PREVALENCE OF HYDATID DISEASE AMONG SLAUGHTERED ANIMALS IN SLEMANI PROVINCE/ KURDISTAN-IRAQ.

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Abstract

Hydatid cyst (HC) is one of the common silent zoonotic disease worldwide distributions, with medical importance and economical effect. The present study was conducted from January 2011 to March, 2012 to determine the prevalence rate of hydatid disease among slaughtered livestock including sheep, goats and cattle in Slemani province. A total of 7698 slaughtered animals were examined from different abattoirs for hydatid cyst during post mortem inspection including 6550 sheep, 348 goats and 800 cattle. The study showed that the prevalence rates among slaughtered animals were 12.7% in sheep, 4.8% in goats and 4.3% in cattle. The fertility rate of HCs was higher in sheep than that of goats and cattle furthermore, the rate of the fertility was higher in liver cysts than in lung cysts in all studied intermediate hosts.

KEYWORD: *Hydatid cyst, E.granulosus, prevalence, Hydatid Disease*

Introduction

Echinococcosis or hydatid Disease is one of the neglected silent helminthes infection caused by the larval stages of cestode belonging to the genus Echinococcus (family Taeniidae), which is a major public health problem in developing countries (Siracusano *et al*., 2012). The larval infection is characterized by long-term growth of the metacestode in the intermediate host (Zhang *et al*., 2003).

Hydatid disease has a dual impact on human health and livestock production. Human populations dependence on livestock are not only most at direct risk from zoonotic disease, but are most vulnerable to the indirect impacts on health, or reduced production on livelihoods and food security, which exacerbates the poverty cycle (Molyneux, *et al*., 2011). Humans become infected accidentally by ingesting food or water contaminated with fecal material containing *E. granulosus* eggs passed from infected carnivores, or when they handle pet or infected dogs (WHO, 2006; Satoskar, *et al*., 2009). The commonest sites of infection are the liver and lungs (Markell *et al*., 1999), whereas, it was noticed that the disease cannot be transmitted between humans or from human to dogs (Rood and Kelly, 2009).

There are six species of *Echinococcus*: *E. granulosus, E. multilocularis, E. vogeli, E. oligarthrus, E. shiquicus and E. felidis* (Brunette, 2012), two of these species are of medical importance, which are *E. granulosus* and *E. multilocularis* causing Cystic Echinococcosis (CE) and Alveolar Echinococcosis (AE), respectively. This study aimed to determine the status and analysis of epidemiological factors of hydatid disease among slaughtered domestic animals in Slemani province.

Materials and methods:

A total of 7698 slaughtered animals of both sexes were examined for hydatid cyst during post mortem inspection including 6550 sheep, 348 goats and 800 cattle. Livers and lungs were inspected by cutting, and both surfaces were examined by incisions as well as examined through visual inspection. The Hydatid cyst fluid (HCF) was collected from individual cyst, washed by phosphate buffer saline (PBS) and checked for the presence of protoscolecies (Latif *et al*., 2010).

The investigation of hydatid cysts was carried out for the following parameters: location of cysts (organ specificity), cyst fertility and viability of protoscolices.

Animal intact cysts were obtained from Slemani abattoir, which included 10 individual cysts from goat, 12 from cattle and 20cysts from sheep. The samples were transported to the laboratory in a cool box. Individual cysts were grossly investigated for degeneration and calcification (WHO, 2003). Then according to the animal species, size of cyst and infected organs around 10% of hydatid cysts were randomly selected for fertility and viability study.

Fertility and Viability

After aspiration of cyst fluid, the fluid was centrifuged, then one drop of precipitated was taken by Pasteur pipette and examined by light microscope under (40x) for the presence of protoscolecies. The cysts which were without protoscolices were considered as non fertile (Daryani *et al*., 2006).

Eosin dye (vital stain) was used for determination of viability of protoscolices (Daryani *et al*., 2006).The protoscolex with inactive flame cell or stained with eosin considered as dead (Esfahani and Youssefi, 2010).

Statical analysis

The data were analyzed using chi-squire (GraphPad Prism 6).

Results

The result revealed that the prevalence rate of Echinococcosis was significantly differences ($p<0.05$) between all animal species (Table1). The prevalence rate of HC in sheep, goats and cattle was 12.7%, 4.8% and 4.3%, respectively. The highest rate of infection was observed in sheep followed by goats and cattle.

The results of the present study showed that the sex of the slaughtered animals has non significant effect on the distribution of HC, as the rate of HC in males and females were very close (Table 1).

Table (1): The prevalence rate of HCs among different slaughtered animals in Slemani province.

Species	No. of inspected animals			No. of Infected		Rate of infection %		Total infected	
	Male	Female	Total	Male	Female	Male	Female	No.	%
Sheep	2400	4150	6550	313	522	13.04	12.57	835	12.7
Goats	227	121	348	11	6	4.8	4.9	17	4.8
Cattle	700	100	800	31	4	4.42	4	35	4.3
Total	3327	4371	7698	355	532	10.67	12.17	887	11.52

Sex: $X^2 = 3.32$ $p = 0.68$ df=1
Species: $X^2 = 54.24$ $p = 0.0002$ df=2

Organ specificity

The distribution of HCs in various organs among slaughtered animals is shown in Table (2). The present study revealed that the co-infection of the liver and lungs was the predominant infection and the preponderant site of hydatid cyst was the liver followed by lungs, this indicates that the liver is the primary site for cyst development and lung involvement comes as a secondary consequence.

