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Bacteriological Study of Liver Abscesses in Sheep in Ahvaz (Iran)

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Abstract: This study was carried out to find the occurrence of liver abscesses and bacterial agents caused them in sheep slaughtered in Ahvaz abattoir in 2005. The animals (n: 576) were selected from two sexes and divided to two age groups (group A: less than 1.5 years and group B: more than 1.5 years). If the abscesses were present, the location and sizes would be recorded and then sampling for bacterial culture was done. Results showed that 50 sheep (8.7%) had liver abscesses. According to presence of abscesses, there was significant difference between two sexes ($p<0.05$) but there was no significant difference between two age groups. Most of the abscesses found in right lobes (60%) and in diaphragmatic surface (66%) of livers. The following bacteria were isolated: *A. pyogenes* (23 cases), *S. aureus* (22 cases) and *C. tetni* (9 cases). *E. coli* (9 cases) and *P. aeruginosa* (1 case). In sex cases, the abscess was sterile.

Key words: Sheep, liver, abscess, abattoir

INTRODUCTION

Liver abscesses usually occur as a result of chronic rumenitis in cattle, but they can be seen rarely in sheep. They can occur in feedlot lambs and other animals fed rations high in grain (Navarre and Pugh, 2002). In lambs, septicemia or extension of an umbilical vein infection can cause liver abscesses (Fetcher, 1983). In most cases, however, liver abscesses are an incidental finding but rarely weight loss, anorexia, depression and decreased production (grown, milk) may occur. Although in the cases of liver abscesses, measuring of liver enzymes and the ultrasonography of the liver may help to detect abscesses (Navarre and Pugh, 2002), but the abscesses usually found in the liver at the time of slaughter or necropsy as well encapsulated with thick fibrotic walls (Nagaraja *et al*., 1996).

Because of studies about liver abscesses in sheep is very little and the frequency of them in Ahvaz was unknown, this study carried out to find the occurrence of liver abscesses and bacterial agents caused them in sheep slaughtered in Ahvaz (Iran).

MATERIALS AND METHODS

Animals: Livers from 576 randomly selected sheep were examined. Specimens were obtained at the local slaughterhouse in Ahvaz in autumn and winter of 2005. The animals were selected from both sexes and divided to two age groups (A: less than 1.5 years and B: more then 1.5 years).

Assessment of the liver abscesses: Liver was examined and the number, location and size of abscesses were record and then sampling for bacterial culture was done.

Statistical analysis: Statistical analysis is performed using Z-test and χ^2 methods.

RESULTS

Prevalence abscesses: Of the 576 sheep examined, 50 (8.7%) had abscesses (Table 1).

Sex: The rate of liver abscesses in male and female was 5.9 and 11.4%, respectively (Table 1). According to presence of abscesses there was significant difference between the two sexes ($p<0.05$).

Age: The rate of liver abscesses in different age groups A and B were 7.4 and 10.4%, respectively (Table 2) and there was no significant difference between them.

Localization and sizes of abscesses: In Table 3 and 4 the frequency of liver abscesses in different liver lobes and surfaces shown, respectively. The frequency of liver

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Table 1: Frequency of liver abscesses in both sexes

Sex	With abscess (%)	Without abscess (%)	Total (%)
Male	13 (5.9)	207 (94.1)	220 (38.2)
Female	37 (11.4)	319 (88.6)	356 (61.8)
Total	50 (8.7)	526 (91.3)	576 (100.0)

Table 2: Frequency of liver abscesses in different age groups

Age	With abscess (%)	Without abscess (%)	Total (%)
Less than 1.5 years	24 (7.4)	302 (92.6)	326 (56.6)
More than 1.5 years	26 (10.4)	224 (89.6)	250 (43.4)
Total	50 (8.7)	526 (91.3)	576 (100.0)

Table 3: Frequency and location of liver abscesses in different hepatic lobes

Location	Right lobe (%)	Left lobe (%)	Right lobe+ left lobe (%)	Quadrate lobe (%)	Total (%)
Frequency	22 (44)	13 (26)	8 (16)	7 (14)	50 (100)

Table 4: Frequency and location of liver abscesses in different hepatic surfaces

Location	Diaphragmatic surface (%)	Visceral surface (%)	Total (%)
Frequency	33 (66)	17 (34)	50 (100)

