Clinico Hematological and Biochemical Changes in Camels Affected with Gastro-Intestinal Parasites

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3Parasitological unite. Animal healthy research institute .Assuit branch .

Abstract
This study was conducted to determine the prevalence and effect of parasitic infection on clinical healthy, hematological and biochemical parameters in camels. Hundred fifty adult one humped camels of both sex were examined for helminthes parasite according to the standard procedures. Examination of fecal samples from camels shows 63 (41 %) were harboring different helminthes nematode species (36.15% ),where coproculture were recorded. Trichostrongylus spp, Nematodirus spp,Osterotagia spp and Osphegostomum spp Trichuris spp. Protozoon parasites, 9.23% (Eimeria spp) nd cestod parasites,3.07% (Monezia spp), while blood smear examination for excluded the camels infected by blood parasites. Single infection recorded in (n=58,44.61%) and mixed infection recorded in (n=5,3.84%). Packed cell volume (PCV), hemoglobin concentration (HB), Total WBC count and red blood cell counts were significantly (P < 0.01) affected in the infected camels compared to the control healthy camels. Parasite infection in camels leads to macrocytic anemia. Biochemical analysis revealed that significant affected of AST,ALT and BUN in the infected camels compared to the control healthy camel,so we can concluded that Camels were affected by gastrointestinal parasite exhibited different clinical signs,a significant change in hematological and biochemical values between the infected and control camels.

Key words: Clinical, hematological parameters, Biochemical analysis, Parasites, Camel,

Introduction
Camel is a very hardy animal and well adapted anatomically as well a physiologically to harsh climatic conditions of desert Nevertheless. It suffers from various endo and ecto-parasitic diseases which are major constraints in improvement of camel health. These diseases cause substantial economic losses in terms of decrease in working capacity, growth and productivity. With the introduction of sedentary, semi-Intensive systems of camel farming, parasite may assume much more significant role in camel husbandry. Also camels play an important socio-economic role in the arid and semi arid areas, where most of the resource poor farmers in Africa live 12. The role of camels in traditional areas has been highlighted 29,20. Camels have been reported to form an integral part of the cultural life and system of pastoral communities and they are the major source of food (meat and milk), transport and they provide a genetic resource base which is abundantly available and can be exploited for improvement of the livelihoods of rural people 26. The major problems of livestock production, camel inclusive, include housing, health and feeding 19,23. The detrimental role which parasitic diseases play in livestock production has been emphasized 13. Losses are due to mortality, lowering of reproductive and growth rate
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reduced hide value, weight loss and increased cost of production due to additional veterinary bills. Animals in discomfort or pain are likely to be less productive than their healthy counterparts. Globally, a number of studies must been taken to determine the relationship between the prevalence of helminth infections and haematological and biochemical parameters in camel herds where other studies on the camel parasite and the practical management were carried over the world. Such studies have been done in Sudan, Mali, Kuwait, Ethiopia and Pakistan amongst other countries. These studies have shown that poor husbandry, management system, climate, and sub-optimal feeding of camels may influence the occurrence and pattern of infection. In this paper we report on the extent of gastrointestinal (GI) nematode infections and Eimeria spp and its relationship with clinico-hemato-biochemical parameters were conducted to assess the general health of the camel.

Materials and Methods

1-Animals;
The study carried on 150 camel which classified into two groups, 130 camel was clinically suspected to be infected by gastrointestinal parasite (infected group) while the rest number 20 camel were clinical and laboratory healthy and consider as the control group in addition to that all of camels under the study are clinically healthy from any suspected viral or bacterial disease and reared in the same condition.

2-Sample collection;
A- Fecal samples.
Fecal samples were collected from 150 Camels after clinical examination for excluded the camel suspected to be infected by bacterial (bacteremia) or viral (viremia) disease at different parts in EL-Kharga city, New-Valley, Governorate, Egypt in the period of 6 month (June to September).
B- Blood samples.
Two type of blood samples was collected from each camel as the following,
1- Direct collected of blood sample from ear vein for direct smear stained by Giemsa stain to excluded of blood parasite infected camel in addition to 5ml blood from Jugular vein in test tube containing EDTA as anticoagulant for hematological examination.
2- 5 ml blood sample was collected in test tube without anticoagulant for preparation of serum for biochemical analysis.
3- Clinical and pathological features;
Under natural conditions camels are practically never infested with just a single Species of gastro-intestinal helminthes, for multiple parasitisms is the rule. With the exception of acute haemonchosis, it is practically impossible to distinguish the diseases produced by different helminthes. Hence the clinical picture of these helminthes is a combination of symptoms induced by various species. For these reasons we shall describe separately the clinical and pathological features caused by helminthes according to 24.

