Research Article

Hydatidosis of slaughtered sheep in Baghdad City; bacteriological study of infected hydatid cyst fluid

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Abstract

Background: Hydatid cyst is an infection caused by cestode species of *Echinococcus granulosus* and often localized in viscera of animals and humans. Hydatid cyst is typically filled with a clear fluid (hydatid fluid) that is sterile bacteriologically. Bacterial infection of hydatid fluid is sometimes present, but not always and this leads to sterilizing the cyst and prevents producing protoscolicies.

Aims: The present work aims to study the prevalence of hydatidosis in sheep slaughtered in Al-Shuala and Al-Karkh abattoirs in Baghdad city and isolation of the possible bacteria that infect hydatid fluid of hydatid cyst.

Materials and Methods: A 6-months period observation of two slaughter slabs of sheep (condemned livers), inspection was done in the same slaughter slabs to assess the hydatid cyst and application of bacteriological examination with culture on the present hydatid cyst fluid.

Results: The study showed that the prevalence of hydatidosis was 124 (9.9%) of 1258 examined livers. Of the 124 hydatid livers, 32 (25.8%) were fertile and the rest were sterile and calcified. A bacteriological study of fertile hydatid cysts has be done under sterile conditions to isolation of bacteria , of the thirty two fertile cyst cultured in this study, 18 (56.3%) were infected with different types of bacterial isolates including *Escherichia coli* (38.9%), *Klebsiella spp*. (27.8%), *Staphylococcus spp*. (25.0%), *Proteus spp*. (11.1%) & *Pseudomonas spp*. (8.2%).

Conclusions: the prevalence of hydatidosis in addition to bacterial infection in liver isolated from sheep seriously affects the keeping quality of liver as an important food production and important to the health of the consumers.

Keywords: Hydatidosis, Prevalence, Bacterial isolates, Sheep's, Slaughter slabs

INTRODUCTION

The affections of the meat-producing animals constitute a major factor that reduces the national income through condemnation of affected animals or through their effect on the growth of animals and lastly on meat production.[1, 2] Different types of affections including hydatid disease and bacterial pathogens can be found in carcasses of slaughtered animal's.[1]

Hydatid cyst, the larval stage or metacestode, is an infection caused by cestode species of the genus *Echinococcus* and often localized in viscera of animals and humans. Hydatid cyst is typically filled with a clear fluid (hydatid fluid) that is sterile bacteriologically. Bacterial infection of hydatid fluid is sometimes present, but not always and this leads to sterilizing the cyst and prevents producing protoscolicies.[3]

Hydatid cyst consists of two layers; laminated "thick outer" layer and germinal "thin inner nucleated" layer. The germinal layer plays a big role in assimilation of nutrients and physiological hemostasis.[4]

The growth of the larval stage produces a single large cyst filled with a clear fluid called hydatid cyst that is sterile bacteriologically. Bacterial infection of hydatid fluid is sometimes present, but not always and this leads to prevention of producing protoscolicies.[3, 5] Bacterial infection may occur as a result of entrance of pyogenic cocci or other well-organized pus-producing spp. to the liver through different routes. These microorganisms play a central role in pathogenesis.[1]

The meat and liver could be considered as an important vehicle in transmitting food borne diseases from animals to man[6] leading to outbreaks of food born poisoning due to consumption of meat contaminated with different pyogens including *Salmonella spp*. and *Staphylococcus spp*.[7, 8]

The aim of the present study was to identify the bacteria infecting the hydatid cysts of the condemned sheep's livers in two slaughter houses in Baghdad city.

MATERIALS AND METHODS

Study area

One thousand two hundred and fifty eight slaughtered sheep were examined at West and North West of Baghdad City during a period of six months (February – July 2011) (531sheep slaughtered in Al-Karkh abattoir and 727 sheep slaughtered in Al-Shuala abattoir).

