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Comparative Study on Liver and Lung Infections with Hydatid Cysts, Liver Flukes and Lung Worms among Slaughtered Ruminants in Kerbala Abattoirs

دراسة مقارنة لإصابة أكباد ورئات ألمجترات المجزورة في محافظة كربلاء بالأكياس المائية ,ديدان الكبد وديدان الرئة

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Abstract

This study was conducted in three slaughter- houses of Kerbala City during five months for the period of 20th April 2011 to 22nd September 2011 and aimed to detect the most common parasitic infections of livers and lungs amongst ruminants in Kerbala governorate.

In this study, a total of 20477 of sheep carcasses , 4421 of goat carcasses , 3993 of cattle carcasses as well as 622 of buffalo carcasses were examined.

The results showed infection of both organs (liver & lung) in a considerable number of examined animals with parasitic diseases namely , hydatid cysts (*Echinococcus granulosus*) , lung worms (*Dictyocaulus spp*) and liver flukes (*Fasciola spp*). The grand total infection rates in buffalo carcasses were higher than other animals and reached to 8.36% with a significant variation ($P \leq 0.01$) , while the total parasitic infection rates in cattle, goats and sheep were 5% , 4.07% and 4% respectively .

The results also showed that livers of buffalo was more frequently infected with hydatid cysts and *Fasciola spp* when compared with livers of cattle, sheep and goats, as 4.98% of buffalo-liver was found infected with hydatid cysts , while livers of 3.28% cattle, 2. 39% sheep and 2% goats harbored the infection. Moreover, *Fasciola spp* was also detected more frequently in buffalo liver (2.57%) than cattle (1.32%), goats (0.74%) and sheep (0.67%).

The infection of goats with lung worms was higher than other animal species which reached to 1.29% , while the rates of infection in other slaughtered animal spp. were 0.94% , 0.8% and 0.55% of sheep , buffalo and cattle respectively .

الخلاصة

أجريت الدراسة الحالية في ثلاث مجازر تابعة لمحافظة كربلاء وخلال مدة خمسة شهور من 2011/4/20 ولغاية 2011 /9/22 وتم خلالها فحص 20477 ذبيحة من ذبائح الأغنام و 4421 من ذبائح الماعز و 3993 من ذبائح الأبقار و622 من ذبائح الجاموس ,وذلك للتحري عن الإصابات الطفيلية المخمجة لأكباد ورئات هذه الحيوانات .

أظهرت النتائج إصابة كلا العضوين في عدد من الأغنام , الماعز , الجاموس والأبقار بالطور اليرقي لطفيلي الأكياس المائية (*Echinococcus spp*) , ديدان الكبد (*Fasciola spp*) وديدان الرئة (*Dictyocaulus spp*). سجلت أعلى نسب لإصابة كلا العضوين بالمسببات الطفيلية في ذبائح الجاموس مع تسجيل فرق معنوي ($P \leq 0.01$) إذ وصلت النسبة إلى(8.36%) بينما كانت نسب الإصابات اقل في باقي الذبائح ووصلت إلـى (5% , 4.07 % و 4%) في ذبائح الأبقار, الأغنام والماعز على التوالي.

بينت النتائج إصابة أكباد الجاموس بداء الأكياس المائية وديدان الكبد بنسب عالية مقارنة مع أكباد باقي الحيوانات المشمولة بهذه الدراسة إذ كانت نسبة الإصابة بالأكياس المائية 4.98% مقارنة مع باقي الحيوانات والتي كانت نسب إصابة أكبادها بالأكياس المائية هي 3.28% , 2.39% و 2% قي الأبقار , الأغنام والماعز على التوالي , بينما وصلت نسبة إصابة أكباد الجاموس بديدان الكبد إلى 2.57% إلا انه في الأبقار , الماعز والأغنام وصلت إلى 1.32% , 0.74% و 0.67% على التوالي . أظهرت رئات الماعز نسب إصابة عالية بديدان الرئة بالمقارنة مع باقي حيوانات الدراسة اذ كانت النسبة 1.29% بينما في الأغنام , الجاموس والأبقار كانت 0.94% , 0.8% و 0.55% على التوالي.