4-Parasitological analysis;
1- Direct smear.
After collecting the samples a direct smear was first made using physiological saline and cover slip was applied and it was examined under the light microscope at ×40.
2- Floatation Technique.
This technique is used easily for the identification of eggs of nematodes and cestodes. Briefly, feces were comminuted in saturated salt solution, fecal debris were discarded. The fluid was poured into a straight-sided tube until a convex meniscus appeared at the top of the tube and a
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cover slip was applied immediately. The preparation was allowed to stand on level surface for fifteen minutes, the cover slip was removed and applied to the glass slide and examined.27.

3-Sedimentation Technique.
This technique is good for trematodes eggs because they are heavier and so sediment down to the bottom of the container. The supernatant from the floatation technique was poured off and a small quantity of the sediment collected with a pipette/dropper and it was put on a glass microscope slide, cover slip was applied and examined.27.

4-Coproculture.
For identification of certain nematodes, coprocultures were performed to obtain larval stage as described by 16,27. Fecal cultures provide an environment suitable for hatching of helminthes eggs and for their development. Feces found positive for parasites eggs but confusing for exact identification were broken up finely, using either a large pestle and mortar or spatula and were placed in a glass jar or Petri dish which were closed and incubated at a temperature of about 27ºC for 7 days. After incubation, samples were examined for larvae. Larvae were identified with the help of keys 16.

5-Hematology analysis.
The blood was collected directly from the camels the jugular vein into vials containing sodium ethylenediamine tetracetic acid (Na2 EDTA) sufficient for 5 mL of blood to prevent coagulation. The tubes were gently rotated to ensure proper mixing of the blood with the anticoagulant without damaging the integrity of the cells and were transported to the laboratory.[9].

Red cell indices packed cell volume (PCV). The blood collected in special anticoagulant bottles were used to determine the PCV of each sample using micro-capillary tubes, which were filled by capillary action and centrifuged at 3000 rpm for 5 minutes after sealing the end of the tube. After the centrifugation the PCV in percentage was read in a special haematocrit reader and the results were recorded.

Red blood cell count (RBC).
Blood was drawn in to a special red cell pipette, which gave a dilution of 1 to 200 when the blood was drawn to the 0.5 mark and diluted to form the 101 mark. After been drawn and well mixed the dilution was discharged onto hematocytometer counting chamber and was allowed to settle for few minutes. The high dry objective of the microscope was used to evaluate the total erythrocyte count. The total number of cells in five squares in the center of the counting chamber was determined and multiplied by 10,000.This value represented the total number of erythrocytes per cm3 of blood.

Hemoglobin concentration (Hb).
0.1 Normal hydrochloric acid was added to whole blood using the acid hematin method, which depends on conversion of hemoglobin to acid hematin. Color of the blood in a test tube after addition of the 0.1 normal HCL was observed with serial dilution with HCL until color matched a standard. The reading was reported in g/100 mL.

White Blood cell indices (WBC).
The hemocytometer method was used. The dilution factor was 1:100 and the total leucocytes were determined by counting all of the cells in the entire ruled area of a hemocytometer, the total count was calculated using the following formula:

Total cells in 9 squares + 10% of total cells × 100=WBC/CU.mm.

6- Biochemical analysis;
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Blood serum samples were tested spectrophotometrically for Aspartate aminotransferase (AST), Alanine aminotransferase (ALT), Total protein, Blood urea nitrogen (BUN) using available kits (Biomex. France) according to 9.

7- Statistical analysis.

Data were summarized by descriptive statistics for mean and standard deviation. Significance testing was done by one-way ANOVA, using Statistics® Software.

Results

1- Clinical examination;
clinically infected camel revealed signs of paleness of mucus membranes, loss of appetite, emaciation, diarrhea with passing of watery fecal materials, on the other hand some diseased camel have a cough signs as in table 1.

2-Prevalence of GIT parasite eggs/oocysts

Table 1. Clinical signs of camel infected with gastrointestinal parasites.

<table>
<thead>
<tr>
<th>Clinical signs</th>
<th>Number of affected camel</th>
<th>Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pale mucus membrane</td>
<td>8</td>
<td>12.69%</td>
</tr>
<tr>
<td>Loss of appetite</td>
<td>53</td>
<td>84.12%</td>
</tr>
<tr>
<td>Rough coat</td>
<td>42</td>
<td>66.66%</td>
</tr>
<tr>
<td>Emaciation</td>
<td>36</td>
<td>57.14%</td>
</tr>
<tr>
<td>Body temperature</td>
<td>Normal in all camels</td>
<td>100%</td>
</tr>
<tr>
<td>Diarrhea</td>
<td>7</td>
<td>11.11%</td>
</tr>
</tbody>
</table>

