The incidence and pathology of cysticercosis in sheep naturally infected with *Cysticercus tenuicollis* larvae

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**Abstract**

Of 427 slaughtered sheep at Al-Diwania abattoir in 1999, 32 sheep (7.4%) were infected with cysticercosis. Peritoneal cavity was the highest infected organ (84.3%). Age variation was noted in infected sheep. The highest infection was in sheep age group of 4 – 6 years and over (19.6%) and the lowest infection was 0% - 3.2% in sheep age groups of 1-3 years. The most important of gross changes was the accumulation of large volume of fluids in the peritoneal cavity which contains immature cyst floating in the fluid. Inflammation areas, hemorrhage routes and distraction were observed in peritoneal parenchyma in both of liver and lung surface. Microscopically changes included fibrous tissues, infiltration of erythrocytes and inflammatory cells surrounded the cyst in liver. Edematous tissue, hemorrhage and exudated fluids were also observed in lungs.

**Introduction**

Cysticercosis is a chronic disease caused by larval stage of *Taenia hydatigena* Tape worm [*Cysticercus tenuicollis*] (14). The parasite causes infection to sheep, goats, cows and other domestic animals. In Iraq (9,10,16) recorded infection of 9.4% of goats, 0.4% of cows and 35.1% of sheep in Arbil province with cysticercosis, while (2) recorded infection of 1% of sheep in Al-Basrah province in 1985. In other countries (3) recorded infection of 20% of Ethiopian sheep with *C. tenuicollis*. Islam and Rashid (7) found the parasite in 5 of 12 sheep in Bangladesh and Beakel (4) found it in 37.1% of Ethiopian sheep. 32.4% of Sudanese sheep were infected with cysticercosis in 1978(6). Many authors (1,2,3,12) indicated to *C. tenuicollis* prevalence mainly in peritoneal cavity and higher rate of infection in old age groups of slaughtered sheep. Several authors (11,12,13) studied the pathology of *C. tenuicollis* in experimentally infected sheep and goats which were killed in 24 hours to 170 days after infection and they found the interstitial hepatitis, dystrophic changes, degeneration of hepatic cells and disturbances in metabolism of glycogen, fats and nucleic acids were the important microscopical changes after 170 days of infection. The purpose of this study is to investigate the histopathological changes in chronic stage of infection of infected organs of sheep in natural infection.

**Materials and Methods**

The study took a sample of 427 sheep slaughtered at Al-Diwania abattoir in 1999. The peritoneal and thoracic cavities, liver, lung, spleen, kidneys and other organs were examined for the presence of cysticercus larvae. The animal sex and age were reported before slaughter. All samples were fixed in 10% neutral buffer formaline and embedded in paraffin wax and then sectioned at 5-6 microns and stained with haematoxyline and eosine stain by using histokineet and microtoms. The prepared sections was examined microscopically at 10x, 40x and 100x lenses.

**Results and Discussion**

**The incidence**

The result in table (1,2) reveal that the incidence of cysticercosis was 7.4% (32 cases) of total examined sheep. The percentage recorded in this work is higher than previously reported in Iraq which was 1-5% in Baghdad and Al-Basrah (2,16) and lower than in north regions of Iraq such as
Arbil and Al-Mousil which were 9.8%-35.1% of sheep (8,9,10). This similar or difference may be due to the prevalence of stray dogs nearby the abattoirs (final host), weather, period of study and endemic the parasite in each region. There was age variation noticed among these animals (Table.1) the percent of infection was higher in sheep age groups of 4-6 years and over (19.8%) then in age groups of 3-4 years, these results is consistent with the previous results reported in Iraq (1,2) and this may be due to the period risk of the old ages sheep to infectious diseases are more than the young ages. Peritoneal cavity was the most frequently organ (84.3%), then liver and lung were less than (9.3%,6.2% respectively), that is consistent with other studies in Iraq (1,2,3) and other countries (5,12,13,15).

**Histopathological changes**

**Gross changes :**
The histopathological changes of cysticercosis was studied in peritoneal cavity, liver and lung. In the chronic phase of infection the most important gross changes included accumulation of large volume of fluids in peritoneal and thoracic cavities with small milky cysts ranging from 3-9 cm in radial and 1-3 cysticerci in number hung in peritoneal cavity wall or floating in the fluid. These cysts represent cysticercus larvae of *T. hydatigena* (Figer-1-), that is similar to those reported by (11,12,13) that was founs accumulation of serofibrinous fluid in peritoneal and thoracic cavities on 14<sup>th</sup>-17<sup>th</sup> days after infection with cysticerci. In acute phase, the severe inflammation, circular red areas with focal pores areas and haemorrhage routs were observed in the peritoneal paranchyma in both of liver and lung surface (Figer-2-) that is due to the migration of parasite larvae(11).

**Microscopical changes :**
The microscopical changes in liver included fibrous tissues and erythrocytes surrounded the cystlike chanals (Figer-3-) with infeltration of inflamatory cells such as lymphocytes, neutrophils, eosinophils, monocytes in addition to giant cells and phagocytes in some chronic cases (Figer-4-). Degeneration changes, destruction and focal areas in hepatic cells were noticed in other cases (Figer-5-). In infected lungs noteced precence oedematious tissues, haemorrhage in addition to exudated fluids between alveoli (Figers 6,7-) and that similar to that reported by (11,13).

