PREVALENCE OF CYSTIC ECHINOCOCCOSIS IN SLAUGHTERED RUMINANTS IN DIFFERENT ABATTOIRS, UPPER EGYPT

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ABSTRACT

Hydatid disease is a re-emerging disease that affects human and animals world-wide. Cystic Echinococcosis (CE) is the most common form of the disease. In Egypt, CE is an endemic disease and several reports have indicated an increasing prevalence rate of the CE infection in animals and humans in the last few years. The aim of the current study is to determine the prevalence rate and other epidemiological factors in the infecting of ruminants with CE in different locations in Upper Egypt. The data gathered shows that of 4,498 animals examined, 89 (1.97%) had the hydatid cyst. Sheep were the most affected animal species (14.1%), then goats (13%), camels (5%) and cattle (0.068%), while buffaloes were free from infection. A higher percentage were affected in the liver (39.3%) than in the lungs (32.5%) and other viscera (2.2%), while 25.8% were affected in both the liver and the lungs. The general fertility rate of cysts examined was 27.71%; cysts of camel origin were the most fertile (66.6%), followed by those of goats (29.41%) and sheep (15.51%); that of cattle was 0%. The current study provides current data about the status of CE infection in ruminants in Upper Egypt that will aid further studies and enable more precise planning for effective control strategies.

Keywords: Hydatid, Echinococcosis, Cyst, Ruminant, Prevalence

1. INTRODUCTION

Hydatid disease is a cosmopolitan zoonoses caused by the larval stage of the Echinococcus tapeworm. The two main types of hydatid disease are caused by E. granulosus and E. multilocularis. Cystic Echinococcosis (CE) is the most common form, caused by the larval stage of E. granulosus. It is seen in most regions of the world particularly the Mediterranean region, Africa and the Middle East, and it is the most frequently encountered form of hydatidosis in humans (FAO, 1982; Thompson, 1995; Torgerson and Budke, 2003; Haridy et al., 2006).

CE is re-emerging as a major public health issue (Torgerson and Budke, 2003). Despite efforts to control CE, the disease continues to threaten human health in a number of countries, including Egypt. In the last few years, several cases of human CE have been reported (at least 18 in the last 5 years) and treated in the hospitals of Cairo and the Delta regions (Elshazly et al., 2009). In Upper Egypt, a serological survey showed that 5% of human samples tested positive for E. granulosus (Dyab et al., 2005).

Ruminants are the main intermediate host for E. granulosus in Egypt (Rahman et al., 1992; Hardy et al., 2000; 2006). It is well-known that the prevalence rates in
farm animals are in co-ordination with the human rate of infection (FAO, 1982; Haridy et al., 2000). CE in farm animals causes considerable economic losses as well, due to the condemnation of the affected organs and the consequent reduction in productivity (Polydorou, 1981). Several surveys on the frequency of CE in farm animals were conducted in the Cairo and Delta regions of Egypt (Haridy et al., 1998; Rahman et al., 1992; Haridy et al., 2006; Sabri et al., 2005) with variable results of the prevalence rate of the disease. Little data exist for the disease’s prevalence in ruminants in Upper Egypt. Consequently, this study was designed to determine the prevalence of CE in slaughtered ruminants of different kinds in some regions of Upper Egypt.

2. MATERIALS AND METHODS

During the period that elapsed between March, 2012 and February, 2013, a total of 4,498 animals (2,910 cattle; 398 buffaloes; 820 sheep; 130 goats and 240 camels) were carefully inspected for the hydatid cyst during routine meat inspection in abattoirs at Hurghada, Qena, Sohag and Aswan, all located in Upper Egypt. These abattoirs were visited weekly throughout the study period. The macroscopically detectable cysts were individually collected in clean plastic bags, labeled and transferred to the laboratory for further examination. The fertility of the collected cyst was determined mainly by the presence or absence of protoscolices (Soulsby, 1982; Thompson, 1995). Data were computed and presented in tables.

3. RESULTS

Data on CE prevalence in the examined animals are shown in Table 1. The overall prevalence of CE in targeted localities revealed that out of 4,498 animals examined, 89 (1.97%) had the hydatid cyst in their organs. As regards the variation among the animal species, CE infection was detected to be more prevalent in sheep (14.1%) and goats (13%) than in camels (5%) and in cattle (0.068%), while buffaloes were free from such infection (Table 1).

With respect to the infection rate in animal organs, our results are represented in Table 2. In general, livers examined harbored a higher percentage of cysts (39.3%) than lungs (32.5%) and other viscera (2.2%). Infection in both liver and lungs was found to be 25.8%. In sheep, hydatid cysts were more predominant in the liver (39.6%) than in the lung (24%). But hydatid cysts were found to occur preferentially in the lungs in camels (50%) and in sheep (47%), while camels had 33.3% cysts in the liver and in sheep 41% were found there. In cattle, cysts were found to infect the liver and lungs equally. In the current work and examination of the cysts (Table 2) indicated that 27.71% of the collected hydatid cysts were fertile. The cysts derived from camels were more fertile (66.6%), than those from goats (29.41%) and cysts in sheep were least fertile (15.51%). All cysts obtained from cattle were sterile.

