STUDIES ON HELMINTHE PARASITES IN NECROPSIED DONKEYS IN EGYPT
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ABSTRACT
The current study was aimed to detect different helminthes parasites in necropsied donkeys in Egypt. For this purpose, necropsied 65 donkeys in Faculty of Veterinary Medicine, Moshtohor and Giza Zoo were used during the period extended from February 2007 to January 2008. The total percentage of infection was 98.45% with 22 helminthes species including, Fasciola hepatica, Anoplocephala perfoliata, Hydatid cyst, Parascaris equorum, large Strongylids, small Strongylids, Habronema muscae, H. megastoma, H. microstoma, Setaria equina and Oxyuris equi. The detected large Strongylids were Strongylus vulgaris, Strongylus edentatus and Triodontophorus serratus. The small Strongylids were Cylindodontophorus mettami, Cylicolophanus longibursatus, Cylicolophanus goldi, Cylicolcyclus auriculatus, Cylicolcyclus brevicapsulatus, Cylicolcyclus insignis, Cylicolcyclus labratus, Cyathostomum labiatum, Cyathostomum tetracanthum, Cyathostomum coronatum and Cyathostomum pateratum. Moderate worm burden (100-500 worms per animal) were found in 61.11%, 75.00% and 73.33% of infected donkeys by large Strongylids, small Strongylids and Habronema species respectively. Adults and old ages of necropsied donkeys harbored most of detected parasites. Fasciola hepatica, hydatid cyst, Parascaris equorum, Setaria equina, Anoplocephala perfoliata and Oxyuris equi with low parasite burden (1-100 worms per animal). The present work showed that, the females were more susceptible to hydatid cyst, small Strongylids, Habronema species and Oxyuris equi infection than males.

KEY WORDS: Donkey, Helminthes, Necropsy

1. INTRODUCTION
Equines still receive much interest and care in many countries as draft animals, source of meat, leather and other related products. Donkeys are still well deserving of the name 'beasts of burden'. They have a prominent position in the agricultural systems of many developing countries. This is shown by the wide spread use of donkeys in rural and urban areas in Africa [38].

The low level of development of the road transport network and the rough terrain of the country will make the donkey the most valuable, appropriate and affordable pack animals under the small holder farming system of Egypt [19]. Parasitic infection is one of health problems that hinder equine breeding, interfering with their production and cause heavy losses among them. Equines are considered the host of large numbers of
parasites, also the presence of tapeworms as a risk factor in certain equine colic syndromes [39], damage is related specifically to the location of *Anoplocephala perfoliata* (*A. perfoliata*) at the ileocaecal junction and its tendency to locate in clusters. At the point of attachment, these parasites are able to cause severe focal enteritis and even areas of necrosis [41].

There are different kinds of damage associated with the migration of larvae especially, *Strongylus vulgaris* (*S. vulgaris*) which cause obstruction in the circulating blood which may lead to colic, paralysis, heart diseases or sudden death [14]. As well *Anoplocephala spp.* and *Parascaris equorum* (*P. equorum*) cause obstruction of intestine, bile ducts and poor absorption of nutrients, *Strongylus species* cause allergy and anemia due to ingestion of large quantities of blood with the production of anti-coagulants [42].

The attention given by governmental and non-governmental organizations to equines has been far below to what it deserves. Also, Knowledge about the health problems affecting their welfare is limited for most parts in Egypt [16, 20, 36]. Therefore, the objectives of this study were to determine the helminthes parasites infecting donkeys at necropsy as well as to reveal the effect of age and sex of equines on its parasitic infection.

3. RESULTS

3.1. Incidence of recovered helminthes:
Results presented in table (1) and figures (1-5) revealed that, 64 (98.46%) out of 65 donkeys were infested with different helminthes The recovered parasites were *Fasciola hepatica* (*F. hepatica*), *A. perfoliata*, *Hydatid cysts*, *P. equorum*, three large *Strongylids*, eleven small *Strongylids*, *Habronema spp.*, *Setaria equina* (*S. equine*) and *Oxyuris equi* (*O. equi*). Mixed infection was common
during this study. *F. hepatica* was detected in bile ducts of two animals (3.08%). *A. perfoliata* was found in small intestines of 25 animals (38.46%) and found in mixed infection with two or three species of parasites (36% and 64%, respectively).

