Prevalence of Cysticercus tenuicollis in slaughtered sheep and goats by season, sex, age, at Karbala abattoir, Iraq

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ABSTRACT
Objective: The aim of this study is determine the prevalence of Cysticercus tenuicollis in sheep and goats at abattoir in Karbala, Iraq.

Methods: The current study was conducted for six months from July to December 2017. The samples were collected from the sheep and goats in Karbala governorate and the work was done in the postgraduate laboratory at the Faculty of Veterinary Medicine at Karbala University.

Results: The results of the study showed that the highest rate of infection of sheep and goats in general was higher in the month of September, 42.65%, August, 45.57%, respectively, while the lowest rate of infection was in October, November, the rate of 30.91%, 28.40%, respectively.

As for the percentage of infection by sex, the rates of infection of males and females for the sheep and goat ranged between 29.16% to 38.09% and 20% to 40.65% respectively. Infection rates by age, the proportion of sheep and goat less than one year was 24.86% – 41.64%, 27.20% – 41.95%, while the largest sheep and goat more than one year was 26.11% – 43.64%, 21.42% – 50%, respectively.

Conclusion: The results of the study showed no difference in the incidence of infection between males and females, and between less than one year and more than one year.

INTRODUCTION
The larval stage of Taenia hydatigena is Cysticercus tenuicollis (metacestode) 1,2,3 which reported in a wide variety of mammalian hosts such as sheep, goat, cattle, pig, as well as human 1,2,4,5. The larval stage are found attached to the mesentery, omentum, and occasionally on the liver surface; however, unusual locations of C. tenuicollis have been described as lungs, kidneys, brain, and reproductive system such as ovaries, uterus, uterine tubes, cervix, and vagina 1,5. While the adult stage (Taenia hydatigena) are found in the intestine of final hosts (Dogs, wolf, hyaena and other wild carnivores are the final hosts) which can harbour this parasite from several months to a year or more 1,5. The life cycle of Taenia hydatigena, start when lays eggs which pass out...
in the faeces of the final host and are ingested by the ruminant intermediate host during grazing. The intermediate host becomes infected by ingesting of proglottids or eggs passed in the faeces of the final hosts in pastures or feeding areas. Eggs reach small intestine and then hatch in to oncospheres which carried in the blood to the liver (which they migrate for about 4 weeks before they emerge on the surface of this organ and attach to the peritoneum) and other visceral organs like the, lung, heart, kidney. Within another 4 weeks each develops into the large metacestode. The final host infected by eating infected meat with larval stage which their scolex liberated and adheres to mucosal layer of intestine. After 51 days the worm becomes mature.

Pathogenicity of adult parasites is not high for definitive hosts. Cysticercosis (caused by Cysticercus tenuicollis) have two clinical forms in sheep, and goat the acute and the chronic one. The purpose of this study was to determine the prevalence of sheep, and goat infected with Cysticercus tenuicollis in certain areas of Karbala during six months.

**MATERIALS AND METHODS**

A total of 240 sheep, and 240 goats were examined for one year. Two visits per months were made to the Karbala abattoir during six months period (from Julay to December 2017). The larval stage which was found in omentum of this animals. In this study were recorded for slaughtered animals seasons, sex and age. The samples were collected from the sheep and goats in Karbala governorate and the work was done in the postgraduate laboratory at the Faculty of Veterinary Medicine at Karbala University.

**RESULTS**

A total of 240 sheep, and 240 goats were examined. The larval stage which found on omentum of carcases. At Julay month the number of examined carcases was 40 goat and 40 sheep. The total infection rate of the goat more than sheep was 35.41%, 32.5% respectively, as well as the infection rate of female goat higher than female sheep was 41.66%, 37.5%, respectively, while the male infection rate of goat and sheep was 29.16%, 27.5%, respectively, as well as the infection rate of goat more than one year higher than sheep less than one year was 29.16%, 27.5%, respectively. At August month the number of examined carcases was 40 goat and 40 sheep. The total infection rate of the goat higher than sheep was 45.57%, 34.58% respectively, as well as the infection rate of female goat higher than female sheep was 50.5%, 35.41%, respectively, as well as the male infection rate of goat higher than the male infection rate of sheep was 40.65%, 33.75% and the infection rate of goat less than one year higher than sheep less than one year was 41.95%, 31.66%, respectively, as well as the infection rate of goat more than one year higher than sheep more than one year was 49.2%, 37.5% respectively as showed in the Table 2. At degree of freedom 0.05 the cl. x² to the male and female goat = 0.153, and the cl. x² to the less and more one year = 0.101 while the cl. x² to the male and female sheep = 0.019, and the cl. x² to the less and more one year = 0.08.

