Prevalence and pathogenicity of Haemonchosis in sheep and goats in Hilla city/Iraq

Mohammad Hadi Mohammad AL-Hasnawy
College of Veterinary Medicine – Green University of AL-Qasim
mrm8299@yahoo.com

Abstract
This study was conducted to investigate the infection rate in sheep and goats with Haemonchosis in the Hilla city, during the period from November 2012 to March 2013. The results showed that the infection rate in sheep and goats *Haemonchus contortus* was 32.35% (66 of 204), these results showed no significant variation (P>0.05) in the infection rates between sheep and goat where recorded infection rates 34.51% (39 of 113) in sheep and 29.67% (27 of 91) in goats. Also, no significant variation (P>0.05) between sexes of infected sheep and goat which recorded highest infection in female sheep and goats were 48.64% and 39.53% respectively, while they were 27.63% and 20.83% respectively in males. According to age of examined animals, the results appeared no significant variation (P>0.05) between ages of infected sheep and goat where referred to the rates of infection were inversely proportional to the age of the animal, and the highest infection rate in the ages of 6-12 months in sheep and goats at a rate of 45.65% and 48.57%, respectively. As for the examination of tissue samples of infected fourth stomach of sheep and goats, the results indicated presence of clear histological changes characterized the presence of necrosis in mucous layer and thickening layer of muscle and hyperplasia of the parietal cells with edema, in addition infiltration by polymorph inflammatory cells and fully fibrosis for some glandular cells of the fourth stomach.

Key word: Haemonchosis, histopathological changes, sheep, goat.

Introduction
Internal parasites represented an important cause of disease and lose of production in small ruminants (Zajac, 2006). Gastrointestinal nematodes are recognized as a major constraint to both small and large-scale small ruminant production in developing countries (Martinez-Gonnalez, et al., 1998). These could be harmful to the health different regions of infected animals and causes economic losses due to mortalities, reduce weight gain and other production losses (Skerman et al., 1967, Sissay, et al., 2007). *Haemonchus contortus* is a trichostrongylate nematode (also known as the barber pole worm) which resides in the abomasum of sheep, goat sand other ruminants and have direct life cycle (Davidson et al., 1980; Bowman, 2009), and it causes severe anaemia and death in severely infected animals (Allonby and Urquhart 1975; Ogundola et al., 2006; Okaiyeto et al., 2010), and
effect on the productive and physiological parameters of the ruminants especially sheep and goat, The depression of weight gain of the infected animals may be duo to loss of appetite (Bisset et al., 2001), due to inflammatory changes in the abomasum’s wall cells during the larval and adult stages (Beriajaya and Copeman, 2006).

Several epidemiological studies on the gastrointestinal nematodes (GIN) infection were carried out to depict the seasonal pattern of haemonchosis in different agro-ecological areas of the world (Gupta et al., 1987; Fritsche et al., 1993; Miller et al., 1998; Hoste et al., 2001; Agyei, 2003; Ng’ang’a et al., 2004).

The present study was conducted to determine the prevalence of *Heamonchus contortus* of sheep and goats in Hilla city, Babylon province, Iraq and detect the infection percentages that depended on animal species, sexes, and ages of infected animals, In addition to exam histological changes associated with infection.

**Materials and Methods**

**Samples collection**

A total of 204 (113 sheep and 91 goats) abomasal samples were collected from different ages, sexes of slaughtered sheep (76 males and 37 females) and goats (48 males and 43 females) at Hilla abattoir in Babylon province between November 2012 to March 2013. The abomasums was removed from the abdominal cavity and ligated at both ends and placed in labeled containers then immediately taken to the laboratory for appropriate examinations.

**Storage and sample preparation of *Heamonchus contortus***

The abomasums was opened along its greater curvature with scissors and examined for the presence of adult worm, dissect the tract wall and take the contents in clean physiological saline, then let it stand for 15 minute and make worms precipitate, then a tightly sealable container that contain the worm as it is expanded and fixation with 70% ethyl alcohol and take a sample that has been fixed in a Petri dish and make a two-fold dilution of lactophenol solution with water. Add the solution to the Petri dish until the worm is immersed completely (Skerman and Hillard, 1966; Wood, et al., 1995; Minami, 2001). Identification the parasites

According to (Bowman, 2009) with use the light microscope, the parasites were diagnosed depended on some morphological characters as length, vulvar flap, anterior end, posterior end, and presence barber pole in females of *Heamonchus* worm, in addition, *Haemonchus contortus* is probably the only nematode parasite of sheep and goats that can be accurately diagnosed without the aid of laboratory testing (Donald, 1968; Waller and Donald, 1970).