**Table (1) incidence of *Cysticercus tenuicollis* in sheep according to age group.**

<table>
<thead>
<tr>
<th>Age/Year</th>
<th>Examined No.</th>
<th>Infected No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-2</td>
<td>37</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>2-3</td>
<td>92</td>
<td>3</td>
<td>3.0</td>
</tr>
<tr>
<td>3-4</td>
<td>86</td>
<td>7</td>
<td>8.1</td>
</tr>
<tr>
<td>4 – over 6</td>
<td>112</td>
<td>22</td>
<td>19.6</td>
</tr>
<tr>
<td>Total</td>
<td>427</td>
<td>32</td>
<td>7.4</td>
</tr>
</tbody>
</table>

**Table (2) distribution of infection with *Cysticercus tenuicollis* on organs.**

<table>
<thead>
<tr>
<th>Organ</th>
<th>Infected No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peritoneal cavity</td>
<td>27</td>
<td>84.3</td>
</tr>
<tr>
<td>Liver</td>
<td>3</td>
<td>9.3</td>
</tr>
<tr>
<td>Lung</td>
<td>2</td>
<td>6.4</td>
</tr>
<tr>
<td>Total</td>
<td>32</td>
<td>100</td>
</tr>
</tbody>
</table>
Fig. (1) *Cysticercus tenuicollis* larva from peritoneal cavity of infected sheep.

Fig. (2) Haemorrhage routes caused by migration of larvae through the liver
Surface (40 X).
Fig. (3) Fibrous tissues & erythrocytes surrounded the cyst in liver (40 X).

Fig. (4) Degenerative changes with infiltration of inflammatory cells (Lymphocytes, Eosinophils & Neutrophils) (400 X).
Figer (5) Destruction & focal areas in hepatic cells (200 X).

Figer (6) Oedematious tissues with exudated fluids between alveoli of lung (40 X).
Figer (7) Fibrous tissues with inflammatory cells in infected lung (100 X ).

References


Cysticercus tenuicollis

الرقي

الخلاصة

من مجموع 427 رأسا من الأغنام المذبوحة في مجزرة الديوانية خلال العام 1999، وجد أن 32 رأسا منها (7.4%) كانت مصاباً بهياكل الكيسيات الناجم عن الإصابة بالطور البريقي C. tenuicollis. أظهرت الدراسة أن أعلى نسبة للإصابة في الاعضاء كان في التневيف البريتي حيث بلغت 84.3%، كما لوحظ أيضا وجود فروق معنوية واضحة في نسبة الإصابة بين المجاميع العمرية المختلفة للاغنام حيث ظهرت أعلى نسبة للإصابة في الفئة العمرية 4-6 سنوات 19.6% بينما ظهرت أقل نسبة للإصابة في الفئة العمرية 1-3 سنوات 3.2%. تم خلال هذه الدراسة أيضاً تحديد أهم التغيرات المرضية الناجمة عن الإصابة بهذا الداء حيث لوحظ أن أهم التغيرات المرضية الديكية هي تجمع كميات كبيرة من السوائل الليفيّة في التجويف البريتي للاعطم ليفي. الفئران والذباب دماغية في جدران هذا التجويف أو طافية في السائل البريتي. كما ظهر أن الأحياء لم تتأثر في مراحل نتيجة التطور. بفضل هذه الدراسة يمكن أن يكون الأكياس النفيسي الحاد في الاعضاء الحيوينة مفيدة في تجربة التطور النوعي للاعطم ليفي. كما يمكن أن تكون الأكياس النفيسي الحاد في الاعضاء الحيوانية مفيدة في تجربة التطور النوعي للاعطم ليفي. كما يمكن أن تكون الأكياس النفيسي الحاد في الاعضاء الحيوانية مفيدة في تجربة التطور النوعي للاعطم ليفي. كما يمكن أن تكون الأكياس النفيسي الحاد في الاعضاء الحيوانية مفيدة في تجربة التطور النوعي للاعطم ليفي. كما يمكن أن تكون الأكياس النفيسي الحاد في الاعضاء الحيوانية مفيدة في تجربة التطور النوعي للاعطم ليفي. كما يمكن أن تكون الأكياس النفيسي الحاد في الاعضاء الحيوانية مفيدة في تجربة التطور النوعي للاعطم ليفي. كما يمكن أن تكون الأكياس النفيسي الحاد في الاعضاء الحيوانية مفيدة في تجربة التطور النوعي للاعطم ليفي. كما يمكن أن تكون الأكياس النفيسي الحاد في الاعضاء الحيوانية مفيدة في تجربة التطور النوعي للاعطم ليفي. كما يمكن أن تكون الأكياس النفيسي الحاد في الاعضاء الحيوانية مفيدة في تجربة التطور النوعي للاعطم ليفي. كما يمكن أن تكون الأكياس النفيسي الحاد في الاعضاء الحيوانية مفيدة في تجربة التطور النوعي للاعطم ليفي. كما يمكن أن تكون الأكياس النفيسي الحاد في الاعضاء الحيوانية مفيدة في تجربة التطور النوعي للاعطم L.