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Original article

Assessment of prevalence of hydatidosis in slaughtered Sawakny sheep in Riyadh city, Saudi Arabia

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ABSTRACT

Hydatidosis, or echincoccosis, is a serious medical and veterinary problem in many countries, particularly those with rural communities where there is a greater contact between dogs and domestic animals. Domestic livestock act as intermediate hosts which are the main reservoir for the disease in humans. It is therefore very important to estimate the prevalence of hydatid cysts in slaughtered animals since it can be transmitted to humans through dogs, which act as the final host for the disease. From this point of view, the present study was suggested to determine the prevalence of hydatidosis in Sawakny sheep slaughtered in Riyadh city, Saudi Arabia. During the course of the study 12,569 Sawakny sheep were inspected for hydatidosis infection. An overall prevalence of 1.06% was detected among the examined sheep, with the highest prevalence occurring in winter (1.38%) and lowest prevalence in summer (0.67%). Sheep aged 6–12 months had a higher rate of infection than older animals, and males were the predominant carriers of infection (97.7%) compared to females (2.3%). The liver was the most infected organ (79.1%), followed by the lungs (14.6%), while concurrent infections of both the liver and the lungs occurred in 6% of cases. The fertility and viability rates of hydatid cysts in the liver (70.1% and 85.1% respectively) were higher than that in any other organs. In conclusion, it is evident that fertile cysts in slaughtered sheep could have an important role in the continuation of hydatid cyst transmission to humans through dogs. Considerable effort should be devoted to controlling the transmission of cysts from abattoirs by the secure disposal of infected offal. In addition, plans are required for further epidemiological studies and control programs.

1. Introduction

Echinococcosis (hydatidosis) is one of the common zoonotic and severe clinical forms of disease caused by the larval (metacestode) and adult stages of cestodes of the genus *Echinococcus* and the family *Taeniidae* (Eckert and Deplazes, 2004). The normal life cycle of *Echinococcus* species requires two mammalian hosts; adult worms inhabit the small intestine of canids as definitive hosts, while larval stages or the hydatid cyst occur in herbivorous intermediate hosts and, occasionally, in humans (Thompson and McManus, 2002). Since Echinococcosis is an important zoonosis, the identification of the incidence and prevalence of infection in various intermediate hosts is essential for determining the significance of each animal species in the maintenance of the parasite life cycle and, subsequently, in the spread of the disease (Cadavid Restrepo et al., 2016). Infections with hydatid cysts in intermediate hosts (goat, sheep, cattle, camels, etc.) are normally asymptomatic, and there are usually no dependable methods for the routine diagnosis of the infection in living animals except in a few cases where cysts have been distinguished by ultrasonography (Eckert and Deplazes, 2004; Hayajneh et al., 2014). Accordingly, the most reliable demonstrative technique is cyst detection during meat investigation or at post mortem inspection and, therefore, the slaughter house is the best place to survey hydatidosis in livestock. From this perspective, we provide here a survey undertaken in Riyadh city, Saudi Arabia, to determine the spread of hydatidosis in food animals, especially Sawakny sheep.

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2. Materials and methods

This work was conducted on Sawakny sheep slaughtered in slaughter houses in the city of Riyadh in the central region of Saudi Arabia. A total of 12,569 Sawakny sheep were examined for cystic hydatidosis over the course of one year from November 2015 to October 2016. Data including age, sex and site of infection were recorded for each animal. Slaughtered sheep were examined at the slaughterhouse by visual inspection and palpation for hydatid cysts in visceral organs including the liver, lungs, spleen, heart and kidneys according to guidelines recommended by WHO/FAO/UNEP (1994). Infected organs were transferred to the Parasitology Laboratory, Zoology Department, College of Science, King Saud University, and all cysts in each organ were measured and examined for fertility and viability of protoscolices. Fertility was detected by the examination of cyst content for the presence of protoscoleces. Cysts with no protoscoleces were considered unfertile cysts. The viability of the protoscolices was assessed using 0.1% aqueous solution of eosin staining; unstained protoscolices were considered as viable while stained protoscolices were considered as non-viable (Fig. 1) (Moazeni and Nazer, 2010).

3. Statistical analysis

Statistical significance differences were assessed with a one-way ANOVA using a statistical package program (Sigma Plot version 11.0). Data are presented as mean ± standard deviation from the mean (SD) and $P \leqslant 0.005$ was considered significant.