Table 1. Prevalence of cystic echinococcosis in different ruminant animals slaughtered in four abattoirs, Upper Egypt

<table>
<thead>
<tr>
<th>Animal species/ Abattoir</th>
<th>Cattle</th>
<th>Buffaloes</th>
<th>Sheep</th>
<th>Goat</th>
<th>Camel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number examined</td>
<td>Positive number</td>
<td>Positive animals %</td>
<td>Positive number</td>
<td>Positive animals %</td>
<td>Positive number</td>
</tr>
<tr>
<td>Hurghada</td>
<td>900</td>
<td>0</td>
<td>0.000</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Qena</td>
<td>350</td>
<td>1</td>
<td>0.280</td>
<td>90</td>
<td>0</td>
</tr>
<tr>
<td>Sohag</td>
<td>540</td>
<td>0</td>
<td>0.000</td>
<td>75</td>
<td>0</td>
</tr>
<tr>
<td>Aswan</td>
<td>1120</td>
<td>0</td>
<td>0.000</td>
<td>113</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>2910</td>
<td>2</td>
<td>0.0068</td>
<td>398</td>
<td>0</td>
</tr>
</tbody>
</table>

Table 2. Predilection sites and fertility rates of hydatid cyst in different organs of ruminant animals inspected in the study

<table>
<thead>
<tr>
<th>Animal species</th>
<th>Total number of cyst</th>
<th>% of fertile cyst</th>
<th>Lungs</th>
<th>%</th>
<th>Livers</th>
<th>%</th>
<th>Lungs and livers</th>
<th>%</th>
<th>Viscera</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. of cysts</td>
<td>%</td>
<td>No. of cysts</td>
<td>%</td>
<td>No. of cysts</td>
<td>%</td>
<td>No. of cysts</td>
<td>%</td>
<td>No. of cysts</td>
<td>%</td>
</tr>
<tr>
<td>Sheep</td>
<td>58</td>
<td>9</td>
<td>15.51</td>
<td>14</td>
<td>24.0</td>
<td>23</td>
<td>39.6</td>
<td>19</td>
<td>32.0</td>
<td>2</td>
</tr>
<tr>
<td>Camels</td>
<td>12</td>
<td>8</td>
<td>66.67</td>
<td>6</td>
<td>50.0</td>
<td>4</td>
<td>33.3</td>
<td>2</td>
<td>0.0</td>
<td>0</td>
</tr>
<tr>
<td>Cattle</td>
<td>2</td>
<td>0</td>
<td>0.00</td>
<td>1</td>
<td>50.0</td>
<td>1</td>
<td>50.0</td>
<td>0</td>
<td>0.0</td>
<td>0</td>
</tr>
<tr>
<td>Goat</td>
<td>17</td>
<td>5</td>
<td>29.41</td>
<td>8</td>
<td>47.0</td>
<td>7</td>
<td>41.0</td>
<td>2</td>
<td>11.7</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>89</td>
<td>22</td>
<td>27.71</td>
<td>29</td>
<td>32.5</td>
<td>35</td>
<td>39.3</td>
<td>23</td>
<td>25.8</td>
<td>2</td>
</tr>
</tbody>
</table>
4. DISCUSSION

Generally speaking, the overall prevalence rate of CE found in our study is considered to be lower than that recorded in previous studies, both in Egypt and in other countries. For example, Rahman et al. (1992) reported CE percentages in camels, sheep, pigs, cows and buffaloes in Egypt as 31.0, 1.33, 4.62, 0.0 and 0.0% respectively. Moreover, (Haridy et al., 1998) also reported an increasing CE prevalence rate in Egyptian camels, from 5.5 to 8.2%, between 1992-1995. Other countries also had a CE prevalence rate higher than our results showed: 17% recorded in Tunisia (Brahmi, 1973), 56.5% in Algeria (Euzeby, 1982), 80% in Morocco (Ould, 1991) and 48% in Libya (Ibrahem and Craig, 1998).