Sampling and examination

A careful visual postmortem examination was carried out of condemned livers of slaughtered sheep. A total of 124 condemned livers of sheep of both sexes and different ages were examined. Specimens from affected livers were collected and placed in sterile plastic containers and shipped to the laboratory on ice bag. The hydatid fluid was aspirated from the cyst using a sterile syringe and under aseptic conditions for bacterial isolation according to standard bacteriological procedures[9] and identification by biochemical tests.[10, 11]

All the infected livers with hydatid cysts were subjected to the bacteriological examination; the media used for bacterial isolation were Tryptone soya agar, Brain heart infusion broth, Tryptone soya broth, Blood agar medium, Robertson's Medium (cooked meat medium) and MacConkey medium.[9]

RESULTS

The results showed that out of the 1258 examined animals, 124 were infected with the larval stage *Echinococcus granulosus* (Hydatid cyst) giving an overall prevalence of hydatidosis to be 9.9%. These cysts were few in number, small in size, spherical in shape. Of 124 cysts examined in sheep, 32 (25.8%) were fertile and the rest were infertile (Table 1).

Bacteriologically speaking, of those 32 fertile cysts, 18 (56.3%) were infected with different types of bacterial isolates including *Escherichia coli* (38.9%), *Klebsiella spp*. (27.8%), *Proteus spp*. (11.1%), *Pseudomonas spp*. (8.2%), & *Staphylococcus spp*. (25.0%) (Figure 1). The present data pointed out that, the most prevalent isolate in the hydatid cyst infected with pyogens belonged to *Escherichia* followed by *Klebsiella* and *Staphyloccoci*.

Table 1. The distribution of hydatid cysts among condemned livers of slaughter sheep in Baghdad abattoirs.

	Al-Shuala No. (%)	Al-Karkh No. (%)	Total No. (%)
Total sheep slaughtered	727	531	1258
Condemned livers of sheep with hydatid cyst	59 (8.1%)	65 (12.2%)	124 (9.9%)
livers with fertile hydatid cyst	20 (33.9%)	12 (18.5%)	32 (25.8%)
livers with hydatid cyst infected with bacteria	11 (55.0%)	7 (58.3%)	18 (56.3%)

