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Traditional diagnosis of *Eimeria* spp. in Camels (*Camelus dromedaries*) at Al-Najaf Al-Ashraf province, Iraq

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Abstract

Dromed camels make up (Uniquely) 95% of all Old World camels. There are 47 countries where these creatures can be found. An apicomplexan protozoa *Eimeria* affects a wide variety of bird species as well as domestic and wild animals, including camels. This study was aimed to distribution of *Eimeria* spp. camels (*Camelus dromedaries*) using fecal examine by conventional techniques to detection of oocyte. A total of 120 camels (*Camelus dromedary*) from different regions of Najaf Al Ashraf province, Iraq, were evaluated (direct injection and sheath solution exchange) from November 2023 to the end of April 2024. The prevalence of *Eimeria* spp. 48.33% (58/120). The highest rate was recorded in male camels (60.5% (26/43)) and the highest infection rate was recorded in the age group (<5 years) at 73.5% (25/34) compared to 41.5% (32/77) in females was recorded group (10, years) showed the morphological characteristics of oocysts as follows: *E. cameli*, *E. dromedarii*, *E. Rajasthani*.

Keywords: *Eimeria*, infection, *Camelus dromedaries* traditional methods, oocyste

Introduction

Parasitic infections, particularly gastrointestinal parasites like *Eimeria* spp., have had a significant impact on camel's development and output. The economic harm they cause, including the mortality of animals and the diminution of livestock products, is significant, particularly in young animals (Kamal *et al.*, 2024) ^[1]. Coccidia are host-specific protozoan parasites that shed their oocysts in the feces of both symptomatic and carrier animals. These parasites act as a source of disease from water and food (Jilo *et al.*, 2022) ^[2]. When animals consume contaminated feed or water, the parasite injures intestinal cells, causing diarrhea and hematochezia (Utebaeva *et al.*, 2021) ^[3]. The great resilience of oocysts to environmental conditions is a crucial aspect of the infection's epidemiology (Gao *et al.*, 2024) ^[4]. In the life cycle of *Eimeria*, there is an endogenous phase in which oocysts are released into the environment and an endogenous phase in which the development of the parasite occurs in the host's intestine. During the endogenous phase, many episodes of schizogony (Abnormal reproduction) occur following the separation between play sex and pregnancy. Transmission of the parasite occurs via the fecal-oral route. Diseases are common on farms where many animals are confined to small spaces. *Eimeria*'s classification was based on the morphological features of both sporulated and non-sporulated oocysts (Hegazi *et al.*, 2023) ^[5].

Materials and Methods

The amount of samples of fecal that weight in the range of 10-15 gm were taken from (120) camels (43 male, 77 female) of various ages from certain region in Al-Najaf, Al-Ashraf, between November 2023 and the end of April 2024. Fecal samples obtained in sterile plastic containers were firmly sealed, and safety precautions such as disposable gloves were removed owing to consecutive numbers. All sample information, including age, gender, and date, were storage in the of our laboratoryrefrigerator for traditional procedures (Direct smear and floating with sheather's solution).

Direct Wet Smear: "One gram of fecal samples was put on the glass towel. After applying one drop of normal saline, a coverslip was blended in using a wood stick. By the light microscopy at 10X and 40X magnification levels, the investigation was carried out (Coles, 1986) ^[6]".

"Flotation method"

"The flotation method was carried depending on the use of Sheather's solution according to (Al-Kaabi, 2009) [7]" as following 2-4 g of poison is placed in a small amount (10 ml) of heated water. To remove the large particles, the mixture of sewage is washed through a sieve of part 40. The filter is placed in a clean plastic bag and wrapped at 1000 RPM for 3 min. Then the gunman was shot. A wooden stick is used to add a small amount of sugar solution to the water and mix it well. Then, it is pumped at 1000 rpm for 2 minutes to fill the container, put the plastic test tubes in the vertical of the pipette, and the sugar solution. Then, on the end of the tubes for 10-15 minutes, the glass cover is placed. To visualize *Eimeria* oocysts, carefully pick up a glass dust cover and place it under a microscope with 10-40x magnification.

Statistical analysis

The association between Parasite infection rate and each of the animals (Camel) was detected using the Chi-square test, Probability values of $p < 0.05$ were considered statistically significant using the SPSS (statistical package for social sciences) version 26. SPSS. 2020. User Guide Statistic Version, 26th ed. SPSS, statistical package for social science, user guide statistical version, 6thed.

Results

Eimeria spp. Camels (*Camelus dromedaries*) using traditional methods (smear suspension and floating Sheather solution) in different areas of AL-Najaf AL-Ashraf of Iraq from November 2023 to the end of April 2024. The total prevalence of *Eimeria* spp was 48.33% (58/120) (Table 1).

Table 1: The *Eimeria* spp. Total rate infections in camels by using traditional methods

Host	No. of fecal sample examined	Traditional microscopy	
		No. of positive	Percentage%
Camel	120	58	48.33

***Eimeria* spp. Kamel according to gender**

According to gender, male and female are 60.5% (26/43)

and 41.5% (32/77). Significant difference ($p \leq 0.05$).