Introduction

Echinococcus granulosus, *Fasciola spp* and *Dictyocaulus spp* are common parasites of ruminants in Iraq (1). The animal helminthes are of great public health and economic importance, as hydatidosis is a source of infection to final host (carnivores) and transmitted to human beings (2). In addition, fasciolosis is now recognized as an emerging disease, the World Health Organization (WHO) has estimated that 2.4 million people are infected with *Fasciola*, and further 180 million are at risk of infection (3). In Iraq, Lebanon, Morocco, Tunisia and Yemen fewer than 100 cases have been documented in human so far, implying that the problem has probably not yet received enough attention in these countries (4). In ruminants, the high number of these helminthes infection(hydatidosis, fascioliasis and lung worm) lead to great loss of organs and carcasses which are the source of animal protein, in addition to loss of production and performance of animals (1).

Reports have shown that the incidence of hydatidosis in animals in Middle East is high, and that it is particularly endemic and one of the major zoonotic diseases in Iraq (5,6).The infection rates of hydatidosis in ruminants were studied by many workers in Iraq. It was found that the infection rate of hydatid cysts in sheep and cattle in Middle Euphrates Area was 3.19% during the period from 1987 – 1991 (7). In a study which was carried out in the governorate of Kerbala, hydatid cysts were recovered from 2.41%, 2.16%, 3.18% and 4.79% of sheep, goats, cattle and buffaloes respectively (8). In another study conducted in Babylon, 24.1% of the examined cattle were found infected with hydatid cysts (5). In Kirkuk, the infection rate of hydatid cysts was 32.6%, 26.3% and 24.9% in sheep, goats and cattle respectively (9). The infection rate of hydatid cysts in ruminants was also reported by many workers in other governorates of Iraq , such as, Thiqar , Diala, Mosul , Baghdad and Erbil governorates (9,10, 11,12, 13,14).

Reports also have displayed that liver flukes were detected from slaughtered ruminants in different areas of Iraq. *Fasciola hepatica* was reported in north and north east of Iraq (15). *Fasciola gigantica* was recovered from slaughtered sheep and goats in the country (15,16). In a study conducted in Kirkuk abattoirs it was reported by (1) that the infection rates of liver flukes were 0.5% , 0.43%, 2.63% and 4% in sheep , goats, cattle and buffaloes respectively. The same study also revealed that lung worms were recovered from carcasses of 0.55%, 0.22% , 2.98% and 0% of sheep, goats, cattle and buffaloes respectively. Furthermore, Dictyocaulus filaria was observed in 27% of sheep slaughtered in Mosul abattoirs (17).

The current study was conducted to find out the infection rates of the common parasitic diseases in the liver and lung of ruminants slaughtered in Kerbala governorate.

Materials & Methods

The current study was conducted in three different small abattoirs located in Kerbala province, and lasted for five months from 20th April 2011 until 22nd September 2011 to investigate some parasitic infections of livers and lungs of slaughtered animals in these slaughterhouses.

A total of 20477 of sheep carcasses , 4421 of goat carcasses , 3993 of cattle carcasses as well as 622 of buffalo carcasses were examined grossly .

The examination of infected carcasses included identifying the type of parasitic infection of both organs (liver & lung) in each of the animal species and then a comparison was made between organs as well as between the studied animals according to the intensity of infection

All data which gathered during the study were statistically analyzed by using Chi-square (X2) test to determine the presence or absence of association between explanatory variables as well as for finding significant and non- significant values according to SAS (18).

Results

The results showed that Hydatid cyst infection was found in 490 (2.39%) of sheep, 90 (2%) of goats, 131 (3.28%) of cattle and 31 (4.98%) of buffaloes, with a significant difference in the infection rates between buffaloes and other animal spp. ($P \leq 0.01$), while lung worm infection was detected in 193 (0.94%) of sheep, 57 (1.28%) of goats, 17 (0.42%) of cattle and 5 (0.8%) of buffaloes with no significant variation between the examined animals ($P \leq 0.05$) table (1).

Table- 1 also shows that Liver flukes were recorded in 139 (0.67%) of sheep, 33 (0.74%) of goats, 53 (1.32%) of cattle and 16 (2.57%) of buffaloes. However, no significant difference was recorded in the infection rates of liver fluke between the examined ruminants.

Table 1: Number and rate of studied parasitic infections in the livers & lungs of slaughtered animals .