Table 2. Prevalence of different GIT parasites eggs/oocysts

<table>
<thead>
<tr>
<th>Parasite class</th>
<th>Parasite sp</th>
<th>Total number</th>
<th>Number positive</th>
<th>Prevalence (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nematodes</td>
<td>Trichuris spp</td>
<td>130</td>
<td>4</td>
<td>3.07%</td>
</tr>
<tr>
<td></td>
<td>Trichostrongylus spp</td>
<td>130</td>
<td>7</td>
<td>5.38%</td>
</tr>
<tr>
<td></td>
<td>Haemonchus spp</td>
<td>130</td>
<td>3</td>
<td>2.30%</td>
</tr>
<tr>
<td></td>
<td>Nematodirus spp</td>
<td>130</td>
<td>15</td>
<td>11.53%</td>
</tr>
<tr>
<td></td>
<td>Oesphagostomum spp</td>
<td>130</td>
<td>8</td>
<td>6.15%</td>
</tr>
<tr>
<td></td>
<td>Osterotagia spp</td>
<td>130</td>
<td>6</td>
<td>4.61%</td>
</tr>
<tr>
<td></td>
<td>Chabartia spp</td>
<td>130</td>
<td>4</td>
<td>3.07%</td>
</tr>
<tr>
<td>Cestodes</td>
<td>Monezia expansa</td>
<td>130</td>
<td>4</td>
<td>3.07%</td>
</tr>
<tr>
<td>Protozoan</td>
<td>Eimeria oocyst</td>
<td>130</td>
<td>12</td>
<td>9.23%</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>130</td>
<td>63</td>
<td>48.46%</td>
</tr>
</tbody>
</table>

Table 3. Blood parameters of infected camels with gastrointestinal parasites and control group camels.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Infected camels</th>
<th>Control camels</th>
</tr>
</thead>
<tbody>
<tr>
<td>RBCs X 10^6</td>
<td>5.42 ± 5.50</td>
<td>7.60 ± 7.12</td>
</tr>
<tr>
<td>Hb (g/dl)</td>
<td>8.27 ± 2.09</td>
<td>10.85 ± 1.97</td>
</tr>
<tr>
<td>PCV (%)</td>
<td>22.52 ± 6.09</td>
<td>29.88 ± 4.91</td>
</tr>
<tr>
<td>MCV</td>
<td>48.2±3.36</td>
<td>37.6±4.52</td>
</tr>
<tr>
<td>MCHC</td>
<td>42.5±6.11</td>
<td>42.6±7.81</td>
</tr>
<tr>
<td>ESR</td>
<td>12.7±5.34</td>
<td>11.6±3.52</td>
</tr>
</tbody>
</table>

A total of 130 camels were examined, of which 63 (48.46%) were diagnosed as harboring
parasite eggs and coproculture of the infected fecal samples revealed 3rd stag larvae of *Trichstrongylus spp*, *Osterotagia spp*, *Oesphegestomum spp* and *Nematodirus spp* as in table 2. The proportion of the camels harboring nematodes eggs was the highest 47 (36.15%), such as *Nematodirus spp*, *Osterotagia spp*, *Oesphegestomum spp*, *trichstrongylus spp*, *trichuris spp* and *Haemonchus spp* as in table 2, followed by protozoan parasites (*Eiemiria spp*) and tap worm (*Monizea spp*) in ratio of 12 (9.23%) and 4 (3.07%) respectively. Single parasite infections (n=58; 44.61%) were more common than mixed infection (n=5; 3.84%).

3-Haematological analysis.
Haematological analysis revealed that significant reduction (p>0.01) in total red blood cell count (TRBCs), hemoglobin value (HB), packed cell volume (PCV) while there was significant increase (p>0.01) in MCV and a significant increase (p>0.01) in total leucocytes count (WBCs), as in table 4.

4-Biochemical analysis.
Biochemical analysis revealed that significant increase in AST, ALT and BUN however revealed a significant decrease in total protein value of infected camels as in table 5. Where p >0.01.