Table 1 Incidence of the parasites recovered at necropsy of donkeys

<table>
<thead>
<tr>
<th>Parasites spp.</th>
<th>Infection status</th>
<th>No. of Infected</th>
<th>Mix. Infect. with one spp. I_1</th>
<th>%</th>
<th>Mix. Infect. with two spp. I_2</th>
<th>%</th>
<th>Mix. Infect. with three spp. I_3</th>
<th>%</th>
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<td></td>
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<td>50</td>
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<td>0</td>
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<td>36</td>
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<td><em>H. microstoma</em></td>
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<td>15.38</td>
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<td>33.33</td>
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</tbody>
</table>

I_1 = No of donkeys had mixed infection with one spp, I_2 = No of donkeys had mixed infection with two spp, I_3 = No of donkeys had mixed infection with three spp.

Table 2 Incidence of the parasites recovered by post mortem examination of internal organs of donkeys in relation to age and sex of animals

<table>
<thead>
<tr>
<th>Parasites spp.</th>
<th>No. of Infected Animals</th>
<th>Low worm burden / animal</th>
<th>Age</th>
<th>Sex</th>
<th>Male</th>
<th>Female</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>I</td>
<td>%</td>
<td>I</td>
<td>%</td>
<td>I</td>
<td>%</td>
</tr>
<tr>
<td>Trematode</td>
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<tr>
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<td>2</td>
<td>100</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<tr>
<td>Cestodes</td>
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<tr>
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<td>15</td>
<td>60</td>
<td>10</td>
<td>40</td>
<td>0</td>
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<tr>
<td>Hydatid cyst</td>
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<td>3</td>
<td>100</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Nematoidea</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parasitus equorum</td>
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<td>13</td>
<td>100</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<tr>
<td>Strongylids spp.</td>
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<td>18.52</td>
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<td>61.11</td>
<td>13</td>
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<tr>
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<td>3</td>
<td>75</td>
<td>0</td>
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<tr>
<td>Habronema spp.</td>
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<td>26.67</td>
<td>11</td>
<td>73.33</td>
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<td>28</td>
<td>100</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<tr>
<td>Oxyuris equi</td>
<td>6</td>
<td>6</td>
<td>100</td>
<td>0</td>
<td>0</td>
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</table>

Adult animals referred to those 2-10 years and old animals referred to those beyond 10 years of age. Low =1-100 worms (or larval stage) per animal. Moderate = more than 100 and less than 500 worms (or larval stage) per animal. High = more than 500 worms (or larval stage) per animal. IA = Number of infected adult animals. IO = Number of infected Old animals. IM = Number of infected male animals. IF = Number of infected female animals.

Saad et al. (2011)
Hydatid cysts were detected in livers of 4.62% of examined animals and found mainly in mixed infection with two other species of parasites (66.67%). *P. equorum* was detected in 13 donkeys (30%). The caeci and colons of donkeys harbored different Strongylids (*S. vulgaris, Strongylus edentates*, *T. serratus*, *C. mettami*, *C. longibursatus*, *C. goldi*, *C. insigne*, *C. brevicapillus*, *C. labratum*, *C. labiatum*, *C. tetracanthum*, *C. coronatum*, *C. pateratum*; Table 1). *S. vulgaris* was the most prevalent species in the present study where 53 donkeys (81.54%) were infected and mainly was found in mixed infection with one species of other worms (71.70%). The small Strongylids were detected in 6.15% of autopsied animals and found mostly in mixed infection with one other parasites species (75%). In the dorsal colon, only females of *O. equi* were detected from 9.23% of necropsied animals and found mostly with three other species of parasites (50%). Examination of stomachs revealed presence of three species of *Habronema* in (23.08%) of animals. *H. muscae* was the predominant species (21.54%), followed by *H. microstoma* (15.38%). *S. equina* was detected in the peritoneal and pericardial cavities of 28 animals (43.08%) and mainly in mixed infection with two other species of parasites.

3.2. The relationship between age of the necropsied donkeys and parasitic infection:

Table (2) revealed that *F. hepatica*, *Hydatid cyst* and *P. equorum* were found in Adult necropsied donkeys. The adults
also acquired higher infection with *A. perfoliata* (72%), large and small *Strongylids*, *S. equina* and *O. equi*. *Habronema spp.* was detected in both adults and olds (40% and 60% respectively).