**Histopathological examination**

A 2cm from each 43 samples of infected abomasums fixed and prepared for histopathological examination. Tissue fragments were fixed in 10% formalin solution (for 72 hours), after stabilizing embedded in paraffin and by microtom and histokinate , the samples were sectioned then stained with hematoxylin and eosin stain then examined by the light microscope. ( Luna, 1968 ; Al-Mukhtar, et al., 1982). All the samples were examined with aid Dr.Hassan Khalaf, Laboratory of clinical pathology in college of veterinary medicine, university of Al-Qadisiya.

**Statistical analysis**

Statistical analysis using spss software and Chi-square test was applied for the statistical analysis of the data (Petrie and Watson, 1999).
Results and discussion

Results showed infection of the fourth stomach of the sheep and goat with *Haemonchus contortus* and severity of infection varied from one animal to another and diagnosed grossly the worms especially the females through the shape of form ovaries coiled around the intestines and which gives the distinctive shape known barber pole figure (1,2,3).

The results recorded that the total infection rate of sheep and goat with *Heamonchus contortus* was 32.35% (66 out of 204), these results were agreement with Qamar et al., (2009) that recorded infection rate was 28.79% in sheep and goat of Punjab in Pakistan. The results showed no significant variation (P>0.05) in the infection rates between sheep and goat, the results in sheep were recorded infected rate 34.51% (39 of 113) comparative with what were recorded in goats 29.67% (27 of 91) table (1). These results were agreement with Omer, (1999) in Sudan who was recorded infection rate 32% in sheep, and Jabeen, *et al.* (2000) and Gadahi, *et al.* (2009) in sheep of Pakistan that recorded infection rates 32%, 28.88% respectively, and agreement with Akkari, *et al.* (2013) that recorded infection rate 33.6% in goat of Béja, Tunisia. while no agreement with Tasawar, *et al.*, (2010) who recorded 77.7% in sheep of Pakistan, also with Fentahun and Luke, (2012) who recorded in Ethiopia high infection rates in sheep and goats 81.2% and 73.5% respectively. That reasons of low percentage of overall infection in present study compared with some studies may be due to the use of anthelminthes periodically and regularly for most of the study area herds.

Figure (1): *Haemonchus contortus* isolated from abomasums of infected animals

Figure (2): the lancet in buccal cavity of *Heamonchus* worm (black arrow) 40X.
Figure (3): the vulvar flap in female of worm (black arrow) 10X.

Table (1): the infection rates according to types of examined animals.

<table>
<thead>
<tr>
<th>Types of animal</th>
<th>No. of examined animals</th>
<th>No. of infected animals</th>
<th>Percentages (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sheep</td>
<td>113</td>
<td>39</td>
<td>34.51 a</td>
</tr>
<tr>
<td>Goats</td>
<td>91</td>
<td>27</td>
<td>29.67 a</td>
</tr>
<tr>
<td>Total</td>
<td>204</td>
<td>66</td>
<td>32.35</td>
</tr>
</tbody>
</table>

*Chi square value: 2.18

According to sex of examined animals, The results showed no significant variation (P>0.05) between sexes of infected sheep and goat where recorded high percentage in females of sheep 48.64% while in males were 27.63% (table 2), also the high infection was recorded in females of goats 39.53% while in the males were 20.83% (table 3), these results fitted with some authors Asanji & Williams, (1987); Pal & Qayyum, (1993); Maqsood et al.(1996); Komoin et al. (1999); Valcarcel & Romero, (1999); Gauly et al. (2006);Qamar et al. (2009) and Tehrani et al. (2012). The high infection in present study in females comparison with males possibly due to the numbers of females over males in the herd and the length of the period of their presence in the pasture.

Table (2): the infection rates according to sex of examined sheep.

<table>
<thead>
<tr>
<th>Sex (sheep)</th>
<th>No. of examined animals</th>
<th>No. of infected animals</th>
<th>Percentages (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Males</td>
<td>76</td>
<td>21</td>
<td>27.63 a</td>
</tr>
<tr>
<td>Females</td>
<td>37</td>
<td>18</td>
<td>48.64 a</td>
</tr>
<tr>
<td>Total</td>
<td>113</td>
<td>39</td>
<td>34.51</td>
</tr>
</tbody>
</table>

*Chi square value: 0.24

Table (3): the infection rates according to sex of examined goat.