Table 2: The *Eimeria* spp. rate of infections in the camels according to the sex

Gender	No. of samples examined	No. of positive	Percentage of total (%)
Male	43	26	60.5
Female	77	32	41.5
Total	120	58	48.3
X ²		3.949581	
P value		0.046883*	

*: significant differences at ($P\text{-value} \leq 0.05$)

"Highest rate of infection with *Eimeria* spp. was recorded in camles 73.5% (25/34), while recorded in groups (10 years \geq) 0% (0/2) with significant differences ($p \leq 0.05$)" (Table 3).

Table 3: Rate of infection with *Eimeria* spp. In camels male according to age groups

Age (year)	No. of the exam. samples	Positive samples	
		No.	% of total
5 years \leq	34	25	73.5
5-10 years	7	1	14.3
10 years \geq	2	0	0
Total	43	26	60.5
X ²		11.731026	
P value		0.002836*	

*: significant differences at ($p \leq 0.05$)

Highest rate of infection with *Eimeria* spp. was recorded in female 63.5% (7/11), while lowest recorded in groups (5 years \leq) 7.1% (2/28) with significant differences ($p \leq 0.05$)

(Table 4).

Table 4: Rate of infection with *Eimeria* spp. In camels male according to age groups

Age (Year)	No. of the exam. samples	Positive samples	
		No.	% of total
5 years \leq	28	2	7.1
5-10 years	38	23	60.5
10 years \geq	11	7	63.6
Total	77	32	41.6
X ²		21.491612	
P value		0.000022**	

*: significant differences at ($p \leq 0.05$)

Traditional methods recorded rate of infection with *Eimeria* spp in 58 camel samples at three district as following AL-Manathera 64.1% (25/39), Slaughter house 51.2% (22/43), and AL-Meshkab 28.9% (11/38) but not statistically variation ($p\text{-value} \leq 0.05$) Table 5 and figure1.

Table 5: The rate of infection with *Eimeria* spp. In camels according to the district in AL-Najaf AL-Ashraf

District (Area)	No. of the exam. samples	Positive samples	
		No.	% of total
Slaughter house	43	22	51.2
AL-Manathera	39	25	64.1
AL-Meshkab	38	11	28.9
Total	120	58	48.3
X ²		9.740151	
P value		0.007673**	

Significant differences at ($p \leq 0.05$)

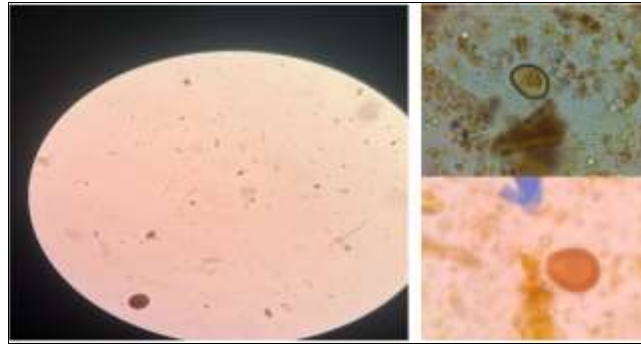


Fig 1: Infection picture with *Eimeria* spp. In camels according

Discussion

Coccidia are an extensive group of parasites that must be present inside the cell. Coccidiosis is an economically significant illness that affects numerous cattle species (Ashfaq *et al.*, 2023) ^[8]. Coccidiosis symptoms range from lack of appetite and mild, brief diarrhea to severe cases characterized by copious volumes of dark and bloody diarrhea and, in extreme cases, death. For an effective and inexpensive management of coccidiosis in camels, extensive knowledge regarding the *Eimeria* species involved is required (El-Bahy *et al.*, 2023) ^[10].

Therefore, "the aim of this study is to determine the frequency and diversity of *Eimeria* species. The species of *Eimeria* included in the present study were previously regarded as camelids (Hussein *et al.* 1987) ^[11]. In the current study on coccidiosis in camels, sex and age of camels did not significantly affect the ratio, these results do not agree with the results of Yakhchali and Cheraghi (2007) ^[12]. Young goats are more susceptible to disease than older goats because of their susceptibility to disease, their breeding and housing populations, and the immaturity of the goat's immune system (Safa and May, 2020) ^[9]. Differences in the prevalence and distribution of coccidiosis may result from a combination of factors such as management and sanitary conditions, temperature, agroecology, environment, climate, host protection level, sample size, sample size, and breeding ability child coccidia in various forms".

Conclusion

Eimeria spp. infections significantly affect camel health and productivity, with a prevalence rate of 48.33% observed in our study. Gender disparities in infection rates were notable, with males showing higher susceptibility. While age influenced infection rates, our results didn't show significant differences. Understanding *Eimeria* diversity is crucial for effective coccidiosis management. Tailored interventions considering factors like age, gender, and environmental conditions are vital for mitigating economic and health impacts. Further research is needed to comprehensively address coccidiosis in camel populations.

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