Figure 4.1 - *Cylicocyclus brevicapsulatus*. 1-a- anterior end. 1-b -♂ posterior end. 1- c -♀ posterior end. 2- *Cylicocyclus insigne*. 2-a- anterior end. 2-b -♂ posterior end 2- c -♀ posterior end. 3- *Cylicocyclus labratum*. 3-a- anterior end. 3-b -♂ posterior end 3- c -♀ posterior end. 4- *Cyathostomum labiatum*. 4-a- anterior end. 4-b -♂ posterior end. 4- c -♀ posterior end. Magnification power was: 10x10 for anterior end, 10x4 for male posterior end and 10x10 for female posterior end.

3.3. Relationship between sexes and parasitic infection:

Table (2) showed that *F. hepatica* was found in male necropsied donkeys only. *A. perfoliata* and *Hydatid cyst* were mostly found in females of (56.00%) and (66.67%) of necropsied donkeys, respectively.

Figure 5.1 - *Cyathostomum tetracanthum*. 1-a- anterior end. 1-b -♂ posterior end. 1- c -♀ posterior end. 2- *Cyathostomum coronatum*. 2-a- anterior end. 2-b -♂ posterior end. 2- c -♀ posterior end. 3- *Cyathostomum pateratum*. 3-a- anterior end. 3-b -♂ posterior end. 3- c -♀ posterior end. Magnification power was: 10x10 for anterior end, 10x4 for male posterior end and 10x10 for female posterior end.

Males and females donkeys were infected with large *strongylids* at percentage of 50% for each, while with small *strongylids* at percentages of (75% and 25%), respectively. *P. equorum*, *Habronema spp.*, *S. equina* and *O. equi* were detected in heavy infection in females (61.45%, 66.67%, 57.14% and 66.67%, respectively). The table also revealed that, most of helminthes were found in low number (<100 worm/ animal) in infected animals except for *strongylids* and *Habronema spp.* which were found in moderate intensity (100-500 worms/ animals).

4. DISCUSSION

Necropsy of 65 donkeys showed that 2 donkeys were harbored *F. hepatica* (3.08%) in their bile ducts with low intensity (1-100 worms/ animal). Lower incidence of *Fasciola* infection was detected also by Ahmed [2] and Khalifa et al. [23] who detected it in 2.78% and 0.37%, respectively of examined animals. *A. perfoliata* was found in small intestine of 38.46% necropsied donkeys. These results were relatively similar to those of Alcaínó et al. [3], Mfitilodze and Hutchinson [32] in horses which were (34.6% and 32.0%, respectively). Lower percentages of infection were recorded by previous authors [1, 7, 8, 22, 24] which were 1.8%, 20.0%, 28.9% and 7.2%, respectively. The difference may be attributed to hygienic condition and age of animals.

*Hydatid cysts* were detected in livers of (4.62%) of donkeys. This result was lower than those recorded by in earlier studies [5, 35, 40] that recorded rate of donkey infestation ranged from 9.3 to 17.8%. Nevertheless, very low incidence of hydatidosis (0.3%) was reported in horses [26]. This variation may be due difference in the age of infected animals [40]. The recovered gastrointestinal nematodes were *P. equorum* (20%), *Strongylids spp.*
(92.31%), *Habronema* spp. (23.00%), *S. equina* (43.00%) and *O. equi* (9.33%). Nearly similar incidence of *P. equorum* (24%) was recorded by Mohesen [34]. Higher incidences (46% and 75%) were obtained by Lyons et al. [29, 31]. On the other hand, Ahmed [2] reported very low incidence (4.17%). The deviation in results may be due to difference in age of examined animals where the heavy infection with *P. equorum* was appeared to be predominated in young animals and yearling as reported by Heil [21].

The present data showed that, the incidence of large *Strongylids* in necropsied donkeys was (83.08%) and *S. vulgaris* was the predominant species (81.54%) followed by *T. serratus* (24.62%) and *S. edentatus* (1.54%). Similarly Alcaíno et al. [4] found high incidence (93.3%) of large *Strongylids* in horse including, *S. vulgaris* and *S. edentatus* at 92.3% and 67.3%, respectively. In this respect, Ahmed [2], Khalifa et al. [23] and Lyons et al. [29] found *S. vulgaris* in large intestine of 93.80%, 60.45% and 95.00% of examined donkeys, respectively. Also Gawor et al. [18] found *S. vulgaris* and *Triodontophorus* in 64.3% and 21.4% respectively.

