Effect of Seasonal Variations on Distribution of Parasites in Camels at Assiut Locality

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Abstract

Throughout four successive seasons (winter, spring, summer and autumn), one hundred and ninety five camels (Camelus dromedarius) from slaughtered houses in different regions at Assiut governorate were examined for protozoa parasites in blood and muscles. These parasites were Trypanosoma evansi, Trypanosoma type 1. (n.sp.) Babesia sp, Theileria cameli in blood and Sarcosystis sp. in muscles.

The prevalence of infection for the different parasites in both blood and muscles was also studied through the different seasons.

Generally Sarcosystis sp. was represented the highest incidence of infection (55.38%) in the present study especially in spring (81.08%). The lowest incidence of infection was represented in Trypanosoma evansi (2.5%). At the same time the lowest incidence through different seasons was represented in Theileria cameli and Trypanosoma evansi (4.83%) in autumn.

Keywords: Successive seasons; The prevalence; Highest incidence; Lowest incidence; Autumn

Introduction

Many reports on Sarcocystis sp. infections among different vertebrates including even man were recorded [1-7].

Many tick species, known to be vectors of diseases of man and his livestock, were found to infest camels, cattle, sheep and goats in different Kingdom Regions of Saudia Arabia [8]. Trypanosoma evansi is the causative agent of surra, one of the most common and widespread of the trypanosomal diseases. Trypanosomes can infect most mammals, although horses and camels are the principal hosts and represent the most significant sources of economic loss. Surra is endemic in many parts of Africa, Asia, and South America where thousands of animals die during disease outbreaks each year. Although not usually considered of zoonotic concern, one case of human infection with T. evansi recently has been documented in India [9].

Hemoparasites known to infect bovine erythrocytes and cause anemia include organisms from the genera Anaplasma, Eperythrozoon, Babesia, and Theileria. Theilerial parasites infect a broad range of wild and domestic artiodactyls throughout the world with highest prevalence in tropical and subtropical climates of Africa, Europe, Australia, and Asia [10,11].

So that, the aim of the present work is to know the effects of the seasonal variation on the distribution of different parasites in camels at Assiut and their prevalence incidence in different seasons.

Material and Methods

Blood samples and muscles of three different parts of camels (Camelus dromedarius) examined for protozoan parasites. The examined camels were collected from different localities of Slaughter houses at Assiut city. The freshly collected blood samples collected in a tube coated with EDTA. Thick and thin blood smears were made for morphological examination of some protozoan parasites. Electron microscopic studies recorded as follow:-

TEM

Few drops from infected blood and parts of muscles immediately fixed in 3 ml. of 3% glutaraldehyde solution in phosphate buffer (PH 7.2), for 24 hrs and Kept at 4°C in refrigerator. The samples were post fixed in 1% Osmium tetroxide in phosphate buffer (PH 7.2, 300 mom), for 30 minutes and washed several times with phosphate buffer solution. The samples were then embedded in Epon which can preserve in structure from distortion during processing then ultra-thin sections were cut by an Ultra microtome and examined by JEOL, 100 CXII operating at 80 KV (TEM).

SEM

For scanning electron microscopy of infected blood and muscles; few drops or a part of infected muscles were fixed in 3% Glutaraldehyde in buffer for 24 hrs. Specimens were washed three times in Phosphate buffer and post fixed in 1% Osmium tetroxide for 2 hours and then washed in the same buffer. They were Dehydrated in different grades of ethyl alcohol and then mounted on special holders and coated with gold. Then they were examined in a JSM-T 200 L.V. 5400 Scanning Electron Microscopy (SEM).
Results

Prevalence & seasonal variation

Survey and incidence of protozoan parasites in camels: One hundred and ninety eight *Camelus dromedarius* examined throughout four different seasons (From May 2011–25 October 2012).

