

## HYDATIDOSIS IN BUFFALOES OF SAMMAWAH, IRAQ

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## ABSTRACT

The prevalence of hydatidosis in buffaloes slaughtered in Sammawah city, Iraq between 2015 to 2016 were studied. Of 62 examined buffaloes, 13 (20.9%) carcasses were infected with hydatid cyst. Hydatidosis affected more female buffaloes 33.3% than male 14.6% but the difference was not significant. Lungs were the most infected. 13 (20.9%), followed by liver 10 (16.1%). Out of (50) examined cysts, 11 (25%) were fertile. The fertility rate in liver cysts (30%) was higher than those in the lung (25%). A non-significant higher number of hydatid cysts were recorded in buffaloes more than 3 years old 27.7%. The cysts recovered from livers showed higher fertility rates 30% than those from lungs 25%. The higher viability rate was found in cysts from the lungs 66.7%. This work is the first logical examination of the hydatidosis in buffaloes in Sammawah city, and the disease is of great significance that requires kind care to control.

**Keywords:** *Bubalus bubalis*, buffaloes, hydatidosis, sammawah, Iraq

## INTRODUCTION

Sammawah city is the biggest city of Al-

Muthanna Province, Iraq. It is situated on both sides of Euphrates river, where buffaloes are mostly raised in the province. Buffaloes constitute a source of milk, meat and skin. Generally, buffaloes in Iraq is raised in a traditional animal husbandry where a close association exists between dogs and buffaloes. The buffalo is the principal intermediate host for the larval multiplication of *E. granulosus* (Gill and Rao, 1967; Molan and Saida, 1989; Irshadullah and Nizami, 1992).

Hydatidosis is a worldwide scattering zoonotic disease, which is of great economic and public health problem (Chalechale *et al.*, 2016). Prevalence studies of the disease have been carried out in India (Singh *et al.*, 1988), Nigeria (Biu and Adindu, 2004), Iran (Khanmohammad *et al.*, 2008), Nepal and Italy (Manandhar *et al.*, 2006; Capuano *et al.*, 2006) respectively.

Hydatidosis is caused by the larval stage (metacestode) of the dog tapeworm *Echinococcus granulosus* (*E. granulosus*). The life cycle includes two mammalian hosts. The final hosts are carnivores such as dogs and the intermediate hosts are herbivores and omnivores wherein the growth of the cysts take place in liver, lungs and other organs (Soulsby, 1982; Biu and Adindu, 2004).

The adult tapeworms *E. granulosus* are the parasite of the bowels of several carnivores (typically dogs) as final hosts. The eggs of the tapeworm represents a free phase in the life of *E.*

*granulosus*. The intermediate host is infected after oral uptake of tapeworm eggs, resulting in the formation of cysts hydatid (metacestode) in various organs (Eckert and Deplazes, 2004).

In different parts of Iraq, hydatidosis has been recorded in various ruminants, including buffaloes. In an earlier report, (Imari, 1962) found the prevalence of hydatidosis in buffaloes occurred in 50% of the examined buffaloes. In the more recent report, (Kadir and Rasheed, 2008) from Kirkuk city, Iraq showed that infection rates of hydatid cysts in slaughtered buffaloes was 2%. In Basrah (Iraq), the incidence hydatidosis in buffaloes was reported to be 64 (36.5%) out of 172 buffaloes (Abdul Wadood, 2005). In Nassiriyah, Iraq, Thweni and Yassen, 2014-2015) found 29 (6.75%) of 429 buffaloes were infected.

To the best of our knowledge, this survey was first of its kind in Sammawah city and, it was undertaken to determine the prevalence of hydatidosis, cyst distributions in organs, fertility and viability of hydatid cysts, and effect of sex and age on the hydatidosis prevalence in buffaloes at Sammawah Abattoir.

## MATERIALS AND METHODS

### Study area

This study was carried out at the Abattoir of Sammawah city in Al-Muthanna province of Iraq and laboratories of the College of Veterinary Medicine, University of Muthanna, Iraq. The study started from August 2015 to February 2016.

### Animals

A total of 62 buffaloes were examined for presence of hydatid cysts. The animals were divided into three age groups; less than one year,

one to three years and animals above three years old (<1 year, 1 to 3 years and >3 years).

### Examination of slaughtered animals and hydatid cysts

At the time of slaughter, each carcass of buffalo with its own organs was examined individually with the use of inspection, palpation and incisions for hydatid cysts. For each examined buffalo, data relating to the date of slaughtering, sexes, age, the occurrence of infection, distribution of infection in viscera, size and number of cysts were recorded. Also, the gross state of each cyst was ordered into (degenerative or calcified cysts).