Small *Strongylids* were found in low percentage (6.15%), which included eleven species, *C. mettami*, *C. longibursatus*, *C. goldi*, *C. auriculatus*, *C. brevicapsulatus*, *Cylicocyclus insigne*, *C. labratum*, *C. labiatum*, *C. tetracanthum*, *C. coronatum* *Cyathostomum* mainly found in large intestine and in mixed infection. Comparatively, higher incidence was recorded by Heil [21] who found that 12.3% of donkeys harbored small *Strongylids*. Also Eysker and Pandey [17] detected small *Strongylids* in 14 donkeys. Such differences may be attributed to changes in the environmental condition. The present study showed that the stomachs of donkeys were infected with adults worms of *Habronema* spp. (23.08%) and the predominant one was *H. muscae* (21.54%) followed by *H. microstoma* (15.3%) and *H. megastoma* (7.69%). In this respect, higher incidence was recorded by Ahmed [2] found of *Habronema* spp. (65.8%) and lower incidence of *H. megastoma* (0.69%), El-Assaly [15] reported *Habronema* spp. in 94 donkeys and horses, Khalifa et al. [23] found *H. muscae* in 45.81% of 48 equines. Pandey et al. [37] and Burgu et al. [8] reported higher incidences of *H. muscae* (89.7% and 100%, respectively) and *H. microstoma* (85.4% and 90%, respectively). The variation in incidence may be attributed the difference in the age of examined animals, or the recent methods used in combating vectors of these worms [27].

*S. equina* was detected in peritoneal cavity of (43.08%) of donkeys. This was in accordance with Mohesen [34] who detected it in of autopsied donkeys (48%). Higher incidences (82.6%) were reported by Ahmed [2]. Such differences may be attributed to changes in the methods of detection of the parasites.

Adult females’ *O. equi* were detected in six donkeys (9.23%). In this respect Mohesen [34] detected *O. equi* in 30% of donkeys. Such variation may be due to application of control and hygienic measures as well as the age of the animals.

Concerning the relation between parasitic infection and age of examined donkeys, *F. hepatica* was recovered from adult necropsied donkeys only. Similarly Alcaíno et al. [3] detected it in horses up to 5 years old.

The present results showed that both adult and old animals acquired infection with *A. perfoliata* with higher percentage in adults (72%). Lyons et al. [27] detected it in (54%) of horses aged at 1-26 years old and Lyons et al. [28] found *A. perfoliata* in adult horses more than young (60% and 30% respectively). Also Beelitz and Gothe [6] found it in 38% of necropsied horses ranged from 2 to 31 years old. Collobert et al. [9] mentioned that the infection rate was not related to age at necropsy or presence of other intestinal parasites. *Hydatid cyst* was found in the livers of adults and not detected in old ages.
Similarly, Mukbel et al. [35] denoted that no donkeys of 3 years of age or less were infected, whereas 33.3% (22 of 66) of those aged 4 years or greater were infected. Also Rahif and Atia [40] found it in donkeys of age 3-22 years.

In the present study, *P. equorum* was detected in intestines of adults (2-10 years) only and not found in old ages. Similar results were reported by Mfitilodze and Hutchinson [32] who found that, the infection with *P. equorum* was restricted to animals less than 5 years old. On the other hand Lyons et al. [31] detected *P. equorum* in 46% of weanlings and Kornas et al. [25] mentioned that *P. equorum* mainly occurred in young (21%) compared to (3.5%) in adult animals. The variations of the results may be due to the ages of examined animals.

The present data revealed that old donkeys were more susceptible to infection with large and small *Strongylids* (66.67% and 75%, respectively). Collobert et al. [11] noted that the prevalence of small *Strongylids* significantly increased with age, 11.80% of the 1 to 6 months old animals compared to 39.47% of the 2 to 4 years old animals.

*Habronema spp.* were detected at higher incidence (60%) in old donkeys compared to (40%) in adult ages. Similar results were recorded by Collobert-Laugier et al. [10] who found that, the infection rate of *Habronema spp.* increased regularly from 2 months to 10 years of age. *O. equi* was found in Adult examined animals only. Similarly Daoud and Al-Alousi [12] found *O. equi* in adult donkeys.

