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PREVALENCE OF THREE LIVER PARASITES IN SHEEP AND GOATS IN AL-MADINAH AL-MUNAWWARAH, SAUDI ARABIA KINGDOM

By

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Abstract

The epidemiological status of cysticercosis, hydatidosis and dicrocoeliosis in sheep and the production practices of sheep farmers that increase the risk of exposure of sheep to their infectious agents were studied in Al-Madinah, during 2011–2012. A total of 450 sheep and 1650 goats were inspected randomly at an abattoir survey and the prevalence of hydatidosis, cysticercosis and dicrocoeliosis was recorded as 0.4%, 13.3% & 0.6% in sheep and 0.16%, 1.8% & 0.0% in goats respectively. The prevalence of cysticercosis increased dramatically in days of wedding parties to more than 75% because a large number of sheep was brought from one grazing endemic farm. The improper disposal of dead animals, the access of farm dogs to offal of slaughtered sheep, the farmers carelessness to treat their dogs with anthelmintic, and the grazing of flocks in fields where stray dogs have free access; increased the sheep and goats risk of exposure to hydatidosis and cysticercosis.

Key words: Saudi Arabia, Hydatidosis, cysticercosis, dicrocoeliosis, sheep & goats

Introduction

Sheep are primarily useful for wool and meat production, the relative importance of each varies with the countries over a range of 1:1 to 1:10 for the ratio of fleece to lamb value. In tropics sheep are essentially valuable only for meat production (Devendra and Coop, 1982) and meat (mutton) might be an additional source of protein as sheep give 5,000 metric tons meat per year (BBS, 2001). Moreover, sheep rearing may give a financial support to the jobless people. But the sheep rearing is hindered by various problems of which parasitic diseases might be a major problem.

In many developing and transition countries, parasitic zoonoses such as cysticercosis and echinococcosis cause serious human suffering and considerable losses in agricultural and human productivity, thus posing a significant hindrance to their development. Although, effective and reliable tools for the diagnosis, prevention and control of parasitic zoonoses are now available, their implementation has not always been successful in many countries. This is primarily due to the lack of awareness on the presence or impact of the causing parasites (Eddi et al., 2006). In addition often the needed intersectional cooperation, resource manage-
ment and political commitment for their control are also absent. FAO’s regular program has established a global network of professionals directly involved in zoonotic and food-borne diseases. The network provides a basic framework for the spread of information related to diagnosis, prevention and control of major zoonotic diseases including cysticercosis and echinococcosis.

Dicroceliosis caused by *Dicrocelium dendriticum* (Digenia, Dicroceliidae), is a hepatic parasitic disease of clinical and financial significance in ruminant breeding, which causes direct losses due to confiscation of parasitized livers (Jithendran and Bat, 1996), and indirect losses due to hepatobiliary alterations produced by the parasites and the costs associated with anthelmintic treatments (Wolff *et al*, 1984; Otranto and Traversa, 2002, 2003; Manga-Gonzalez *et al*, 2004; Ferreras *et al*, 2007). A wide range of species of land mollusks and ants, which act as first and second intermediate hosts, respectively, intervene in the complex life cycle of *D. dendriticum*, in addition to the domestic and wild mammals which are the definitive hosts (Manga-Gonzalez *et al*, 2001).

The parasite produces a potentially serious agricultural problem and public health risk in endemic areas. The human populations are considered to be at highest risk of infection with this zoonotic helminthes particularly in rural areas most of whom earn their livelihood wholly or partially through livestock rearing (Krecek *et al*., 2008). *Taenia* spp. and echinococcosis spp. are common parasites of humans. Most infections occur in the developing world and are closely related to poverty and ignorance. These cestodes tend to infect the CNS, where they cause complex and pleomorphic clinical syndromes, including epilepsy, chronic meningitis, acute encephalitis, focal neurological deficits and intracranial hypertension (Brutto, 2005).

The present work was designed to study the occurrence of the most important zoonotic helminthes infecting sheep and goats in Al-Madinah, KSA.