Table (2): Distribution of hydatid cysts in the internal organs among slaughtered animals in Slemani province.

Species	No. of inspected animal	No. and % of infection		Infected organs					
				Liver		Lung		Liver and Lung	
		No.	%	No.	%	No.	%	No.	%
Sheep	6550	835	12.75	79	9.46	44	5.26	712	85.26
Goats	348	17	4.89	7	41	3	17.6	7	41.1
Cattle	800	35	4.38	14	40	5	14.2	16	45.7
Total	7698	887	11.52	100	11.2	52	5.8	735	82.8

$X^2 = 60.2$ $p= 0.0001$ df=2

Type of cysts

The nature of the isolated cysts of slaughtered animals was studied on the base of fertile, sterile and calcified (Table 3). In sheep, the rates of fertile, sterile and calcified cysts among 100 examined cysts were 86, 9and 5%, respectively. In goats, the rates of fertile, sterile and calcified cysts among 40 examined cysts were 60, 20 and 20%, respectively. The same pattern was observed in cattle, 58, 22 and 20%, respectively.

Table (3): The number and percentage of cyst types in different intermediate hosts

Intermediate host	No. of cysts	Type of cysts					
		Fertile		Sterile		Calcified	
		No.	%	No.	%	No.	%
Sheep	100	86	86	9	9	5	5
Goats	40	24	60	8	20	8	20
Cattle	50	29	58	11	22	10	20
Human	12	10	83.3	1	8.3	1	8.3
Total	202	149	73.7	29	14.3	24	11.8

X^2= 19.22 p=0. 003 df=6

Discussion

The highest rate of infection was observed in sheep followed by goats and cattle. Similar high rate of infection in sheep have been reported by Amin (2007) in Slemani, Al-Berwari (2012) and Abdullah and Mero(2013) in Duhok, they suggested that due to the host specificity and strain distribution in this region, in addition in Kurdistan sheep are more desirable for rearing due to their consumption preference to fulfill religious and social requirements and they are more adapted with dog than goats or cattle also their feeding habit have effect on the infection rate.

On the other hand, lower rates were reported by Bajalan (2006) in Kalar; Kadir and Rasheed, (2008) in Kirkuk, and Jarjees and Al-Bakri, (2012) in Mosul. The low prevalence rate in goats, in the present study may be due to feeding habit of this animal, as they eat the higher parts of herbage that are exposed to the sunlight which decrease the viability of the eggs (Torgerson and Budke, 2003), also the low prevalence rate of HC among cattle in the present study may be due to rearing them in cowshed with better care which relatively has no contact with the source of infection (Thompson and McManus, 2002).

In contrast Meerkhan and Abdullah, (2012) in Duhok, reported higher infection rates among cattle than in sheep and they attributed it to the fact that cattle are slaughtered at older age which increase the risk of exposure to eggs of *E. granulosus* and cattle eat larger amount of herbage than sheep and goats.

This difference in prevalence rate among livestock attributed, to the mode of grazing, presence of the definitive host (carnivore) and other environmental factors. El-Ibrahim (2009), and the strains of the parasite also have essential role in HC distribution which is known as host specificity (Hama *et al*., 2012).

The results of the present study revealed that the sex of the slaughtered animals has no effect on the prevalence rate of HCs, as the rate of HC in males and females were very close. This finding is in agreement with Rokni (2009) and Salem *et al*. (2011) they stated that both sex has the same chance to get infection which usually depend on the contact with the source of infection and habit of grazing. In contrast Ibrahim (2010) and Muqbil *et al*. (2012) reported that females of sheep and goats were more likely to have HC infection than males as males were slaughtered in younger age while female sheep and goats were usually maintained for longer periods than males to give offspring several times before slaughtering.

Organ specificity

The present study revealed that the co-infection of the liver and lungs was the predominant infection and the preponderant site

of hydatid cyst was the liver followed by lung, this indicates that the liver is the primary site for cyst development and lung involvement comes as a secondary consequence. Similar findings were reported by many researchers from different parts of the world Saida and Nuraddin (2011) in Erbil; Muqbil *et al*. (2012) in Baghdad; Ioan *et al*. (2012) in Romania, and Jarjees and Al-Bakri (2012) in Mosul they stated that the liver acts as the first barrier for the oncosphere penetrating the intestinal mucosa to reach the portal vein and carried by the blood stream to all parts of the body, due to the large size of oncosphere, most of them become settled in the liver. On the other hand, the results of this study did not coincide with those of some other workers in which they found that the lungs were the most predominant site for Echinococcosis Abdullah, (2010) in Duhok and Lotfi *et al*. (2010) in Iran they attributed it to the larger lymphatic vessels which provides a chance for the oncosphere to reach lymphatic lacteal then travel through the lymph to the lungs before being translocated in venules to reach the liver, or the oncosphere may be released from the egg during rumination which may gain access to the lung.