### Examination of fertility of cysts and viability of protoscoleces

Fertility status of 50 hydatid cysts on different internal organs of 13 buffaloes were completed by examination of hydatid fluid of each cyst under a light microscope for the presence and absence of protoscolices in hydatid fluid; the cystic fluid of each cyst was aspirated, centrifuged at 5,000 rpm for five minutes and then, the deposit was examined for the presence of protoscoleces under (40x magnification). Cysts contain protoscoleces were considered as fertile and vice versa; sterile cysts were those cysts had no protoscoleces (Khanmohammad *et al.*, 2008). Additionally, the viability of the protoscolices was checked under the microscope for amoeboid-like peristaltic movements with (40x magnification). For more strong decision, a drop of sediment of hydatid fluid, which contains protoscoleces, was added to the same volume of 0.1 % aqueous eosin solution were placed on the microscopic slides and covered with cover-slips and then examined with the microscope ( $\times 40$  objective). Protoscoleces that took up eosin dye were considered dead. In

contrast, protoscoleces excluded the dye were considered alive (Manandhar *et al.*, 2006).

### Data analysis

Hydatidosis prevalence was calculated according to the proportion of the infection rates of slaughtered buffaloes. Chi-square ( $\chi^2$ ) was used by Microsoft Excel to compare the prevalence of hydatidosis in both sexes, different ages and to compare the viability of pulmonary and hepatic cysts. When a P value was less than or equal to 0.05 at 95% confidence interval ( $P \leq 0.05$ ), differences were considered statistically significant.

## RESULTS

### Overall prevalence

A total of 62 buffaloes slaughtered in Sammawah abattoir were examined for the presence of *E. granulosus* hydatid cysts from August 2015 to February 2016. Out of the 62 buffaloes examined, 13 buffaloes revealed the existence of hydatid cysts, giving an overall prevalence of 21.1% (Table 1).

### Prevalence by animal sexes

From 62 surveyed carcasses, 41 (66.1%) were males and 21 (33.9%) were females. The overall rate of infection for female buffaloes was higher 33.3%; than male 14.6% (Table 1), but there was no significant difference between the sexes ( $P < 0.05$ ).

### Prevalence by animal ages

The prevalence of hydatidosis varied among the three age groups (<1 year, 1 to 3 years and >3 years) and, the difference also was not significant. The infection rates of cysts were found in 0%, 21.1% and 25.7% of buffaloes (<1 year, 1 to

3 years and >3 years) respectively (Table 1).

### Prevalence by infected organs

The survey showed that the lungs and livers of buffaloes from Sammawah city were the most commonly affected organs. The most frequently infested organ was lung with the prevalence of 20.9% (13/62) followed by liver 16.1% (10/62) while, the lowest relative percentage of hydatidosis was in spleen 1.6%. The percentages of the rest visceral infections were in omentum 4.8% and kidneys 3.2% (Table 2).

### Fertility of hydatid cysts

Out of 50 hydatid cysts observed in organs obtained from whole examined buffaloes, 24 hydatid cysts were recovered from lungs, 20 from liver (Table 3). Out of the 50 evaluated hydatid cysts, 12 (24%) were fertile, 31 (62%) were sterile and 7 (14%) were calcified. The total fertility rate of 50 examined cysts was 24%. Regarding fertility of hydatid cysts from different viscera of buffaloes, this study recorded higher numbers (30%) of fertile cysts in the livers than in lungs (25%).

### The viability of hydatid cysts

Results of the survey in Sammawah abattoir revealed that out of the total 12 (24 %) of the fertile cysts in buffaloes, 7 (58.3%) were viable; however, the rest 5 (41.7 %) were nonviable. (Table 4). Also, the survey showed that there was a significant difference in the viability of fertile cysts between lungs and livers ( $P < 0.05$ ).

## DISCUSSION

In Iraq, hydatidosis is one of the major infectious zoonotic diseases because food animals

are still slaughtered traditionally and uncontrolled access of roaming dogs to infected offal and infected dogs take turn to contaminate environment with the infective eggs of adult worm of *E. granulosus* (Molan and Saida, 1989; Almalki *et al.*, 2017).

### Overall prevalence

The prevalence of hydatidosis in Iraqi buffaloes has been reported to vary from 2% (Kadir and Rasheed, 2008) to as high as 50% (Imari, 1962). From the present study, it is clear that Samawah city, Iraq has a high rate of hydatidosis infection in buffaloes (20.9%) but, it was far less than the finding of (Imari, 1962). Al-Abbassy *et al.* (1980) attributed low hydatidosis prevalence to diverse factors such as periodical destruction of dogs and improved standards of meat inspection.

Comparing infection rates observed in buffaloes (20.9%) of this study and researchers in other countries; it is obvious that Samawah city has lower infection rate than 25.7% and 48.1% that reported by Khanmohammadi *et al.* (2008), and Singh *et al.* (1988) in Iran and India respectively. In contrast, the present study showed a higher rate of hydatidosis than 6.8% and 10.6% that reported in buffaloes in Nepal and Italy respectively (Eckert and Deplazes, 2004; Capuano *et al.*, 2006). This reduction in infection rates has been attributed to the government policies on slaughter procedures including proper meat inspection, slaughter-house construction, and incineration of infected organs and control the dog (Joshi *et al.*, 2003).