Concerning the relationship between sex and helminthes infection, the present study revealed that, *F. hepatica* was found in male donkeys. *A. perfoliata* was found in female donkeys more than males. This result came in contrast with Kornas et al. [24] who found it in stallions and mares (12% and 5.2% respectively) and with Agneessens et al. [1] who said that there were no associations of prevalence and intensity of infection with *A. perfoliata* and sex.

*Hydatid cysts* were found in males and females necropsied donkeys by 33.33% and 66.67%, respectively, this was disagreed with Rahif and Atia [40] who found the infection rates of *hydatid cyst* was higher in males than females.

Males and females donkeys were infected with large *Strongylids* by equal percentage, while males were more susceptible to infection with small *Strongylids*. In this respect little literature were found but Mfitilodze and Hutchinson [33] found that male horses had lower overall prevalence of *Strongyles*.

The present data showed that females had higher infection rates of *P. equorum*, *Habronema spp.*, *S. equina* and *O. equi* than males. Similarly Kornas et al. [25] found *P. equorum* in mares higher than stallions. The heavy infection of gastrointestinal nematodes in females of donkeys may be due to their hormonal activities as mentioned by Dietz et al. [13].

5. REFERENCE


دراسة على الديدان الطفيلية في الحمير المشرحة في مصر

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الخصام العربي

تم إجراء الدراسة الشريحة لمدة 65 حمار في محافظتي القليوبية والجيزة وذلك بهدف تجميع الأنواع المختلفة من الديدان التي تسببت

تعرض عليها. كشفت الدراسة أن نسبة الإصابة بالديدان المختلطة كانت 98.45% وقد تم حاجة الأطراف البالغة من الديدان من نوع

الفاشيل كاهايا، والأيديوبريفوليات، ويرقات الأكياس المائية، وديدان أسكارس الخيول، وديدان السترونجيلد الكبيرة والصغيرة،

وديدان الهارونيما ماسكي وهايرونيما بيغفولياتا وهايرونيما ميكروستوفا، وديدان السترونجيلد الكبيرة وهايرونيما إكينا، وإكسيوريس إكواي.

وشهدت الدراسات الاستنتاجية أن الديدان السترونجيلد الكبيرة ديدان سترنوجيلد فولجاريس وسترونجيلد إيديناتس وديدان تريباونداتوريس سيراتس، بينما شملت

ديدان سترونجيلد الصغيرة ديدان سريكستورفس، ديدان هيبروكستورف، ديدان سترونجيلد جولدي وديدان سيلوكيستوك

وريجيكولناتس، سيلوكيستوك رافيكابولستاتس، سيلوكيستوك إيسنني و سيلوكيستوك إتشام، وديدان سترونجيلد لاباتم، سترونجيلد

تماراكامس، و سترونجيلد كرونتم و سترونجيلد باباتم. وكانت الحميرا المتصابة بديدان الفاشيل كاهايا ويرقات الأكياس

المائية و أسكارس الخيول و سترونجيلد الكبيرة. وبدأت الدراسات الإكسيوريس إكواي تحتوي على معدلات متصلة من الديدان لكل

حيوان تم فحصه. وبالتالي للحميرا المتصابة بديدان الأيديوبريفوليات بيروفولياتا فوجد أن 60% منها إحتوت معدلات منخفضة من الديدان

كل حيوان مفحة، وكذلك 61.11% و 73.33% من الديدان المتصابة بديدان الاسترونجيلد الكبيرة والصغيرة وأنواع

الهارونيما المختلفة بمعدلات متصلة من هذه الديدان على التوالي لكل حيوان تم فحصه. أحتويا الأعماق البالغة من الحمير على

أغلب الطفيليات التي تم تسجيلها ماعدا ديدان الهارونيما المختلفة والتي كانت أكثر تواجداً في الأعماق الممتدة. بالنسبة لعلاقة

وجود الطفيليات بين الحيوان، فكانت نسب ذكور الحمير أكثر إصابة عن إناثها بديدان الفاشيل كاهايا و ديدان سترونجيلد الصغيرة وكان

العكس صحيحًا بالنسبة لمختلف الأنواع الأخرى من الطفيليات التي تم تسجيلها. أوضح هذه الدراسات أن ذكور الحمير كانت أكثر

عرضة للإصابة بديدان الفاشيل كاهايا عن إناثها. في حين أن هذه الإحصاءات كانت أكثر إصابة بديدان الأكياس المائية وديدان

الإكسيوريس إكواي، والهارونيما، والإكسيوريس عن ذكورها.