



PREVALENCE OF HYDATID CYSTS IN SLAUGHTERED SHEEP AND GOATS IN HADHRAMOUT (YEMEN)

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ABSTRACT:

218 sheep and 422 goats carcasses were examined (2005/2006) for the presence of hydatid cysts in Hadhramout (Yemen). The prevalence was 3.21% in sheep and 2.13% in goats. All the positive animals are males. The liver was the predominant site of infection in both animals. In relation to the age-group (years) the rate of infection increased with the animal's age. There was a slight difference in the fertility of cysts in sheep (46.6%) and goats (55.2%), while the same observations were noted between liver and lungs in the two animals, while the degenerated cysts were more observed in sheep (24.5%) than in goats (12.6%).

These findings reflect the existence of the life cycle maintenance and the transmission of the cestode *Echinococcus granulosus* from definitive host (dogs) to intermediate hosts (sheep, goats) in Yemen. Consequently, further epidemiological researches are needed to clarify all the factors affecting the continuity of this biological cycle.

INTRODUCTION:

Cystic echinococcosis (Hydatid cyst disease) is widespread zoonosis (OMS, 1979) and a global problem of increasing importance (Motassian *et al.*, 1977), infecting humans and animals such as sheep and goats as intermediate hosts for the causative cestode, *Echinococcus granulosus* (Despommier and Karapelou, 1987).

The prevalence of hydatid cysts in animals in some Arabic countries was studied (Hassonah and Behbahani, 1976, Farah *et al.*, 1984, Al-yaman *et al.*, 1985, Al-Abbassy *et al.*, 1985, Pandey *et al.*, 1988, Molan, 1993). However,

little has been published in Yemen concerning the prevalence of hydatid cysts, particularly in domestic animals, with the exception of some human infections observed in hospitals in Sana'a and Mukalla. The work of Saif (2001) aimed to study the parasites in stray dogs in Sana'a revealed the presence of the adult worm, and also the observations of Ali *et al.* 2003 in Aden governorate about the hydatid cysts among slaughter-house animals.

Our preliminary observation of an infected sheep slaughtered at Mukalla city (Baswaid, 2006) was the pillar of this survey which aims to report the rate of infection of hydatid cysts in

sheep and goats in Hadhramout governorate (Yemen), to be followed by further investigation about the disease all over the country.

MATERIALS AND METHODS:

Sheep and goats are the most principal slaughtered animals for human consumption in Hadhramout governorate on social and religious occasions. All the animals of this survey were slaughtered in special abattoirs during the period from June 2005 to May 2006 in two cities (Sheher and Mukalla), where the majority of animals were imported from the rural regions of the governorate. Cysts were encountered in each organ and protoscolices were examined for fertility and viability either by direct microscope examination of the fluid extracted from the cysts, or by the use of "Violet de Gentiane 1%" coloration (Eckert *et al.*, 1984).

RESULTS:

The prevalence of hydatid cysts in slaughtered animals in Hadhramout (Yemen), during the period from June 2005 to may 2006 is illustrated in table (1). This prevalence shows a slight difference between sheep (3.21%) and goats (2.13%). From table (2) the liver was the predominant site of infection in both animals. In sheep the cysts could be detected either in the liver alone or in the liver and lungs together,

while no cysts were present in the lungs only, as, in contrast, has been observed in goats. Other organs of the two animals observed have shown negative infection.

Tables (3 & 4) reveal the rate of infection vis-a-vis the age-group (years), and where the more aged animals show higher prevalence rate, with negativity of all slaughtered animals below one year of age and the small number of females slaughtered (7 sheep and 3 goats).