Examined camels were found harboring muscles and blood protozoa:

**Muscles parasites**

*Sarcosystis* sp. 108 (55.3 %) [Figures (1 and 2)]

**Blood parasites**

*Trypanosoma evansi* 5 (2.5%) [Figures (3 and 4)]

*Trypanosoma* type 1 (n. sp.) 19 (9.7%) [Figures (5 and 6)]

*Babesia* sp. 51 (26.1%) [Figures (7 and 8)]

*Theileria camelii* 12 (6.1%) [Figures (9 and 10)]

Generally *Sarcosystis* sp. was represented the highest incidence of infection (55.38%) in the present study especially in spring (81.08%). The lowest incidence of infection was represented in *Trypanosoma evansi* (2.5%). At the same time the lowest incidence through different seasons was represented in *Theileria camelii* and *Trypanosoma evansi* (4.83%) in autumn.

On one hand, *Trypanosoma evansi* was disappeared in spring and summer and on the other hand, *Trypanosoma* type 1. (n. sp.) was disappeared in spring and winter. But on the other side, *Babesia* sp. appeared through the four seasons with high incidence ratios in autumn and winter (28.8% and 28.2%) respectively and low incidence in spring and summer (18.9% and 24.5%) respectively.
Hence, distribution and differentiation of the infection ratios with protozoa and presence of new parasites for the first time in *Camelus dromedarius* throughout the different seasons can be explained on the basis of feeding habits and their living in herds with different animals (Cattle's, sheep's and goats).

**Figure 4**: Scanning electron micrograph of *Trypanosoma evansi* in the blood cells of *Camelus dromedaries*.

**Figure 5**: Photomicrograph showing *Trypanosoma* type (1) (n. sp.) in the blood cells of *Camelus dromedarius* stained with Geimsa stain.

**Figure 6**: Transmission electron micrograph of *Trypanosoma* type (1) (n. sp.).

**Figure 7**: Photomicrograph showing *Babesia* sp. in the blood cells of *Camelus dromedarius* stained with Geimsa stain.

| Parasites | Winter | Spring | Summer | Autumn |
|-----------|--------|--------|--------|--------|
| No. examined | No. infected | Percentage | No. examined | No. infected | Percentage | No. examined | No. infected | Percentage | No. examined | No. infected | Percentage |

Table (1) and Histogram (1) show the incidence of different parasites infecting *Camelus dromedarius* during the different seasons.
Table 1: Shows distribution of muscles and blood parasites through different seasons in *Camelus dromedaries*.

| Parasite           | 39 | 29 | 74.3 | 37 | 30 | 81.08 | 57 | 28 | 49.1 | 62 | 24 | 38.7 |
|--------------------|----|----|------|----|----|-------|----|----|------|----|----|------|
| Sarcocystis sp.    |    |    |      |    |    |       |    |    |      |    |    |      |
| Tr. evansi         | 2  | 5.12| 0    | 0  | 0  | 0     | 0  | 0  | 0    | 0  | 3  | 4.83 |
| Tr. type 1. (n. sp.) | 0  | 0  | 0    | 0  | 0  | 3     | 5.2| 16 | 25.8 |
| Babesia sp.        | 11 | 28.2| 7    | 18.9| 14 | 24.5  | 16 | 25.8| 3    | 4.83|    |      |
| Theileria cameli   | 3  | 7.69| 2    | 5.4 | 4  | 7.01  |    |    |      |    |    |      |
| Theileria cameli   | 3  | 7.69| 2    | 5.4 | 4  | 7.01  |    |    |      |    |    |      |