### Prevalence by animal sexes

The present study indicated that the rate infection of hydatidosis was not significantly higher in female 7(33.3%) than male 6(14.6%). However, there was no significant difference between the two sexes. Similarly, Khan and Purohit (2006); Pour *et*

*al.* (2012) observed that the prevalence was higher in females than males buffaloes. Females are most affected because they live longer than males (Lahmar *et al.*, 2013; Rahmani *et al.*, 2012).

### Prevalence by animal ages

During the present study, the higher prevalence was recorded in older buffaloes; the prevalence of infection was 0% in >1 year old, 21.1% in 1 to 3 years old, 25.7% in <3 years old buffaloes (Table 2) but, the difference was not significant. Similarly, previous studies found that prevalence of hydatidosis in buffaloes increases when the age advances. For instances, Islam (1982); Asadov and Sadikov (1965); Gupta *et al.* (2011); Pour *et al.* (2012) recognized a higher prevalence of cysts in older buffaloes than younger ages. These findings were perhaps due to the chronic nature of hydatidosis and lengthier exposure time of older animals than younger ages. Lahmar *et al.* (2013) suggested that the possibility of acquiring the infection increased with the age of ruminants due to a long period of exposure to *E. granulosus*.

### Prevalence by infected organs

In the present study, the lungs of buffaloes were the main infected organ, the same as the previous studies conducted in Iran (Pour *et al.* 2012), Turkey (Beyhan and Umur, 2011), Nepal (Manandhar *et al.*, 2006) and Italy (Capuano *et al.*, 2006). In contrast, Abdul (2005) from Basrah province, Iraq found that buffaloes' liver was the most affected organ (51.5%) compared to lungs (48.4%). These findings can be attributed to the fact that livers and lungs have the first great capillary sites met by the migrating echinococcus oncosphere before any other peripheral organ. Thus, oncosphere lodge first in the liver, then the lungs and other organs (Kebede *et al.* 2006).

Table 1. Prevalence of buffaloes hydatidosis base on age and sex in Sammawah abattoir.

Effect of sex and age of buffaloes		No. of examined buffaloes	No. infected buffaloes	Prevalence (%)
Sex	Female	21	7	33.3
	Male	41	6	14.6
Total		62	13	20.9
Age	<1 y	8	0	0
	1-3 y	19	4	21.1
	>3 y	35	9	25.7
Total		62	13	20.9

Table 2. Prevalence of hydatid cysts from buffaloes slaughtered at Sammawah abattoir based on anatomical positions.

Organ	Total No. of organs examined	No. of infected organs	Prevalence (%)
Omentum	62	3	4.8
Kidney	62	2	3.2
Spleen	62	1	1.6
Liver	62	10	16.1
Lung	62	13	20.9
Total	124	29	23.4

Table 3. Organ distribution of the hydatid cyst in each organ.

Organ	No. of organs infected	No. of cysts in each organ
Omentum	3	3
Kidney	2	2
Spleen	1	1
Liver	10	20
Lung	13	24
Total	29	50

Table 4. It shows fertile (viable, nonviable), sterile and calcified hydatid cysts in liver and lungs of buffaloes slaughtered at Sammawah.

Organs	No. of cyst	Fertile cysts						Infertile cysts			
		No. of fertile		Viable		Non-viable		Sterile		Calcified	
		no.	%	No.	%	No.	%	No.	%	No.	%
Lung	24	6	25	4	66.7	2	33.3	15	62.5	3	12.5
Liver	20	6	30	3	50	3	50	11	55	3	15
Omentum	3	0	0	0	0	0	0	3	100	0	0
Kidney	2	0	0	0	0	0	0	1	50	1	50
Spleen	1	0	0	0	0	0	0	1	100	0	0
Total	50	12	24	7	58.3	5	41.7	31	62	7	14

### Fertility and viability of hydatid cysts

The result of the present study on fertility nature of hydatid cysts from buffaloes in Sammawah city (24%) was lower than the earlier observation (68.5%) of Al-Abady (2006) from Thi-Qar province, Iraq. Also, it was lower than the earlier report from India by Kosalaraman and Ranganathan (1980), who found that 35% of hydatid cysts of buffaloes were fertile. However, Islam (1982) from Bangladesh found only 10.3% of hydatid cysts of buffaloes were fertile.

Results of this study, also revealed that liver had the maximum number of fertile cysts (30%) followed by lungs (25%). Similarly, Sangaran *et al.* (2011) from India and Mirani *et al.* (2000) from Pakistan have shown that the highest number of fertile cysts was in liver (59%) followed by lungs.

Also, it was reported in this study that viability in pulmonary cysts at 66.7% was higher than hepatic cysts at 50%, and this was confirmed by Al-Abady (2006) from Thi-Qar province, Iraq. Where viability in livers (67.7%) was higher than that in lungs (84.7%)

### CONCLUSION

Despite the current study revealed infection rate lower than reported in Middle and south regions in Iraq. It is clear from this study that hydatidosis is a significant endemic disease in Sammawah city. Furthermore, the high incidence of viable cysts points to the necessity for increased attention in preventing dog to access the infected offal, which is roughly disposed of during traditional livestock slaughter in Sammawah city.

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