Table 5: Frequency of bacteria isolated from liver abscesses

Bacteria	Frequency (%)
Arcanobacterium pyogenes	12 (24)
Arcanobacterium pyogenes + *Clostridium tetani*	7 (14)
Arcanobacterium pyogenes + *Staphylococcus aureus*	4 (8)
Staphylococcus aureus	9 (18)
Staphylococcus aureus + *Escherichia coli*	9 (18)
Clostridium tetani	2 (4)
Pseudomonas aeruginosa	1 (2)
No growth	6 (12)
Total	50 (100)

abscesses in right lobes (44%) and diaphragmatic surfaces (66%) more than other lobes and visceral surface. The sizes of 11 abscesses were less than one centimeter in diameter and in 39 cases; they were 1-5 cm.

Bacteriological examinations: The bacteria that isolated from liver abscesses have shown in Table 5. In six cases, the abscesses were sterile.

DISCUSSION

The liver is particularly susceptible to abscesses because it receives blood from several sources, including the hepatic artery, the portal system and the umbilical vein in fetus and neonate. Entry via portal vein is most common route (Nagaraja *et al*., 1996). In cattle (and probably in the other ruminants) erosion of the ruminal epithelium secondary to grain overload, lactic acidosis and ruminitis is thought to be the most common mechanism allowing bacteria like *F. necrophorom* colonization of the liver (Nagaraja and Chengappa, 1998). Hepatic abscesses do not cause clinical signs of hepatic dysfunction unless they are particularly massive or extensively metastatic (Radostits *et al*., 2000). The greatest economic impact of liver abscesses is from reduced animal performance. A number of studies involving comparisons of cattle with and without abscesses have documented that cattle with abscessed livers have reduced feed intake, reduced weight gain, decreased feed efficiency and decreased carcass yield (Nagaraja *et al*., 1996). In addition, hepatic abscess leads to the rejection of the affected livers at the abattoir (Radostits *et al*., 2000).

Liver abscesses occur in any species, but the abscesses of significant economic impact occur in feedlot cattle (Nagaraja *et al*., 1996). However, it can occur in other ruminants, like sheep. In sheep, liver abscess occurs in all breeds, sexes and ages of sheep but the disease usually develops during the early stages of fattening when lactic acid from change in ration occurs. (Jensen, 1974)

Results of this study showed that 50 sheep (7.8%) had liver abscesses. Unfortunately, the studies about liver abscesses in sheep, in compare to cattle are very little. Therefore, a comparison of the results of this study with other studies was difficult. However, in one study of 2042 sheep slaughtered in Jordan, 337 (16.4%) contained abscessed livers (Al-Qudah and Al-Majali, 2002). In addition, in other survey Scahlan (1995) shown that 35 of sheep livers had abscess in USA. It seems, the reason of difference between frequencies of liver abscesses in this survey with other studies is difference management practices and nutrition in these countries. It should be noted that although many factors are involved in occurrence of liver abscess, but diet is the most important one and liver abscesses usually occur after receiving more carbohydrate food that result in ruminitis (Radostits *et al*., 2000).

In this study, there was no significant difference between the two age groups. Jensen (1974) believes, although liver abscess occurs in all ages of sheep, but feedlot lambs 4-6 months of age have a higher incidence than do other age groups. In this study, female sheep had liver abscess more than male and there was significant difference between the two sexes. It expected that the rate of abscess is higher in older sheep and in a herd, female sheep are older than males. The question may rise, as male sheep is breed as feedlot animal rather than females and receive more carbohydrate food than females; therefore, they must be more vulnerable to liver abscess. One can imagine that the female sheep fed with the risky diet before slaughtering and due to their higher age, they more exposed to liver abscess.

Observation of more abscesses on diaphragmatic surface and right lobes of liver can be due to being more exposure of these parts to portal vein blood stream.

Presence of isolated bacteria (*A. pyogenes*, *S. aureus* and *C. tetni*. *E. coli* (9 cases) and *P. aeruginosa*) indicated abscesses forming following ruminitis and reaching bacterial flora from rumen to liver.

According of results of this study and in compare to incidence of hepatic abscess in cattle and in sheep in Jordan, it seems that frequency of hepatic abscesses in sheep in Ahvaz is not high.

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