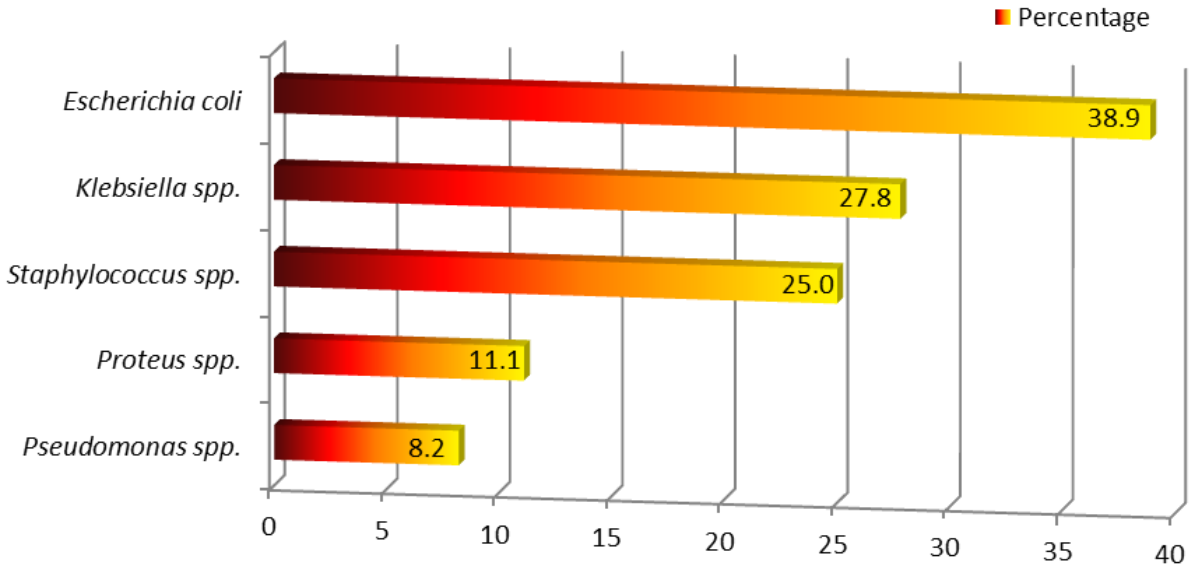

Figure 1. The percentage of bacterial isolates from infected hydatid cyst fluid in condemned livers of slaughtered sheep in Baghdad abattoirs.

DISCUSSION

The liver is an important meat by-products, that need to be kept free from all pathogens including bacteria and parasites that greatly affect the liver tissue rendering it unfit for human consumption through partial or total condemnation in abattoirs.[1, 3]

In the present study, a high percentage of parasitic infection (9.9%) with fertile hydatid cysts in sheep was found. Hydatid cyst is the larval stage in intermediate hosts, it is responsible for the maintenance of the domestic life cycle of *E. granulosus* in the locality although these were lowered by half when infected with bacterial pathogens and then decreased its potential to continue the life cycle. It is important to point out that parasitic remnants (hydatid cyst fluid) provide a nidus for bacterial proliferation.[12] This percentage was higher than that reported by Falah et al. in Iran in which they found 6.5% of the animals in Hamadan and in 7% of the animals in Boroujerd.[3] These differences in the results may be due to the difference in regions and time of research.

Ziino et al. in Italy isolated bacterial spp. from 12 of 25 hydatid cysts from the lung and livers of cattle including *Staphyloccocus* spp., *Salmonella* spp., *Escherichia coli*, and *Proteus* spp.[5] While Falah et al. reported that the most common bacterial isolates *Escherichia coli* (23.94%) and *Klebsiella* (22.5%) followed by *Proteus*, *Enterobacter*, *Staphylococci* B-hemolytic and non-hemolytic, *Pseudomona*, and *Edwardsiella* in Hamadan slaughterhouse (Iran) while the most common bacteria in Boroujerd slaughterhouse (Iran) was *Escherichia coli* (35.7%) and *Klebsiella* (42.8%).[3]

The close relationship between bacterial and parasitic infection was well distinct, although bile is being sterile, due to constant bile flow and the bacteriostatic properties of the bile,[12] the obstruction of biliary system and its stagnation might occur as a result of parasitic infections, then bacteria gain access to the biliary system through either papilla or portal circulation. Although the duodenum and jejunum normally contain only a few gram positive bacteria, when bile flow of liver is interrupted, the small intestine is colonized by colonic type organisms.[12] The presence of granulomas produce by adult trematodes, their eggs in the liver portal triads act as foci for colonization of Staphylococcus species.

Medicinal treatments of animals using some contaminated syringe or using disposable syringe more than one times for treatment of sheep before slaughtering might be an important factor for secondary bacterial infection, by introducing some bacterial spp. through un-sterilized instruments such as *Pseudomonas spp*. In our study *Pseudomonas spp*. was isolated from hydatid fluid in low percentage (8.2%). In addition several cases of

infected hydatid cysts showed polymicrobial infections and this feature might explain that the route of infection might include more than one way.[1] We believe that the permeability of the adventitious capsule, laminated layer and germ layer of hydatid cyst increases with increasing the size of hydatid cyst over time which leads to introduce many types of bacteria in hydatid fluid.

In conclusion, the prevalence of hydatidosis in addition to bacterial infection in livers isolated from sheep seriously affect the keeping quality of liver as an important food production and important to the health of the consumers Therefore, improved sanitary conditions in our slaughter houses, hygienic disposal of the condemned parts as well as treatment of parasitic affections in animals pre-slaughtering must be kept in mind to safeguard consumers. Furthermore, control of parasitic diseases through eradication of stray dogs is an important tool to reduce hydatid diseases in animals.

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