At September month the number of examined carcases was 40 goat and 40 sheep. The total infection rate of the goat lower than sheep was 39.5%, 42.65%, respectively, while the infection rate of female goat higher than female sheep was 47.22%, 42.22%, respectively, while the male infection rate of goat lower than the male infection rate of sheep was 31.78%, 38.09% and the infection rate of goat less than one year lower than sheep less than one year was 39.72%, 41.66%, respectively, as well as the infection rate of goat more than one year lower than sheep more than one year was 39.28%, 43.64%, respectively, as showed in the Table 3. At degree of freedom 0.05 the cl. x² to the male and female goat = 0.271, and the cl. x² to the less and more one year = 0.004 while the cl. x² to the male and female sheep = 0.007, and the cl. x² to the less and more one year = 0.192. At October month the number of examined carcases was 40 goat and 40 sheep. The total infection rate of the goat lower than sheep was 33.48%, 30.91%, respectively, while the infection rate of female goat higher than female sheep was 39.77%, 25.4%, respectively, while the male infection rate of goat lower than the male infection rate of sheep was 27.2%, 36.42%, and the infection rate of goat less than one year lower than sheep less than one year was 27.2%, 35.57%, respectively, as well as the infection rate of goat more than one year higher than sheep more than one year was 39.77%, 26.11% respectively as showed in the Table 4. At degree of freedom 0.05 the cl. x² to the male and female goat = 0.386, and the cl. x² to the less and more one year = 0.671 while the cl. x² to the male and female sheep = 0.126, and the cl. x² to the less and more one year = 0.011. At November month the number of examined carcases was 40 goat and 40 sheep. The total infection rate of the goat lower than sheep was 28.4%, 34.43% respectively, while the infection rate of female goat higher than female sheep was 38.8%, 31.94% respectively while the male infection rate of goat lower than the male infection rate of sheep was 20%, 36.93% respectively while the infection rate of goat less than one year higher than sheep less than one year was 35.38%, 29.86% respectively, while the infection rate of goat more than one year lower than sheep more than one year was 21.42%, 39.01% respectively as showed in the Table 5. At degree of freedom 0.05 the cl. x² to the male and female goat = 0.049, and the cl. x² to the less and more
one year = 0.046 while the cl, $x^2$ to the male and female sheep = 0.198, and the cl. $x^2$ to the less and more one year = 0.026. At Desember month the number of examined carcasses was 40 goat and 40 sheep. The total infection rate of the goat higher than sheep was 39.44%, 33.14% respectively as well as the infection rate of female goat higher than female sheep was 38.88%, 31.58%, respectively and the male infection rate of goat higher than the male infection rate of sheep was 40%, 34.75% respectively as well as the infection rate of goat less than one year higher than sheep less than one year was 28.88%, 24.86% respectively, and the infection rate of goat more than one year higher than sheep more than one year was 50%, 41.42% respectively as showed in the Table 6. At degree of freedom 0.05 the cl. $x^2$ to the less and more one year = 0.771 while the cl. $x^2$ to the male and female goat = 0.01, and the cl. $x^2$ to the less and more one year = 0.042.

Table 1: Numbers and infection rates with cysticercus tenuicollis for slaughetered goats and sheep at July

<table>
<thead>
<tr>
<th>Animal Age</th>
<th>Examined animals</th>
<th>Infection animals</th>
<th>Infection rates</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Female</td>
<td>Male</td>
<td>Female</td>
</tr>
<tr>
<td>Goat less than one year</td>
<td>18</td>
<td>8</td>
<td>6</td>
</tr>
<tr>
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<td>20</td>
<td>2</td>
</tr>
<tr>
<td>Goat more than one year</td>
<td>8</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>Sheep more than one year</td>
<td>8</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Total goat sheep</td>
<td>26</td>
<td>14</td>
<td>10</td>
</tr>
<tr>
<td>Total sheep</td>
<td>16</td>
<td>24</td>
<td>6</td>
</tr>
</tbody>
</table>

Table 2: Numbers and infection rates with cysticercus tenuicollis for slaughetered goats and sheep at August