The fertility percentage of hydatid cysts was slightly higher in goats (55.2%), compared to that of sheep (46.8%), but there were no differences when comparing the two organs of the same animal (Table 5). Contraversely, degenerated cysts were 12.6% in goats and 24.5% in sheep. It is to be noted that the degenerated cysts were highly observed with high aged animals as in this survey. For instance, the examination of a male goat (4 years old) showed a high number of degenerated cysts (3 of 8 in lungs and 7 of 9 in liver). In addition, examining two male sheep aged 3 and 4 years, showed similar results (1of 2 and 7 of 11 in lungs respectively) and in liver (5 of 14 and 15 of 28 respectively). The number of cysts per animal was 20 in sheep (with mean of 14 and 9 per organ in liver and lungs, respectively), while it was 10 in goats (with mean of 6 and 7 per organ in liver and lungs, respectively).

Table (1) : Prevalence of hydatid cysts in sheep and goats slaughtered in Hadhramout (Yemen) during 2005/2006

| Animal | No. examined | No. infected | Infection rate (%) |
|--------|--------------|--------------|--------------------|
| Sheep | 218 | 7 | 3.21 |
| Goats | 422 | 7 | 2.13 |

Table (2) : Location of hydatid cysts in slaughtered animals (sheep and goats)

| Animal Organ | Sheep | | Goats | |
|-----------------|-------|-------|-------|-------|
| | No. | (%) | No. | % |
| Liver only | 2 | 28.57 | 3 | 33.33 |
| Lungs only | 0 | - | 1 | 11.11 |
| Liver & Lungs | 5 | 71.43 | 5 | 55.56 |

Table (3) : Hydatid cysts prevalence by age-group in sheep

| Age-group (years) | No. examined | No. infected | (%) |
|-------------------|--------------|--------------|-------------|
| Below 1 year | 24 | - | - |
| 1-2 years | 171 | 4 | 2.34 |
| 2-3 years | 17 | 2 | 11.76 |
| Over 3 years | 6 | 1 | 16.67 |
| Total | 218 | 7 | 3.21 |

Table (4) : Hydatid cysts prevalence by age-group in goats

| Age-group (years) | No. examined | No. infected | (%) |
|-------------------|--------------|--------------|-------------|
| Below 1 year | 66 | - | - |
| 1-2 years | 301 | 4 | 1.33 |
| 2-3 years | 43 | 3 | 6.98 |
| Over 3 years | 12 | 2 | 16.67 |
| Total | 422 | 9 | 2.13 |

Table (5) : Rate of fertile and degenerated hydatid cysts in sheep and goats

| Animal | Organ of origin | No. of cysts examined | Fertile cysts | (%) | Degenerated cysts | (%) |
|--------|-----------------|-----------------------|---------------|-------------|-------------------|-------------|
| Sheep | Liver | 99 | 47 | 47.5 | 27 | 27.3 |
| | Lungs | 44 | 20 | 45.5 | 8 | 18.2 |
| | Total | 143 | 67 | 46.8 | 35 | 24.5 |
| Goats | Liver | 45 | 25 | 55.6 | 8 | 17.8 |
| | Lungs | 42 | 23 | 54.8 | 3 | 7.1 |
| | Total | 87 | 48 | 55.2 | 11 | 12.6 |

DISCUSSION:

The present findings point to the existence of life cycle essential elements of the cestode *Echinococcus granulosus*. The presence of the adult worms in dogs (Saif, 2001) and the larval stages in sheep (Ali *et al.* 2003) and in sheep and goats (the present survey) confirm one type of biological cycles. The widespread geographical distribution of this disease, is attributed to the worldwide availability of susceptible hosts, and the increasing of environmental pollution (Motassian *et al.*, 1977).

The animals inspected for hydatid cysts, in this survey, showed relatively low rate of infection, compared to the results of studies conducted in some Arabic countries : 4.6% in sheep in Saudi Arabia (Farah *et al.*, 1984), 12.8% in sheep in Kuwait (Hassonah and

Behbehani, 1976), 4% in sheep and 3.6% in goats in Jordan (Al-Yaman *et al.*, 1985), 5.3% in sheep in Morocco (Pandey *et al.*, 1988) and 5.9%, 4.5% in sheep and 5.1%, 3.1% in goats in Iraq respectively (Al-Abbassy *et al.*, 1980 and Molan, 1993), but slightly high compared to the results (0.17% in sheep only) observed by Ali *et al.* (2003). This difference is attributed, perhaps, to the variability of : origin of animals, mode of grazing and other environmental factors. In our survey, the majority of slaughtered animals were bred indoors, and there was a weak practical relationship between animal offal and scavenging dogs, consequently, the cut out of the cycle. Al-Abbassy (1980), attributed the low rate of infection to the different factors as: periodical destruction of dogs, improved standards of meat inspection and overall improvement in socio-economic conditions. In Hadhramout these

sanitary and socio-economic measures were maximally achieved.