Discussion

The coccidian nature of *Sarcocystis* was achieved by a series of experimental transmission of the cyst contents from goat muscles, in which a high prevalence of these parasites had been reported [12,13]. Cysts were only formed within muscles of the intermediate hosts and these were described as *sarcocystis* which usually indicated a broad host range as well as world-wide distribution [14,15]. The present study confirmed that there was a variable rate of natural infection in the muscles of the examined hosts, where 108 (55.3%) animals were infected with microscopic *Sarcocystis*. These results are in low with those recorded Riyadh by Al-Quraishy et al. [16] with a prevalence of 91% and 89%, respectively. Also, Woldemeskel and Gebreab [17] recorded a prevalence of 90% in Ethiopia, whereas, Latif et al. [18] reported 97.4% infection rate in Iraq. On the contrary, lower rates of natural infection with *Sarcocystis* were reported by some authors [19-23] agree with the present study. The current study showed that *S. meisheri* distributed in the different tissues of camels with a variable rates. The highest infection rate was recorded in esophagus muscles (62%) followed by abdominal muscles (52.2%) and tongue (51.25%). This distribution was studied previously by Singh [24] he stated that, esophagus is the most infected organs among all other tissues. Singh et al. [25] reported that a total of 79.3% of esophagus and 72.4% of tails had *sarcocystis* in older goats, but their prevalence in younger animals was 40.0% in esophagi and none in tails. The differences in intensities and organ distribution of the examined hosts may be due to oocyst contamination, isolates responsible for the infection, differences in the ecological and nutritional status of the hosts that may lead to variations in the immunity against infection and parasites as well [26,27].

In Egypt, *T. evansi* is an enzootic in camels with high prevalence of antibody and genome detection by PCR assays among slaughtered camels as reported at the main Abattoir of the Cairo governorate [28,29]. Mohamoud et al. [30] revealed that, many camels were negative by blood examination but positive by PCR, which may be related to low parasitemia and/or low sensitivity of the thin blood smear technique and indicates that low parasitemia might be due to early infections, chronic infection and/or lower strain virulence.

Figure 8: Transmission electron micrograph of Babesia sp. showing more than one vacuoles in the blood cells of *Camelus dromedarius*.

Figure 9: Photomicrograph showing *Theileria cameli* in the blood cells of *Camelus dromedarius*. 
Furthermore, it was reported that the detection of less than \(2.5 \times 1,000,000\) trypanosomes per ml in blood samples by microscopy is not feasible [31], and this explain the low incidence (2.5%) of the parasite through one season only and its disappeared through the rest of seasons in the present study beside that, some drugs which given in the veterinary hospitals for these animals.

Blood parasites are common in domestic animals, rodents and human beings, may be fatal and mostly transmitted by ectoparasites to human and other [32-34]. Babesi species are transmitted by ticks to susceptible animals, rodents and humans [35,36]. Although a number of different animals serve as reservoirs of Babesia species however rodents are at the top [36]. In the present work Babesia sp. was infected camels with different rates in the different seasons, autumn, winter, summer and spring (28.8%, 28%, 24.5% and 18.9%) respectively. in contrast higher infection rates had been observed by different research workers working in various geographical regions.

*Theileria* sp. is transmitted by ticks acting as biological vectors. *Rhipicephalus appendiculatus* is the most important vector for *T. parva*, but *R. Zembezienis* and *R. duttoni* carry this organism in parts of Africa. *T. annulata* is transmitted by ticks in the genus *Hyalomma*. *Hyalomma* spp. are also the vectors for *T. lestoquardi*, *T. ovis* and *T. separata*, while *T. buffeli* and *T. sergenti* are transmitted by *Haemaphysalis* sp. and *T. mutans* and *T. vellifera* are transmitted by *Amblyomma* sp. Genus *Rhipicephalus* spread *T. taurotragi*. Ticks in the genus *Rhipicephalus* spread *T. taurotragi*. [37-42]. In the present study the parasite was accompanied to Babesia so that, it was appeared in all seasons with low different incidence (7.69%, 7.01%, 5.4% and 4.83%) in winter, Summer, spring and autumn in respectively.

![Scanning electron micrograph of cigarette shape of *Theileria cameli* in the blood cells of *Camelus dromedaries.*](image)

**Figure 10:** Scanning electron micrograph of cigarette shape of *Theileria cameli* in the blood cells of *Camelus dromedaries.*

**Conclusion**

The present study was showed that, the seasonal variation had a clear effect on the distribution of the parasites in camels either by disappearing of some species through the different seasons or appearing of new species in others.

Generally the prevalence values of some parasites were differentiated through the different seasons.

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