4. Results

The results showed that the infection prevailed throughout the year with an overall prevalence of 1.06% (134/12,569). The highest prevalence was recorded in winter (1.38%: 42/3009) followed by spring (1.15%: 36/3100) and autumn (1.08%: 33/3069), while the lowest prevalence was reported in summer (0.67%: 23/3391). Statistically, however, the prevalence of infection was not significantly different between the seasons ($P = 0.139$) (Table 1, Fig. 2).

The prevalence of hydatidosis did differ significantly by sheep sex though, with males dominating the incidences of infection (97.7%: 131/134) compared to females (2.3%: 3/134) ($P < 0.001$) (Fig. 3).

The results also showed that infection differed according to the sheep's age, with the highest prevalence in sheep aged 6–12 months (58.2%: 78/134) followed by sheep aged 13–24 months (30.6%: 41/134) while the lowest prevalence was

Table 1
Seasonal prevalence of hydatidosis in Sawakny sheep slaughtered in Riyadh city.

Season	Examined no.	Infected no.	Prevalence of infection (%)
Winter	3009	42	1.38
Spring	3100	36	1.15
Summer	3391	23	0.67
Autumn	3069	33	1.08
Total	12,569	134	1.06

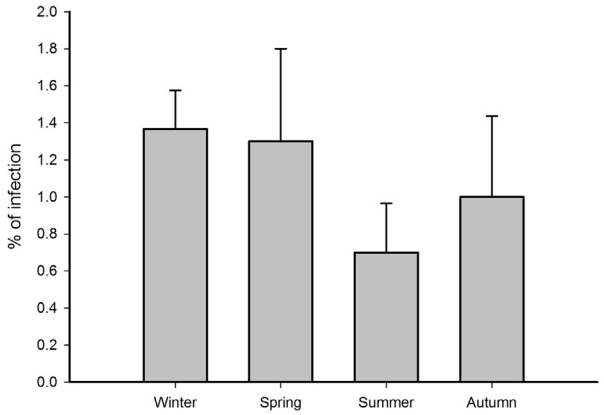

Fig. 2. Mean seasonal prevalence (% ± SD) of hydatid cyst in slaughtered sheep.

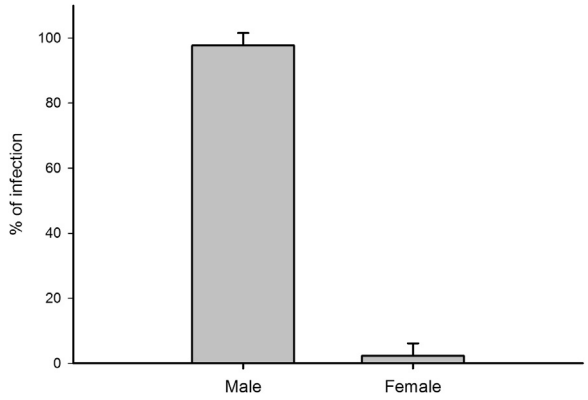

Fig. 3. Mean prevalence (% ± SD) of hydatid cyst per sex of slaughtered sheep.

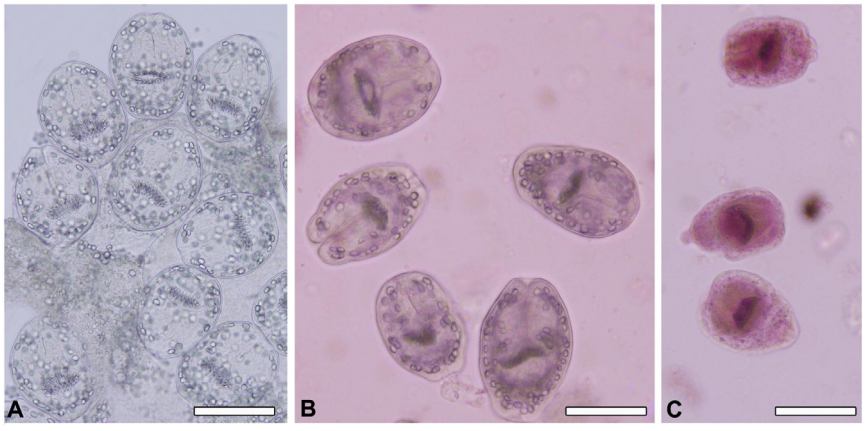

Fig. 1. Representative photomicrographs for viability test; (A) viable non-stained protoscolices, (B) viable protoscolices after staining with 0.1% eosin, (C) dead protoscolices after staining with 0.1% eosin. Scale-bar = 100 μm.

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