Table 4. Total and differential leucocytic count of control and infected camels with gastrointestinal parasites.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Infected camels</th>
<th>Control camels</th>
</tr>
</thead>
<tbody>
<tr>
<td>WBCs X 10^6</td>
<td>14.61±1.62 <em>↑</em></td>
<td>11.54±1.83</td>
</tr>
<tr>
<td>Lymphocytes (%)</td>
<td>49.31±2.72 <em>↑</em></td>
<td>43.9±2.4</td>
</tr>
<tr>
<td>Neutrophile (%)</td>
<td>44.3±2.31 <em>↑</em></td>
<td>49.3±2.33</td>
</tr>
<tr>
<td>Monocytes (%)</td>
<td>3.7±0.38</td>
<td>3.5±1.4</td>
</tr>
<tr>
<td>Eosinophile (%)</td>
<td>2.4±0.71</td>
<td>2.1±0.4</td>
</tr>
<tr>
<td>Basophile (%)</td>
<td>0.6±0.4</td>
<td>0.6±0.44</td>
</tr>
</tbody>
</table>

Table 5. Biochemical parameters in both infected camels with gastrointestinal parasites and control camels.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Infected camels + SE</th>
<th>Control camels +SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>AST (µ/l)</td>
<td>159±8.61 ↑*</td>
<td>105±11.31</td>
</tr>
<tr>
<td>ALT (µ/l)</td>
<td>163±4.17 ↑*</td>
<td>113±2.21</td>
</tr>
<tr>
<td>BUN (mg/dl)</td>
<td>12.28±7.13</td>
<td>12.36±1.48</td>
</tr>
<tr>
<td>Total protein (g/dl)</td>
<td>4.8±0.61 ↑*</td>
<td>6.7±1.26</td>
</tr>
</tbody>
</table>

Discussion
The microscopic fecal examination showed that helminthiosis was an important health disease in camels. This finding is in agreement with the results of other researchers, that helminthes is one of the main problems in camel's worldwide. The overall prevalence of 84.46% of GIT parasite eggs/oocyst in the camels in this study shows that there were frequent infections with different species of helminthes and protozoan. nine different species of gastrointestinal tract worms and protozoan were identified in camels. They were broadly classified as nematodes (7 species), cestode (tape worm) (1 specie) and protozoan (1 specie) according to the egg structure and fecal culture. The relatively high level of endo parasitism recorded in this study is probably related to the number of adult parasites established in the GIT.

Mixed parasitism (n=5, 3.84%) involving two or more helminth genera was recorded in the present study and is in agreements with the results of other researchers. Strongylidea spp and *Eimeria spp* (n=3) were the most incriminated helminths in camels and that agreement.
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with 12. Other helminth/oocyst genera detected, though at a low frequencies included Trichstrongyluss spp, Trichuris spp., and Eimeria spp. This high prevalence was agreement to the prevalence of 100% reported in (41%) Ethiopia but the result may be consider low if compared with 10. The country-to-country variation can be adequately attributed to variation between agro climatic conditions, levels of hygiene and husbandry practices 4 Where eggs are very resistant to adverse conditions, like drying or freezing and the larvae rarely hatch and infection usually takes place through ingestion of the eggs.

Eimeria spp with prevalence of 9.23% was low if compared with prevalence of 13.3% recorded in Assiut governorate. Egypt10, 12.5% and 25% respectively recorded in Pakistan5. Heavy protozoan infection causes significant impact in young camels resulting into high morbidity and mortality8,15.

Most of the camels examined appeared to be in fairly health condition, loss of appetite, body temperature is normal in all camels under the study (36-36.5 °C), emaciation recorded in helminthes infected camel and diarrhea noticed as clinical signs in some positive camel. This could be explained by the fact that loss of body condition in the study animals could be due to other factors, such as seasonal change of forageable feed.

With respect to hemogram there was a significant decrease in TRBCs, HB, PCV, where that reflecting macrocytic norochromic anemia and it is agreement with results recorded by 18,21, where that may attributed to direct effect of parasite to decrease life span of RBCs and suppression of haemopiotic system2,21. Also we recorded a significant increase in WBCs which may be attributed to stimulation of lymphoid tissues and stem cells in the bone marrow by the parasite and their toxin22. Also we noticed no change in ESR which may be attributed to the correlation between sedimentation rate and intensity of anemia where settling of RBCs will occur when anemia is more intense.

In relation to biochemical analysis there was a significant increase in ALT and AST and that may be attributed to the damage of skeletal muscles, hepatic tissue and erythrocytes also may be due to the fact say that bulk of those tissues through out the body could be considered as an ample reservoir of enzyme liable to be released and detecting during pathological condition17, also there was a significant reduction in Total protein which agreement with 25,6 and may be attributed to digestive disturbance and less production of protein from liver tissue.

Conclusion and recommendation

The present study has revealed the presence of a wide range of helminths species, which are representative of the important pathogenic parasites of camels worldwide. The presence of narrow spectrum of GIT parasites with moderate prevalence is an indication that unfavorable environmental conditions for infection, survival and perpetuation of the parasites, periodical drenching of camel with antiparasitic doses.

Camels were affected by gastrointestinal parasite exhibited different clinical signs, a significant change in hematological and biochemical values between the infected and control camels.

Reference:


Osman et al., IJAVMS, Vol. 8, Issue 5, 2014: 154-161
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