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# Phenotypic Traits of *Echinococcus Granulosus* Parasite Isolated from Cattle and Goats in AL-Diwaniya City, Iraq

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**ABSTRACT:** Hydatid cyst is the larval stage of *Echinococcus granulosus* and is found in tissues of the intermediate host and other structures. It has a spherical or semi-spherical shape and takes the shape of the affected organ, and its size varies with age.

Seven samples of hydatid cysts were collected from the liver and lungs of infected animals, 5 samples from cows and 2 samples from goats. The incidence of liver injury was 57.1%, compared to the lungs, which accounted for 42.9%. The colors of the inner layers of hydatid cysts were studied in both cows and goats. Three colors were found: white with 14.2%, yellow and yellowish-white with 42.9% for each. The lengths of the large hooks (LH) were also studied, which were 26.9 ± 0.585 for goats and 25.9 ± 0.555 for cows.

**KEYWORDS:** Echinococcus. parasite. Hydatid cyst.

## INTRODUCTION

Echinococcosis is one of the most important zoonosis diseases in humans and local animals and represents a public health problem, especially affecting rural and poor communities [1]. Thus, it generates economic losses estimated at millions of dollars annually. In humans, fatal injuries have been recorded due to hydatidosis caused by the explosion of hydatid cysts, which causes shock, with the inability to perform surgical operations to remove cysts in vital organs, especially the brain, which are life-threatening and may be fatal [2].

E. granulosus differs in a wide variety of parameters affecting epidemiology, pathogenesis, infection and control [3].

## MATERIALS AND METHODS

### Samples collection

Seven samples of hydatid cysts were collected for animals, 5 samples for cows and 2 samples for goats. These cysts were identified in the affected organs of cows and goats by examining either the presence of a white or yellowish-white layer on the outer surface of the affected organ, especially in the liver, as it is very clear, the color of the hydatid fluid in fertile samples tends to white yellowish; Because it contained quantities of protoscolices, and in some cysts of the liver and lungs, the fluid tended to yellow, while in some sterile cysts, it was clear white in color.

### Hydatid cysts and their characteristics in cows and goats

During the collection of samples and isolation of the components of the hydatid cysts of animals, some biological aspects were recorded, including the spread of the disease and the identification of the characteristics of the affected organs and the cyst such as color, shape and diameter.

### Isolation of protoscolices and germinal layer

The protoscolices and the germinal layer were isolated by sterilizing the outer surface of the affected organ by following method [4], using 70% ethanol alcohol to prevent contamination, then 10 or 5 ml syringes were used to puncture the cyst from the sides to withdraw the hydatid fluid from it. . 95% of the liquid was withdrawn and placed in test tubes of 10 or 15 ml, one drop of it was placed on a glass slide and covered with the cover of the slide and examined by light microscopy with a power of 100X and 400X to confirm the presence of protoscolices, then a circumferential incision was made in the fibrous envelope (outer) of the cyst using a scalpel and tweezers, then the generated layer was pulled out with forceps and placed inside the preservation vials.

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## RESULTS

### Distribution of Hydatid Cysts According to affected Organs

Cow and goat samples were obtained from the affected organs, which included the liver and lungs, as they formed the largest percentage in the liver compared to the lungs in the affected cows. As for goats, the infection rates were equal for each of the liver and lung organs, as shown in Table (1).

**Table 1.** Distribution of hydatid cysts by affected organs

| Hostinfected Organs | Goats | | Cows | | Total | |
|---|---|---|---|---|---|---|
| | No. | % | No. | % | No. | % |
| Liver | 1 | 50 | 3 | 60 | 4 | 57.1 |
| Lung | 1 | 50 | 2 | 40 | 3 | 42.9 |
| Total. | 2 | | 5 | | 7 | |

**Fig. (1):** Represents the liver of infected cows

### Color of internal layers for hydatid cysts

Three colors of the inner layers of hydatid cysts in cows and goats are white, yellow and yellowish white, as shown in Table (2).