Type of parasitic infection	No . of examined animals							
	Sheep		Goat		Cattle		Buffalo	
	Examined	Infected	Examined	Infected	Examined	Infected	Examined	Infected
Hydatid cyst	20477	490 (2.39%)	4421	90 (2%)	3993	131 (3.28%)	622	31 (4.98%)
Lung worms	20477	193 (0.94%)	4421	57 (1.28%)	3993	17 (0.42%)	622	5 (0.8%)
Liver flukes	20477	139 (0.67%)	4421	33 (0.74%)	3993	53 (1.32%)	622	16 (2.57%)
Total	20477	822 (4%) A	4421	180 (4.07%) A	3993	201 (5%) B	622	52 (8.36%) C

- Capital similar letters = no significant values
- Capital different letters = significant values
- $P \leq 0.01$

Regarding the infection rates of the livers of ruminants with hydatid cysts and liver flukes , so hydatid cysts were recovered from 258 (1.26%) livers of sheep , 49 (1.11%) livers of goats, 84 (2.1%) livers of cattle and 17 (2.73%) of buffaloes. Moreover the examined livers of ruminants were also infected with Liver fluke (*Fasciola spp*) in 139 (0.68%) sheep , 33 (0.75%) goats, 55 (1.38%) cattle and 16 (2.57%) buffaloes table (2). The results which are displayed in table (2) showed a high significant variation between buffaloes and other animal spp ($P \leq 0.01$) , however, no significant difference was recorded between sheep and goats in the same table.

Table 2: Number & rate of liver infections among slaughtered animals with hydatid cysts and liver fluke (*Fasciola spp*) .

Animal species	Examined No.	Liver Infection with hydatid cysts		Liver Infection with liver fluke.		Total	
		No.	%	No.	%	No.	%
Sheep	20477	258	1.26	139	0.68	397	A 1.94
Goat	4421	49	1.11	33	0.75	82	A 1.85
Cattle	3993	84	2.1	55	1.38	139	B 3.48
Buffalo	622	17	2.73	16	2.57	33	C 5.31
Total	29513	408	1.38	243	0.82	633	2.14

-capital similar letters = no significant values
-capital different letters = significant values
-$P \leq 0.01$

The infection rates of ruminant-lungs with hydatid cysts and lung worms *(Dictyocaulus spp*) are shown in table (3) . Hydatid cyst infection was found in 232 (1.13%) of sheep, 41 (0.93%) of goats, 47 (1.18%) of cattle and 14 (2.25%) of buffaloes, while, lungs of 192

(0.94%) sheep, 57 (1.29%) goats, 22 (0.55%) cattle and 5 (0.8%) buffaloes were observed being infected with lung worms, and with no significant variation was recorded among the animals in the lung-infections.

Table 3: Number & rate of lung infections among slaughtered animals with hydatid cysts and lung worms (*Dictyocaulus spp*) .

Animal species	Examined No.	Lung Infection with hydatid cyst		Lung Infection with lung worms .		Total	
		No.	%	No.	%	No.	%
Sheep	20477	232	1.13	192	0.94	424	2.07
Goat	4421	41	0.93	57	1.29	98	2.21
Cattle	3993	47	1.18	22	0.55	69	1.72
Buffalo	622	14	2.25	5	0.8	19	3.05
Total	29513	334	1.13	276	0.9	610	2.7

* No significant values

Discussion

Hydatidosis, fascioliasis and lung worm are widely distributed throughout the north , central and south areas of Iraq (1). The high number of the studied helminthes infection cause considerable economic loses and public health problem. In ruminants, affected livers and lungs are destroyed and condemned, and the disease usually results in decreased production of meat, milk and wool, as well as secondary bacterial infections, fertility problems and great expenses of anthelmintics (19, 20).

The results of this study showed that the infection rates of hydatid cysts and liver fluke were highest in buffaloes, followed by cattle, sheep and goats. However, the rate of lung worm infection was highest in goats, followed by sheep, buffaloes and cattle.

The highest rate of hydatidosis infection amongst buffaloes (4.98%) is explainable, as it is mainly attributed to the old age at which buffaloes were slaughtered and examined for the presence of hydatid cysts. It was found that aged animals gain access of parasitic infection due to longer exposure than young ones (21).