<table>
<thead>
<tr>
<th>Animal Age</th>
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<th>Infection rates</th>
</tr>
</thead>
<tbody>
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<td>Male</td>
<td>Female</td>
</tr>
<tr>
<td>Goat less than one year</td>
<td>11</td>
<td>13</td>
<td>5</td>
</tr>
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<tr>
<td>Sheep more than one year</td>
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<td>6</td>
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<tr>
<td>Total goat sheep</td>
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<td>20</td>
<td>10</td>
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<tr>
<td>Total sheep</td>
<td>16</td>
<td>24</td>
<td>8</td>
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</tbody>
</table>

Table 3: Numbers and infection rates with cysticercus tenuicollis for slaughetered goats and sheep at September

<table>
<thead>
<tr>
<th>Animal Age</th>
<th>Examined animals</th>
<th>Infection animals</th>
<th>Infection rates</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Female</td>
<td>Male</td>
<td>Female</td>
</tr>
<tr>
<td>Goat less than one year</td>
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<td>20</td>
<td>4</td>
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<td>Sheep less than one year</td>
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<td>6</td>
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<tr>
<td>Goat more than one year</td>
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<tr>
<td>Sheep more than one year</td>
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<td>7</td>
<td>4</td>
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<tr>
<td>Total goat sheep</td>
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</table>

Table 4: Numbers and infection rates with cysticercus tenuicollis for slaughetered goats and sheep at October

<table>
<thead>
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<th>Infection rates</th>
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<td>Female</td>
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<td>Female</td>
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<tr>
<td>Goat less than one year</td>
<td>8</td>
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<tr>
<td>Total goat sheep</td>
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<td>8</td>
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<tr>
<td>Total sheep</td>
<td>16</td>
<td>24</td>
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Discussion

Iraq as one of the endemic areas of Taenia hydatigena in dogs as final hosts, and livestock (sheep, goats and cattle) as intermediate hosts. The results of the present study showed that sheep and goats were infected with C. tenuicollis. The higher rate sheep infection at September was 42.65% which agree with result of [17], and with [18] in Burkina Faso, while the low rate sheep infection at October was 30.91% which similar result in Egypt and [20] in Nigeria, but it different with [21] in Iraq and [22] in Ethiopia.

The results of the study showed that the highest rate of infection of goats in general was higher in the month of August, 45.57% which agree with result of [23] in Pradesh Uttar of India and [24] in Ethiopia, while the low rate goat infection at November was 28.40% which agree with result of [25] in Iraq and [26] in Egept as well as [27] and [28] in Sudan, but it different with [29] in Iraq and [30] in Mazandaran province in Iran and [31] in Ethiopia.

The infection rates according to sex, the male infection rate of sheep was 29.16% - 38.09% which agree with result of[32] in the Ethiobia, but it different with some studies in Iran such as [33] in Tabrez city and [34] in Mazandaran province. while the male infection rate of goat was 20% - 40.65% which agree with result of [35] in Basrah in Iraq, and with result of [36] in the Ethiobia, but it different with [37] in Tabrez city and [38] in Mazandaran province in Iran.

On the other hand the female infection rate of sheep was 25.4% - 47.22% which agree with result of[39] in the Ethiobia, but it different with [40] in Basrah in Iraq, and [41] in Tabrez city. While the female infection rate of goat was 36.80% - 50.50% which was higher than [42] in Basrah in Iraq, and [43] in Tabrez city but agree with result of [44] in the Ethiobia. The infection rate according to age, the infection rate of sheep less than one year was 24.86% - 41.64% which agree with [45] in center of Ethiobia, but it different with [46] in Sokoto, Nigeria, and with [47] in Ethiopia and [48] in Mazandaran province in Iran, while the infection rate of sheep more than one year was 26.11% – 43.64 % which agree with [49] in center of Ethiobia and [50] in Burkina Faso, but it different with [51] in Sokoto, Nigeria and with [52] in Ethiopia. The infection rate of goat less than one year was 27.20% - 41.95% which different with [53] in Ethiopia and with [54] in Egypt, but agree with [55], while the infection rate of goat more than one year was 21.42% – 50 % which agree with [56] and [57], but it different with [58] in Ethiopia and with [59] in Iraq.

The main reasons of variation in the prevalence mainly account to management system prevailing in the local areas and the grazing behaviour, and the main causes of the persistence of the disease was the presence of stray dogs in pastures and beside abattoirs. The rate infection of goat was higher than rate infection of sheep because most sheep develop protective immunityyearly in life and this immunity regulate the parasite population, while goat develops the immunity more sloly.

REFERENCES


