4 %) is more than in males (12.2 %), and Azami*et al.* (2013) showed the prevalence of cystic

echinococcosis in females of cattle (9.1%) and males (3.1%) in Iran.

According to statistical analysis, a significant difference was observed among age groups and the percentage of infection with fasciolosis and cystic echinococcosis in the cattle.Cattle above 4 years are highly susceptible to infection than other age groups. This result agrees with the findings of Molina *et al.* (2005), who showed that the prevalence of fasciolosis in cattle and buffaloes was higher in an age of older animals.Debas and Ibrahim (2013) recorded the prevalence of cystic echinococcosis in the age group above 5 years (31.2%), whereas they recorded (8.8%) in the age group less than 5 years. The reasons for incidence in aged animals may be because they remain for longer, especially thefemales used for reproductive purposes, production of milk, and other benefits, and this causes weakness inresistance to diseases. Ibrahim *et al*. (2008) demonstrated that age variation could be again linked with differences in infection exposure because aged animals may have been exposed to more infective stages.

V. CONCLUSION

Fasciolosis and cystic echinococcosis in cattle are endemic parasitic diseases in Thi-Qar province/ Iraq.The prevalence documented in this study may contribute to determiningthe prevention programs. Meat inspection at postmortem is a suitable method for providing helpful information about the infections of these diseases.

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