**Materials and Methods**

The digestive tract and the associated glands were collected from sheep autopsied at local slaughter house in Al Madinah Al Munawwarah, The study was carried out at Department of Biology, Faculty of Science, Taibah University, where different organs were thoroughly examined for the detection of any larval or adult helminthes infection and morphological studies on the helminthes through 2011.

Examination of visceral organs, collection of parasites and their preservation were made by the methods followed by Rahman *et al*. (1996). All collected worms were placed separately in physiological saline. Immediately after collection initial studies on the morphological features of these helminthes for preliminary identification were made by mounting under the microscope. All trematodes and cestodes were cleared off, the debris by passing through saline for several times and preserved in 10% formalin. Some specimens were pressed between two glass
slides and preserved for staining procedures. Label marking the data, place of collection, specimen, sex and organ of the animals were placed on the collecting bottles. Semichon’s carmine was used as a staining agent and 10% formalin used for fixation, removed through washing in running water for several hours to get rid of the fixatives. Then the specimens were dehydrated through alcohol 30%, 50%, 70%, 80%, 90% & 100% for half to one hour in each case. They were then cleared in clove oil for half an hour and mounted using Canada balsam. In all cases, parasites were identified following the standard keys (Khalil et al. 1994).

Results

Table 1: Helminthes in digestive system of sheep and goats.

<table>
<thead>
<tr>
<th>Name of parasites</th>
<th>No. infected</th>
<th>%</th>
<th>intensity(Mean)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>sheep</td>
<td>goat</td>
<td>sheep</td>
</tr>
<tr>
<td>T. multiceps Cysticercus</td>
<td>60</td>
<td>30</td>
<td>13.3</td>
</tr>
<tr>
<td>E. granulosis Hydatid cysts</td>
<td>2</td>
<td>3</td>
<td>0.4</td>
</tr>
<tr>
<td>D. dendriticum</td>
<td>3</td>
<td>0</td>
<td>0.6</td>
</tr>
</tbody>
</table>

Fig. 7: Liver parasites in sheep and goats.

Discussion

In the present study, the percentage of infection with cysticercosis (Figs. 1 & 2), hydatidosis (Figs. 3 & 4), and dicrocelosis (Figs. 5 & 6) were 13.3%, 0.4% & 0.6% respectively in sheep and 1.8%, 0.16% & 0.0% in goats (Tab. 1; Fig. 7). No doubt, cysticercosis prevalence increased dramatically in days of wedding party to more than 75% because many sheep were brought from same grazing endemic areas.

In the present study, sheep were infected (13.3%) with T. multiceps cysticercus. In Ethiopian sheep, metacestodes of T. hydatigena were 37.1% and that of E. granulosus 16.4% (Bekele et al, 1988). In Honduras, Sakai et al. (1998) found that of 192 porcine sera, 27.1% (52) were positive by the EITB. Sero-positivity did not correlate with age and sex by statistical analysis. With respect to the number and the frequency of recognition of the seven
diagnostic glycoprotein bands in the EITB, 67.3% of positive sera were recognized only one band and 80.8% of them recognized GP42-39. In northern Jordan, Abo-Shehada et al. (2002) reported that 12/451 sheep (3%) were infected with *T. multiceps*. In Tanzania, the prevalence was 17.4% (village-specific range 3.2-46.7%), and cysticercosis was considerably higher in pigs reared in households lacking latrines than in those reared in households that were using latrines (Ngowi et al. 2004).

In South Africa, Krecek et al. (2007) found 64.6% of sheep had helminthes. The apparent prevalence as measured by each of four tests was 11.9% for lingual examination, 54.8% for B158/B60 Ag-ELISA, 40.6% for HP10 Ag-ELISA and 33.3% for EITB. In Sardinian sheep, *C. cerebralis* showed a rate of 0.35% among 566 slaughtered sheep (Scala et al., 2007). In Egypt Desouky et al. (2011) found that of 25 animals examined from diseased sheep and goats, 25 (100%) revealed infection with one to four coenuri in brain. Sites of predilection were on left hemisphere (48%), followed by right hemisphere (40%) and cerebellum (12%). There was no apparent effect of the age of sheep and goats on susceptibility to infestation with *C. cerebralis*. The cysts from infected sheep experimentally infected newborn puppies, with a prepatent period of 60 days post infection. A total of 15 immature worms recovered from one puppy did not reach patency until 105 days post infection with *C. cerebralis* cyst scolices. Pathologic changes in *C. cerebralis*-infected sheep brain showed parasitic elements, demyelinated nerve tracts, hyperaemic blood vessels with round cell infiltration, encephalomalacia with round cell infiltration and palisading macrophages, giant cells, and focal replacement of brain parenchyma with caseated and calcified materials.