Other studies also reflect this variable rate of prevalence in the different animal species examined. For example, in Egypt, 0.33% of a total of 2,871,510 sheep slaughtered in the governmental abattoirs over five years (1995-1999) had hydatidosis (Haridy et al., 2006), while camels had an infection rate of 7.67% and cattle and buffaloes were clear of the infection altogether (Dyab et al., 2005). In the Delta region, the CE prevalence rate was 6.4% in sheep and 5.27% in goats (Sabri et al., 2005); in central Iraq the CE prevalence rate was 5.9% in sheep, 5.1% in goats, 4.9% in cattle and 20.4% in camels (Al-Abassy et al., 1980); in central Jordan the CE prevalence rate was 1.3% in sheep and 54% in goats (Dajani and Khalaf, 1981); and in. In northwestern Iran, the prevalence rate was 19.0% in sheep and 22% in cattle (Nourian et al., 1997). In African countries, in north western Morocco the prevalence rate was 10.7, 1.4 and 80% in sheep, goats and camels respectively (Pandey et al., 1986); in Libya, the CE infection rate was reported to be 4.9% in sheep, 2.4% in goats, 2.7% in camels; and 15% in cattle (Kassem et al., 2013), while in Ethiopia, the prevalence rate was 35.15% in cattle, 11.78% in sheep, 4.9% in goats, 16.79% in camels, with pigs being free of the infection altogether (Fromsa and Jobre, 2011). In Egypt, the buffaloes in our study were likewise found to be free from any infection, which is in agreement with previous reports from Egypt (Rahman et al., 1992; Dyab et al., 2005), but in disagreement with reports from countries like Bangladesh, where 42.36% of the buffaloes were found to be infected (Islam, 1982).

The variation in the prevalence rate of CE found in our results in Upper Egypt and those found in previous records in Egypt can be attributed to the demographical differences between Upper Egypt and the Cairo-Delta area. In Egypt, the main human population and livestock are concentrated in the Cairo-Delta area, where a moderate climate and the branching of the Nile River favor the existence and stabilization of the disease. Upper Egypt, on the other hand, has some unique characteristics, such as hot climate, long distances between cities and a lower population base, all of which aid in minimizing the opportunity for the E. granulosus life cycle to continue.

The variation in the CE prevalence rate found in the current study and that reported in other countries could be attributed to several factors, including applied control strategies, the farming system used and the state if a country’s national development.

Results of infection rate in animal organs in the current study (Table 2) are in line with other the studies that report the liver, lungs, or both to be most often infected organs (Sabri et al., 2005). The organ involved may also depend upon the host species (Fromsa and Jobre, 2011) and on anatomical and physiological factors (Soulsby, 1982). In the current study, the cyst distribution found in the organs of afflicted animals is in agreement with previous studies (Rahman et al., 1992; Haridy et al., 2000; 2006; Fromsa and Jobre, 2011).

In general, livers examined harbored a higher percentage of cysts (39.3%) than lungs (32.5%) and other viscera (2.2%). Infection in both liver and lungs was found to be 25.8%. In sheep, hydatid cysts were more predominant in the liver (39.6%) than in the lung (24%). But hydatid cysts were found to occur preferentially in the lungs in camels (50%) and in sheep (47%), while camels had 33.3% cysts in the liver and in sheep 41% were found there. In cattle, cysts were found to infect the liver and lungs equally. The present data are in line with other authors (Ibrahim and Craig, 1998). Studies previously performed in Egypt reported that the hydatid cyst was localized in the liver (5.7%) and in the lung (6.4 %) of sheep (Sabri et al., 2005).

The fertility rate of the hydatid cyst is an important factor in CE infection (Soulsby, 1982; Torgerson and Budke, 2003; Fromsa and Jobre, 2011). In the current work and examination of the cysts (Table 2) indicated that 27.71% of the collected hydatid cysts were fertile. The cysts derived from camels were more fertile (66.6%), than those from goats (29.41%) and cysts in sheep were least fertile (15.51%). All cysts obtained from cattle were sterile. This fertility result is lower than previously reported in Egypt (49%) Haridy et al. (1998) and in other countries such as Libya, where Ibrahim and Craig (1998) reported that 91.6% of examined cysts were fertile.
The greater fertility rate of cysts from camel origin, followed by that in goats and sheep indicates the important role of camels and small ruminants in the transmission of animal and human CE in Egypt.

But a general conclusion can be drawn from our study, which shows that in Egypt, CE is more prevalent in small ruminants (i.e., sheep, goats) and in camels than it is in cattle. Buffaloes do not play any role in sustaining the CE infection. This is in line with previous studies in Egypt (Rahman et al., 1992; Haridy et al., 2000; Dyab et al., 2005) and also with studies done in neighboring countries (Ibrahim and Craig, 1998). This conclusion can be explained by the process of animal management of small ruminants, which favor CE infection: high interactions do occur between ovine and caprine herds and dogs and very frequently with camels. But the rearing of cattle and buffaloes takes place largely indoors and that minimizes or prevents the interaction that can lead to contamination.

It is well known that the *E. granulosus* sheep strain (G1) is the predominating *Echinococcus* species involved in human CE and that there is also involvement of the camel strain (G6) that contributes to this problem (Torgerson and Budke, 2003; Magambo et al., 2006). Special programs for these animals should be employed to minimize the infection with *E. granulosus*.

The results represented here will help to provide more extensive and reliable information for further studies on hydatidosis, that can be used for planning and application of control measures for CE in human and animals.

5. CONCLUSION

So general note about CE in Egypt can be concluded that, CE is prevalent in sheep, goat and in camels than it is in cattle and buffaloes. Further studies on CE in animals are engorged.

6. ACKNOWLEDGEMENT

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7. REFERENCES