<table>
<thead>
<tr>
<th>Sex (goat)</th>
<th>No. of examined animals</th>
<th>No. of infected animals</th>
<th>Percentages (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Males</td>
<td>48</td>
<td>10</td>
<td>20.83 a</td>
</tr>
<tr>
<td>Females</td>
<td>43</td>
<td>17</td>
<td>39.53 a</td>
</tr>
<tr>
<td>Total</td>
<td>91</td>
<td>27</td>
<td>29.67</td>
</tr>
</tbody>
</table>

*Chi square value: 1.82
As for the rate of infection by age, the results showed no significant variation \((P>0.05)\) between ages of infected sheep and goat and referred to inversely proportional between the rate of infection and the age of the animal where recorded the high rate of infection in young ages \((6-12)\) months in sheep and goats \(45.65\%\), \(48.57\%\) respectively table \((4),(5)\). These results appeared rapprochement with Qamar et al., (2009) who found the higher infection rate in animals below 9 months of age than above 9 months, in addition Maqsood et al.,(1996) reported that the prevalence of haemonchosis was higher in both sheep and goats less than two years of age compared with those of above two years, also agreement with Assoku, (1981); Gibbs, (1986); Asanji & Williams, (1987); Pal & Qayyum, (1992); Maqsood et al.,(1996); Vlasoff et al.,(2001); Magona and Musisi, (2002); Vanimisetti et al.,(2004); and Lateef et al.,(2005). The reasons of these results may be back to less infection frequent in which lead to less susceptibility of immune system to new infection, or the old animal become more resistance for infection (Silverman & Patterson, 1960).

<table>
<thead>
<tr>
<th>Ages of sheep (months)</th>
<th>No. of examined animals</th>
<th>No. of infected animals</th>
<th>Percentages (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6-12</td>
<td>46</td>
<td>21</td>
<td>45.65 a</td>
</tr>
<tr>
<td>13-24</td>
<td>33</td>
<td>14</td>
<td>42.42 a</td>
</tr>
<tr>
<td>25-48</td>
<td>21</td>
<td>3</td>
<td>14.28 a</td>
</tr>
<tr>
<td>49-72</td>
<td>13</td>
<td>1</td>
<td>7.69 a</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>113</strong></td>
<td><strong>39</strong></td>
<td><strong>34.51</strong></td>
</tr>
</tbody>
</table>

*Chi square value: 0.23

Table (4): the infection rates according to ages of examined sheep.

<table>
<thead>
<tr>
<th>Ages of goat (months)</th>
<th>No. of examined animals</th>
<th>No. of infected animals</th>
<th>Percentages (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6-12</td>
<td>35</td>
<td>17</td>
<td>48.57 a</td>
</tr>
<tr>
<td>13-24</td>
<td>31</td>
<td>9</td>
<td>29.03 a</td>
</tr>
<tr>
<td>25-48</td>
<td>17</td>
<td>1</td>
<td>5.88 a</td>
</tr>
<tr>
<td>49-72</td>
<td>8</td>
<td>Zero</td>
<td>Zero a</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>91</strong></td>
<td><strong>27</strong></td>
<td><strong>29.67</strong></td>
</tr>
</tbody>
</table>

*Chi square value: 1.81

On the other hand, the results referred to histopathological changes on mucosal layer of examined abomasums in sheep and goats. The infected abomasums were characterized by necrosis of mucosa with thickening of muscularis layer of mucosa (figure 4,5), and hyperplasia of parietal cells (glandular epithelium of the mucosa) with edema (figure 6) and infiltration of polymorph inflammatory cells (figure 7), in addition, the results were appeared debris of parasite with completely fibrosis in glandular tissue of abomasums figure (8), most present results were agreement with Omer, (1999); Scott et al.(1999); Mir, et al., (2007); Tehrani et al., (2012), also coincided some authors results Bendixsen, et al., (1995); Ballc, et al., (2000b); Perez, et al., (2003); Huntley, et al., (2004); Bricarello, et al., (2004); and Amarante, et al., (2005) with the current study who observed cellular infiltration, dilatation of the gastric glands, ulcers, edema, hemorrhage and an increase in the number of mastocytes and eosinophils. The reasons of histopathological changes that accompanied this infection Probably due to the attachment of the parasites with abomasums mucosa and immune responses which occur in infection areas.
Figure (4): the necrosis of mucosa with thickening of muscularis layer of mucosa (black arrow) in abomasums. hematoxylin and eosin stain 40 X.

Figure (5): the necrosis of some mucosal tissue (black arrow) while other still viable and normal (yellow arrow) of abomasums mucosa. hematoxylin and eosin stain 40 X.
Figure (6): Section of abomasum characterized by hyperplasia of parietal cells (glandular epithelium of the mucosa) with edema (black arrows). hematoxylin and eosin stain 40 X.

Figure (7): Section of abomasum characterized by hyperplasia with necrosis (black arrows) and infiltration of polymorph inflammatory cells (box). hematoxylin and eosin stain 40 X.
References


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