The infection rates of hydatid cysts in this study among examined ruminants are consistent to those reported in Kerbala by (8) who found the rates of hydatidosis in buffaloes, cattle , sheep and goats were 4.79%, 3.18%, 2.41% and 2.16% respectively. Nevertheless, findings of the present study on hydatid cysts infection in cattle are slightly lower than that recorded in Kirkuk (1) who reported the infection rates in cattle 4.38%, and little bit higher than the infection rates of sheep 1.17% and goats 0.32% in the same study. The results of this study on hydatid cysts infection are lower than those reported in Baghdad (11) who found the infection rates in cattle, sheep and goats were 13.9%, 29.5%, and 25.6% respectively, and (12) who reported 5.9% in sheep , 5.1% in goats and 4.9% in cattle slaughtered in Baghdad slaughterhouse. Moreover, our findings in this study on the infection rates of hydatid cysts in cattle , sheep and goats are lower than that reported in Mosul governorate (13), who reported 4.34% in cattle, 9.76% in sheep and 3.12% in goats. Similarly, results of this study on the infection rates in ruminants were also lower than those reported in Erbil governorate (14) as 22.3% of cattle and 27.4% of goats were found infected with hydatid cysts. It might be useful to mention that the fluctuation in the infection rates reported from different governorates can be attributed to the variance of the environmental circumstances , sample size, spatial distribution of the parasite and period of the study.

Regarding the prevalence of fascioliasis in ruminants , the results of the present study revealed that the infection rate in buffaloes was 2.57% which was higher than cattle 1.32%, goats 0.74% and sheep 0.67%. The highest infection rate in buffalo followed by cattle, goats and sheep can be explained as buffaloes and cattle are spending much time grazing in and near water swaps, stagnant water, and water lands where the intermediate host (snails) which harbors the infective stage of the parasite is found. Thus , buffaloes and cattle are more frequently exposed to the

infection than small ruminants (sheep and goats) . It was found by (22) that the differences in rate of fascioliasis infection in ruminants can be attributed to the different grazing and feeding systems or to the histological differences and quantity of fibrous tissues of ruminant livers. The higher rate of fascioliasis infection in buffaloes and cattle than sheep and goats can also be attributed to the advanced age of slaughtered animals. In a study conducted in Babylon governorate , (2) reported the rate of Fasciola gigantica increased with advanced age , as the infection rate was 3.4% in cattle less than two years old , while in cattle more than 4 years old , the infection rate was 59%.

In the present study, distribution of the fascioliasis infection in slaughtered ruminants was consistent to that recorded by (1) who found the rate of liver fluke infection in buffaloes (4%) and cattle (2.63%) was higher than sheep (0.5%) and goats (0.43%). However, our findings on the distribution of liver fluke in ruminants were lower than that reported by (16) who found the rate of infection in cattle and sheep was 27% and 7.1% respectively.

Regarding the variation in the incidence of parasitic infections in the targeted organs, the high infection rate of liver with hydatid cysts as compared to the lower one of *Fasciola spp*. may refer to the high level of contamination of the grazing area with the infective *Echinococcus* eggs than that of *Fasciola spp* (23). In addition , other factors may also play a role in this variation , such as organ preference, infectivity and development rate (21).

Concerning lung worm infections in slaughtered ruminants , our findings revealed that the highest rate of *Dictyocaulus spp* infection was recorded in goats 1.29% and sheep 0.94%, followed by buffaloes 0.8% and cattle 0.42%. It was also found in this study that lungs of goats were more frequently infected with lung worm 1.29% than hydatid cyst infection 0.93%. The results of the current study in sheep and goats are higher than those reported in Kirkuk by (1) as 0.55% of sheep and 0.22% of goats were infected with lung worm. Nevertheless, in the same study by (1), the infection rate in cattle was 2.98% which is higher than our findings , while the worker could not have recovered lung worm from 50 buffaloes examined in Kirkuk abattoirs. Our findings are lower than that reported by other workers such as in Mosul slaughterhouse (17) found lung worm in 27.3% of examined sheep, while in Baghdad governorate (15) recovered lung worm from 9.9% of sheep as well.

The variation in the distribution of the lung worm among ruminants could be attributed to the traits of the parasite –strains such as host preference, development rate, infectivity and pathogenicity (21). The highest rate of lung worm in goats and sheep recorded in this study can also be attributed to the relatively softer consistency of lung in these animal species which allows easier development and manifestation of the parasite there (23,24).

The results of this study reveal that *Echinococcus spp*. , *Fasciola spp*. and *Dictyocaulus spp*. are widely distributed among ruminants in Kerbala governorate, and that the high prevalence of these parasites in food animals has a severe impact on public health and causing a significant economic losses. In order to protect public health and mitigate losses, it is recommended to carry out an immediate control strategy for eradication of intermediate hosts (stray dogs and snails), activation of the current and relevant legislations , proper meat hygiene and inspection in abattoirs, providing enough equipment and support to the Veterinary Services for treatment and immunization of livestock against these parasitic infections.

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