Prevalence of Sheep Liver Hydatid Cyst in the Northwest Region of Iran

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Abstract: Iran is one of the endemic areas of echinococcosis and as Northwest region of Iran is one of the biggest territories for rearing domesticated animals, the present aim was to determine the prevalence of hydatid cysts in slaughtered sheep in northwest region of Iran. In this study sheep livers were investigated pathologically at the municipal slaughterhouse of Tabriz, Northwest region of Iran, with prevalence value of 23.57%, being recorded. Prevalence was higher in under 1 year old sheep compared with over 1 year old sheep. This study showed sheep are the most important intermediate hosts for Echinococcus granulosus in this area. The high prevalence of the cysts in sheep suggests that sheep clearly have an important role to play in the continuation of the E. granulosus life cycle in Northwest Iran.

Key words: Echinococcus granulosus, histopathology, liver, sheep, Iran

INTRODUCTION

Echinococcosis is a zoonotic infection caused by Echinococcus granulosus, which is a small tapeworm and in the natural cycle, dogs and other canids are typical definitive hosts and ungulates, including sheep, goats, pigs and horses, are intermediate hosts in which hydatid cysts occur. The latter stage can also develop in humans (Eckert and Deplazes, 2004). Although E. granulosus penetrates deep between the villi of the small intestine of the definitive host, there are no pathogenic effects even in heavy infections a (Eckert et al., 2001), suggesting that infected definitive hosts are asymptomatic carriers of the parasite. Furthermore, infections with E. granulosus cysts in the intermediate host are typically asymptomatic, except for a small number of cases with chronic and heavy infections. In sheep and other herbivores the cysts can reach 4 cm in size. They contain watery fluid and material called hydatid sand, which looks like sand but consists of the young stages of the parasite. Old cysts can look like tuberculosis lesions or abscesses. The most common site for the cysts is the liver, less commonly brain, lungs and kidneys are affected. The heart and bone are uncommonly affected.

There are no reliable methods for the routine diagnosis of infections in living animals, but in rare cases cysts have been identified by ultrasonography alone or in conjunction with serum antibody detection (Eckert et al., 2001). A new ELISA with a high specificity and a sensitivity of 50-60% might be useful for detecting E. granulosus cysts in sheep on a flock basis but cannot be used for a reliable diagnosis of infected individuals (Kittelberger et al., 2002). The most reliable diagnostic method is cyst detection during meat inspection or at post-mortem examination. Cystic echinococcosis in farm animals causes considerable economic problems due to loss of edible livers. Significant losses of meat and milk production and fleece values from infected sheep may also occur. These losses are of special significance in countries with low economic outputs where sheep production is of particular importance (Torgerson et al., 2001).

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This disease is an important zoonosis. It represents a serious public health problem and has an important effect on the economy and social welfare in Iran. On the other hand, economical losses are also very important. The cost was estimated to about US$ 1500 for one surgical operation.

Iran is one of the endemic areas of echinococcosis and as Northwest region of Iran is one of the biggest territories for rearing domesticated animals, the present aim is to determine the prevalence of hydatid cysts in slaughtered sheep in northwest region of Iran.

**MATERIALS AND METHODS**

In this study sheep livers were investigated pathologically at the municipal slaughterhouse of Tabriz, Iran. All sheep were on semi intensive system and originated from small farms in the villages. Most of these sheep were males. The study was conducted from July 2004 to September 2004. Samples was collected from 140 sheep slaughtered (Systematic Random Sampling) at the municipal slaughterhouse of Tabriz, Iran. All samples were fixed in 10% formalin buffer, processed with H and E routine techniques at the histopathology lab of Islamic Azad University, Shabestar Branch, Iran.

**RESULTS AND DISCUSSION**

In present study, in Tabriz, hydatid cyst was found in 23.57% out of 140 sheep livers. The highest prevalence value was found in sheep (34.21%) under 1 year old (Table 1).

**Macroscopic Features**

The majority of sheep harboured 1-10 cysts in the liver, although heavy infections (10 cysts) invariably occurred in the liver. The highest effal condemnation was seen in the livers of sheep. The cysts were 4 cm in size and they contained watery fluid.

**Microscopic Features**

**Epithelial Lining**

The epithelium that most frequently formed the lining of cyst was cuboidal. The adjacent cysts the walls contained bile duct tissue. As to the hydatid cysts, all had the characteristic inner germinative layer and a connective tissue and various cellular elements (Fig. 1).

**Cystic Fluid**

The fluid from the cysts was usually clear and yellow. The hydatid cysts contained fluid that was under higher pressure, colorless and alkaline. The cysts contained watery fluid and material called hydatid sand, which looks like sand but consists of the young stages of the parasite (Fig. 2).