**Table 2.** Color of the inner layers of hydatid cysts in infected animals

| Color | Goats | Cows | No. | % |
|---|---|---|---|---|
| White | 1 | – | 1 | 14.2 |
| Yellowish white | 1 | 2 | 3 | 42.9 |
| Yellow | – | 3 | 3 | 42.9 |
| Total | 2 | 5 | 7 | 100 |

### Hooks measurements

The results of the research showed that the average length of the small hooks (AH) in goats was 22 ± 0.57 µm and the average blade length was 12.2 ± 0.87 µm. As for the (LH), the average length of the (LH) was 26.9 ± 0.58 µm and the average blade length was 14.5 ± 0.64 µm. For cows, the average length of the (AH) was 21.4 ± 0.71 µm and the average blade length was 11.1 ± 0.90 µm. The average length of the (LH) was 25.9 ± 0.55 µm and the average Blade length is 15 ± 0.62 µm, as in Table 3 below.

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**Table 3:** shows the lengths of LH and SH and the lengths of their blades

| Host | Mean ± SEM | | |
|---|---|---|---|
| | Small hook length | The length of her blade | Big hook length |
| Goats | 22 ± 0.579 A | 12.2 ± 0.874 A | 26.9 ± 0.585 A |
| Cows | 21.4 ± 0.714 B | 11.1 ± 0.90 B | 25.9 ± 0.555 B |
| Significant difference (P<0.05) | | | |

**DISCUSSION**

This study showed that the percentage of liver infection in goats was 50% and 50% in the lungs, and the infection rate in cows was 60% in the liver and 40% in the lungs.

It was found in some neighboring countries such as the Kingdom of Saudi Arabia [5] that the liver and lung are the most affected visceral organs in the animals that were examined, as the prevalence rate of infection in the liver was 85.85% in cows and 81.48% in goats, and the same study found that little Of the animals were infected in other organs such as intestines and muscles.

In a study conducted in Iran in Lorestan Province in a study [6], the rates of infection in the liver and lungs in goats were 60% and 40%, and in cows 60% and 40%, respectively, and this is consistent with the current study.

The results of this study differ with another study conducted in eastern Ethiopia on cows, which showed that 54.9% of hydatid cyst infections were in the lungs, 18.3% in the liver and 26.83% in multiple organs as double infections [7]. It differs from the study [8] that was conducted in central Ethiopia on cows and showed that the infection rate in the lungs was 78.38%, while the percentage in the liver was 18.92%, and the infection rate in the spleen and heart was 0.8% for each.

The liver is primarily affected by hydatid cysts, as the hexagonal embryos that penetrate the intestinal mucosa are released. They migrate passively through the blood in the portal vein to the liver. One (or more) embryos develop into a hydatid cyst, which contains the cyst fluid and the protoscolices [9].

The current study showed the presence of three colors for the inner layers of hydatid cysts: white, yellow and yellowish white.

This is consistent with what was mentioned [10] in Kirkuk and Sulaymaniyah, as the layers with yellow color were the layers with the largest percentage, as in cows they were 8.16% white, 10.21% yellowish white, and 81.63% yellow, and in goats 50% of both white and yellowish white, this is in Kirkuk, while in Sulaymaniyah it also agrees with the current study, as the cows were 11.11% white, 27.78%, yellowish white and 61.11%.

The difference in the coloration of the layers surrounding the hydatid cysts between different hosts is due to several reasons, some of which may be related to the host and others due to the parasite itself. The outer lamellar layer is a fibrous capsule made up of white or collagenous fibers, which are strong, pull-resistant fibers formed by fibroblasts, which are from connective tissue cells that are scattered around that layer, and this procedure is part of the body's resistance to hydatid cysts, and this What was supported by the researcher [11] also that the metabolism of the host may be related to the color of the inner layers of the hydatid cysts. As for the causes related to the parasite, it may be due to the different strains of the parasite, its fertility and non-fertility, as well as the chemical components of cysts and hydatid fluid.

The current study showed that there are significant differences between the lengths of the hooks in infected animals.

The current study agreed with the study [12] in Iran, which recorded that the average total length of the large hooks isolated from goats was 22.85 ± 1,400 µm, and their blade length was 13.43 ± 0.400 µm.

The reason for the variation in the measurements of the hooks in the protoscolices may be due to the variation in the hosts, as the internal environment of the host bodies, such as physiological factors, plays a role in the differences in the morphological characteristics of the Echinococcus granulosus parasite, and this supports what was mentioned [13] and the site of infection in the host body plays an important role in determining many morphological traits, in addition to the difference of strains between echinococcosis granulosus, which is supported by [14].

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