Type of cysts

In the present study the majority of cysts in sheep (86%) and goats (60%) were fertile, while the fertility rate of HCs in cattle was lower (58%) than in sheep and goats, this indicate that sheep and goats have an essential role for the perpetuation of the life cycle then spread of the disease.

These results are consistent with Ioan *et al*. (2012) in Romania and Jarjees and Al-Bakri (2012) in Iraq. The fertility rate of hydatid cyst is an important factor in the epidemiological studies, due to the possibility of fertile cysts to disseminate the disease and to determine the main species as a potential host in the spread of the infection (Mahmoud, 1980). The variation in fertility rate among different intermediate hosts due to the difference in strain of *E. granulosus* (Hama *et al*. 2013).

In contrast Saeed *et al*. (2000) and Fikire *et al*. (2012) found that the fertility rate was higher in the lung cysts than in liver cysts and they attributed it to the relatively softer consistency of lung tissue which allows the easier development of the cyst. The fertility of hydatid cysts varies depending on the host species (Saeed *et al*., 2000). The variation in the prevalence rate of fertile cysts in different intermediate hosts in the present study may be due to the presence of different strains of *E. granulosus* which might cause the variation in the fertility rate in various environmental regions (McManus, 2006).

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ڕێژەی بڵاو بونەوەی نەخۆشی تورەکەی ئاوی (Hydatid cyst) لە نێو ئاژەڵە سەربڕاوەکان لە پارێزگای سلێمانی/ کوردستان-عراق

تورەکەی ئاوی یەکێکە لە نەخۆشیە بێدەنگە شاراوەکان و لە نەخۆشیە سەرچاوە ئاژەڵیە کانە، وە لەسەرتاسەری جیهاندا بەربڵاوە و کاریگەری هەیە لەسەر تەندروستی و وە ئابوری کۆمەڵگا، ئەم تویژینەوەیە ئەنجام درا لە ماوەی کانونی یەکەم ٢٠١١ تا ئازاری ٢٠١٢ بۆ دیاری کردنی ڕێژەی بڵاو بونەوەی نەخۆشی تورەکەی ئاوی لە نێوان ئاژەڵە سەربڕاوەکاندا (مەڕ، بزن وە ڕەشەوڵأخ) لە پارێزگای سلێمانی وە پشکنین بۆ ٧٦٩٨ سەر ئاژەڵ کرا پاش سەربڕین بۆ زانینی توش بوون بە نەخۆشی تورەکەی ئاوی لە کوشتارگە جیا جیا کانی پارێزگای سلیمانی کە بریتی بوون لە ٦٥٥٠ سەر مەڕ، ٣٤٨ سەر بزن وە ٨٠٠ سەر ڕەشە وڵأخ. ڕێژەی تووشبوون بریتی بوو لە ١٢,٧% لەمەڕ دا، ٤,٨% لە بزن دا وە ٤,٣% لە ڕەشەوڵاخ دا. تێکڕای ڕێژەی بەپیتی لەو تورەکە ئاویانەی کە لە مەڕ وە وەرگیرابوون زیاتربوو لەوانەی کە لە بزن و ڕەشەوڵاخەوە وەرگیرابون هەروەها ئەوەش زانرا کە ئەم ڕێژەیە لەو تورەکانەی کە لە جگەرەوە وەرگیراون زیاترە لەوانەی کە لە سیەکانەوە وەرگیراون لە هەموو ئاژەڵەکاندا.

نسبة انتشار داءالاكياس المائية (Hydatid cyst) بين الحيوانات المذبوحة في محافظة السليمانية/ كوردستان– العراق

الملخص:

داء الاكياس المائية هو احد الامراض المخفية ذو المنشأ الحيواني وله انتشار عالمي, وذو تأثير طبي واقتصادي في المجتمع. أجريت هذة الدراسة خلال الفترة من كانون الثاني٢٠١١ الى اذار٢٠١٢ لتحديد نسبة انتشار داءالاكياس المائية بين الحيوانات المذبوحة والتي تضمنت الاغنام والماعز والمواشي في محافظة السليمانية.وتم فحص و التحري ل ٧٦٩٨ حيوان تم ذبحهم في مختلف المجازر للتحري عن داءالاكياس المائية و شملت ٦٥٥٠ راسا من الاغنام و٣٤٨ ماعز و ٨٠٠ من المواشي . بلغت نسبة الانتشار لهذا الداء١٢,٧% في الاغنام و ٤,٨% في الماعز و ٤,٣% في المواشي. وجد اعلى معدل لنسبة الخصوبة للاكياس المائية في الاغنام والتي كانت اعلى مما هي عليه في الماعز و المواشي وأيضا لوحظ ان معدل الخصوبة كان أكثر في الاكياس المعزولة من الكبد مقارنة بالاكياس المعزولة من الرئة في جميع الحيوانات التي تمت دراستها.