No doubt, the variation among the present and other studies might be due to the differences in geographical niches, climatic conditions, rearing and management of sheep, breeds of sheep and the variation in the sampling collection procedures. As well as the difference in time of sampling and gradual change in the climatic condition.

In the present study, dicrocoeliosis showed 0.6% in sheep and 0.0% in goats. Perhaps, this might be the first time to report this liver fluke in Al-Madinah. Nasher (1990) found *D. dendriticum* in imported sheep and *Paramphistomum cervi* in indigenous cattle is recorded for the first time in Saudi Arabia. Omer et al. (1991) found *D. dendriticum* in schoolchildren in Asir Province. Gawish et al. (1993) found *D. dendriticum* in slaughtered sheep in Al Riyadh abattoir. The highest rate of infection was among Naheemi sheep imported from Turkey. Abu Zinada (1999) in Jeddah found natural dicrocoeliasis in imported sheep. Helmy and Al-Mathal (2003) in Riyadh reported *D. dendriticum* in school outpatients’ clinic. Al-Mathal and Fouad (2004) successfully used Myrrh (*C. molmol*) in treatment of human and sheep *D. dendriticum* in Saudi Arabia. Al-Megrin (2010) found that *D. den-
Dendriticum was among other parasites prevalence among the immunocompromised patients in Riyadh.

Abroad, Gargili et al. (1999) in Turkey reported that of 476 sheep livers 23.52% were infected with *D. dendriticum*. In Ghana, Sammy et al. (2011) recorded *D. dendriticum* as 3.2% by direct wet mount and Kato-Katz of human stool. Ghazani et al. (2008) in Iran reported 20% sheep.

In Egypt, Haridy et al. (2003) reported non-human dicrocoeliasis and Masoud et al. (2003) successfully treated human and non-human dicrocoeliasis *dendriticum* with Mirazid®.

In the present study, hydatidosis showed an incidence of 0.4% in sheep and 0.16% in goats. Generally speaking, many authors dealt with human and animals hydatidosis in Saudi Arabia. Perhaps, the first human cases were given by El Marsfy and Morsy (1975) and Yu et al. (1982) in Riyadh. Animal hydatidosis was first reported by Farah (1987), as zoonosis (Bolbol, 1988) and as exported (Huh et al. 1988). The last publication was given by Masoodi et al. (2011).

**Conclusion**

No doubt, helmintic infections are very common in countries rearing animals worldwide. The animal parasites are in one way or another are transmitted to man either directly or indirectly. Recommendations to control these parasitic diseases are necessary since it is a modern dangerous zoonotic parasite. To get rid of sheep parasites, comprehensive study should be launched in the area where sheep and goats are abundant and practically participating in cash incomes, sources of food, skin and manure to farming communities and play significant role in these sectors. Strategic treatment is appropriate, effective anthelmintic should be practice in Saudi Arabia.

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Fig. 1: Cysticercus in sheep liver (arrow). Bar 10mm.
Fig. 2: *Cysticercus* averted scolex from sheep liver. Mote suckers (S) and rostellum (R) with hooklets. Bar 0.2 mm
Fig. 3: Infected sheep liver oriddled with a number of growing hydatid cysts. Bar 10mm
Fig. 4: Hydatid cyst isolated from sheep liver infected. Bar 10mm
Fig. 5: Liver of sheep with many *Dicrocoelium dendriticum*. Bar 10mm
Fig. 6: *D. dendriticum* from sheep liver. Note oral sucker Os, uterus U, 2 characteristic testes Ts and one rounded ovary Ov. Bar 0.5mm