The liver was the predilection site of infection both in sheep and goats. These findings were similar to the observations reported by Farah *et al.*, (1984) and Al-Yaman *et al.*, (1985), but did not coincide with those of Pandey *et al.*, (1988), where lungs are the most predominant organs. In addition, the two organs were infected either alone or together (Al-Abbassy *et al.*, 1980, Ali *et al.* 2003).

The older animals were highly infected, while the younger ones had low rate of infection. According to Pandey *et al.*, 1988, this is attributed to two factors. Firstly, higher age reflects a much longer period of risk of infection. Secondly, the chances of detecting cysts at meat inspection are higher in aged animals due to the bigger size of the cyst. In our survey no sheep or goats with less than one year of age were found positive. These findings substantiate what have been reported by Al-Abbassy *et al.*, (1980). A cestode egg, in general, requires at least one year's time before the hydatid cyst stage grows sufficiently to produce protoscolices capable of infecting the carnivore host (Smyth, 1964).

The fertility rate is substantially higher in the two animals; it was higher in sheep (46.8%), compared to that observed by Al-Yaman, (1985), (8.0%), and at limit with the results of Al-Abbassy, (1980), (39.4%), while it was low, compared to 88.2% obtained by Hassonah and Behbehani, (1976). The fertility in goats was higher compared to sheep in our survey and to that reported by Al-Abbassy *et al.*, 1980 (2.0%), and Al-Yaman *et al.*, (1985), (28.6%). Any how, sheep also show high degenerative cysts than goats (24.5% to 12.6% respectively), and the liver shows more degenerative cysts than lungs either in sheep or in goats -because the worm

Echinococcus granulosus exists as a complex of intraspecific variants or strains which differ from one another in a variety of characteristics (different infectivity towards various host species, as well as, in their transmission patterns-(Mac Manus and Smyth, 1986). However, published information pertaining to the epidemiological factors contributing to the infection in Yemen is scanty.

These findings will contribute to the study of basic knowledge about *E. granulosus* maintenance in different potential hosts, its prevalence and geographic distribution all over the country, which may facilitate future control strategies.

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معدل الإصابة بالأكياس المائية في الخراف والماعز المذبوحة في محافظة حضرموت (اليمن)

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تم فحص ٢١٨ من ذبائح الخراف، ٤٢٢ من ذبائح الماعز بين عامي ٢٠٠٥ و ٢٠٠٦م في محافظة حضرموت، للتحقق من وجود الأكياس المائية. فكانت الإصابة بنسبة ٣.٢١% بين الخراف، ٢.١٣% بين الماعز. سادت هذه الأكياس في الكبد في كلا النوعين من الحيوانات، ووجد أن الإصابة تزداد بازدياد عمر الحيوان. هناك اختلافات بسيطة في خصوبة الأكياس بالنسبة للخراف (٤٦.٦%)، والماعز (٥٥.٢%)، أيضاً بالنسبة للعضوين المصابين في كل من الحيوانين. أما بالنسبة لتحلل الأكياس فوجد أنه في الخراف (٢٤.٥%) أكثر منه في الماعز (١٢.٦%).

هذه النتائج تؤكد وجود دورة الحياة والانتقال بين العوائل الأساسية (الكلاب)، والثانوية (الخراف والماعز)، ويتطلب ذلك دراسات مستقبلية لإمطة اللثام عن العوامل التي تؤثر على استمرارية هذه الدورة البيولوجية.