Hydatid disease is an important medical and veterinary problem in Iran. Domestic intermediate hosts (cattle, sheep, goats and buffaloes) are major reservoirs for the disease in humans. The widespread distribution and nature of the life cycle of *E. granulosus* suggest that there will always be a risk of re-introducing the custode as long as live animals are imported. One of the territories from which Tehran (the capital city of Iran) imports live ruminants is Northwest Iran where hydatidosis

<table>
<thead>
<tr>
<th>Age (year)</th>
<th>Sheep</th>
<th>No. of examined sheep liver</th>
<th>No. of infected sheep liver</th>
<th>Percent of infected sheep liver</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;1</td>
<td>38</td>
<td>13</td>
<td></td>
<td>34.21</td>
</tr>
<tr>
<td>&gt;1</td>
<td>102</td>
<td>20</td>
<td></td>
<td>19.60</td>
</tr>
<tr>
<td>Total</td>
<td>140</td>
<td>33</td>
<td></td>
<td>23.57</td>
</tr>
</tbody>
</table>
Fig. 1: Photomicrograph of hydatid cyst in a sheep liver. Thick fibrous pericyst, hyaline ectocyst (×660 H and E)

Fig. 2: Photomicrograph of hydatid sand in a sheep liver (×660 H and E)

is widespread in domesticated farm animals. Diagnosis of hydatid in intermediate hosts is hindered by the absence of reliable tests for use in live animals. Although various imaging techniques have been used for the diagnosis of cystic hydatid disease in humans, there are problems associated with their application to ruminants. Most prevalence studies have relied on slaughter data (Macpherson, 1981; Baldock et al., 1985), as these are an economical way of collecting and analysing information on livestock disease, particularly subclinical conditions. Also, lesions of hydatid cyst usually remain for the life of the animal and so, at post-mortem it is possible to tell whether or not an animal is infected (Njoroge et al., 2000). Considering the Iran as one of the endemic area of echinococcosis, three cycles of E. granulosus have been suggested there; a domestic cycle between dogs and livestock, a desert cycle between dogs and camels and a sylvatic cycle between wild carnivores and wild ruminants. Dalimi et al. (2002) reported that the mean prevalence of hydatidosis of sheep in various parts of Iran was 8.1% with a range of 1 to 27.5%. The prevalence in cattle was 38.3%, with a mean prevalence of 12% (1-28%) in cattle in different parts of Iran. Up to 20% of goats were infected with a mean prevalence of 6.5% (0.5-20%). Up to 11.9% of buffaloes were infected with a mean prevalence of 17.3% (1.5-57.8%). According to our results, 23.57% of the sheep were found infected with hydatid cyst. The cysts were, pleomorphic either unilocular or multilocular forms of similar rates.
Hydatidosis is a common disease in the Middle East, especially in countries neighbouring Iran. In Iraq, prevalence values of 4.5-44% in sheep, 3.1-26.7% in goats and 4.3-13.9% in cattle have been reported (Molan, 1993; Saeed et al., 2000). In Turkey, 26.6% of sheep, 22.1% of goats and 13.5% of cattle were infected with this disease (Umur, 2003). In Kuwait, 0.2-11.2% of sheep, 5% of goats, 32.5-40.2% of cattle (Hassounah and Behbehani, 1976) and in Pakistan, 5.5-9.8% of cattle, 8.3% of sheep, 7.5% of goats and 12.3-49% of buffaloes were infected (Munir et al., 1982; Khan and Haseeb, 1984). Prevalence values in India were 8.9-69.0% of buffaloes, 9.7-68.9% of cattle, 2.3-93.3% of sheep and 1.1-72.7% of goats (Mathur and Khanna, 1977; Prasad and Mandal, 1978; Abraham et al., 1980; Kosalaraman and Ranganathan, 1980; Prabhakaran et al., 1980; Islam, 1981; Deha et al., 1983, 1985; Rao, 1985) and in Syria, 4.5% of sheep, 2.3% of goats and 5.2% of cattle were infected (Dajani, 1978).

In the present study, sheep, apart from being the most frequently infected, are the most slaughtered animals for human consumption in abattoirs in this locality in Iran followed by cattle, goats and buffaloes. Furthermore, offal, especially the liver is usually offered to domestic dogs or is dumped in rubbish bins, outside houses, where stray dogs can easily feed on it.

Farm animals, especially in sheep and cattle, is likely to be related to the presence of green pastures, an abundance of animals, a shortage of industrial animal husbandry and the presence of stray dogs infected with E. granulosus. There is only one industrial animal husbandry, Keshtosanate Moghan in Northwest region of Iran and unpublished data showed that the prevalence in industrial animals is less than that in traditional animal husbandry, i.e., cattle 0.7%; sheep 4.1% and goats 0%. The low prevalence of hydatidosis in industrial animal husbandry may be explained by using grass cultivated in surrounded farms, where dogs are prohibited. Gusha et al. (1987a and 1990b) and Ibrahim and Craig (1998) also reported that the liver was the predominant infected site in sheep, goats and cattle. In the Middle East, the most common location of hydatid cysts in sheep is the liver followed by the lungs (Al-Yaman et al., 1985; Abdel-Hafez and Al-Yaman, 1989; Abu-Shehada, 1993; Kamhawi et al., 1995).

In conclusion, sheep clearly have an important role to play in the continuation of the E. granulosus life cycle in Northwest Iran. Therefore the safe disposal of infected offal, especially of sheep, will significantly reduce the transmission of cysts from slaughterhouses to potential hosts in this region.

ACKNOWLEDGMENT

This research was partly supported financially by the Research Council of Islamic Azad University, Shabestar Branch, Iran.

REFERENCES


