

Identification of the potential vector of some Spirurida (*Parabronema skrijabini*) in dromedary in Iraq.

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Abstract

This search carried out to determine the possible vector of the *Parabronema skrijabini*, 44% of 43 samples from camels were infected, infection isolated from abomasum. 141 parasites found in 19 infected camels, worm burden ranged from 1-13 per head, in range 7.4 parasite/camel.

423 flies were collected, 6 species of flies were identified. *Stomoxys calcitrans* was 26.7% of them (113 of 423).

Rate of infection in camels with *P. skrijabini* and number of flies increased concurrently with decrement of temperature.

تشخيص المضائف الناقلة لبعض الخيطيات (*Parabronema skrijabini*) المصابة للمعدة الرابعة للجمال في العراق

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الخلاصة:

شخصت الاصابة بطفيلي الـ *Parabronema skrijabini* في 44% من 43 جمل فحصت منفحتها للكشف عن هذه الاصابة وبواقع 19 جمل مصاب. عزل 141 طفيلي من 19 جمل مصاب وتراوحت شدة الاصابة بين 1-13 طفيلي في الراس الواحد، وبلغ معدل عدد الطفيليات 7.4 طفيلي للجمال الواحد. كما جمعت 423 ذبابة تعود لـ 6 انواع مختلفة من الذباب، شكل الذباب من نوع *Stomoxys calcitrans* 26.7% وبواقع 113 ذبابة. لوحظ ارتفاع نسبة الاصابة بالطفيلي (*Parabronema skrijabini*) في الجمال تزامنا مع زيادة اعداد الذباب بصورة عامة ومع ذباب الاسطبل (*Stomoxys calcitrans*) بصورة خاصة.

Introduction

Parabronema skrijabini considers as a large parasite that infect the abomasum of camels, *P. skrijabini* Rassowska, 1924 a nematodes with a high pathogenic effect, and below to order Spirurida Chitwood 1933, suborder Spirurata Railliet, 1914, subfamily Parabronematinae skrijabini, 1941, genus *Parabronema baylis* 1921. This species has been found in Okapi in London (Sarwar, 1954), and in

Nubian ibex and giraffe in Egypt (Ezzat, 1945), in Pakistan and India recorded in sheep and goat (Singh 2012, Al-Asadi 2014). Мачульскийкий (1950) found this species in deer, cattle, *Camelus bactrianus* as well as small ruminants in Russia, and in Lama in Kazakhstan and Kazak. In Kirkyzistan this parasite has been found in sheep, and in domestic animal

in Auzbakistan and in deer in Pamyris (Токтоучикова, 1975).

Because of a high economic value of camels by providing meat, milk and wool as well as transportation and labor, a lot of studies on camels record many species of parasites of gastrointestinal tract. In Iran, Mohammad(2011), Borji et al,(2010), Tajik(2011) found *Nematodirus*, *Trichuris*, *Marshallagia*, *Moniezia*, *Strongyloides*, *Stilesia*, *Nematodirella*, *Trichostrongylus*, *Esophagostomum*, *Chabertia*, *Camelostrongylus mentulatus*, *T. colubriformis*, *Haemonchus longistipes*, *Cooperia onchophora*, *Parabronema skrjabini*, *Marshallagia marshalli* and *Teladorsagia circumcincta* in camels.

Magzoub (2000), In Saudi Arabia, found that most endemic species were *Haemonchus longistips*, *H. contortus*, *Trichostrongylus probolurus*, *Camelostrongylus mentulatus*, *Parabronema skrjabini*, *Nematodirus* spp., *Trichuris* spp. 91% of camels sample have a *Trichostrongylus* eggs, highly number of eggs found in October to December. He discovered seasonal variation in infection rates between these species of parasites. Infective stage of parasites can be lived in a freezing weather and highly summer temperature. He found out the critical period in life cycle of each parasite of them that will be very helpful in design control strategy.

Adults female shedding enveloped eggs with a thin shell, with lateral curved larva, shedding of *Parabronema* eggs to environment occurring in certain period of year, in camels, shedding occurring in May to October, in highly qualitative of this happened in summer, when adult female found in abomasum after September when eggs seen in feces of infected animals. Development of intermediate host

depends on food intake (animal feces), because it very important to flies for laid their eggs, in 1 to 2 days after laying eggs, they hatching and begin for eating feces and *Parabronema* eggs which have in it. Eggs of parasite hatching in intestine of flies' larva, lancet formed in anterior end of larva which helps in penetrate of intestinal wall of flies' larva. *Parabronema* larva stay in haemacoel of flies till enter to final host body, where larva developing to infective stages parallel with developing of larva of intermediate hosts. Final host infected when infective stage enter to him by oral rout (Borji et al., 2010).

Intermediate host of *Parabronema* it flies, larva of flies live in the feces of ruminants, eggs hatching after eating of flies to eggs, in intestine larva be an infective. many studies discuss the control of parasitic infection by control of intermediate hosts (flies)(Soulsby, 1982). Seven species of *Parabronema* founded, flies of type *Lyperosia titillans*, *L. irritans* and *Paregle alatayensis* (farm flies) act as important role as intermediate host. Mohan (1947) determined development of *Parabronema* in *Stomoxys stilesi*, *S. calcitrans*, *S. assamensis*, *Lyperosia titilans* and *L. irritans* in ratio 90 to 100% in sites where these flies lives, which preferred worm moist area. As well as these species, *Parabronema* founded other species of *Stomoxys* (*S. bengalensis* Picard,1908, *S. bilineatus* Grunberg, 1906, *S. boueti* Roubaud, 1911, *S. indicus* Picard, 1908, *S. inornatus* Grunberg, 1906, *S. luteolus* Villeneuve, 1934, *S. niger* Macquart , 1851, *S. ochrosoma* Speiser, 1910, *S. omega* Newstead, Dutton and Todd, 1907, *S. pallidus* Roubaud, 1911, *S. pullus* Austen, 1909, *S. sitiens* Rondani, 1873, *S. stigma* Emden,

1939, *S. taeniatus* Bigot, 1888, *S. transvittatus* Villeneuve, 1916, *S. uruma* Shinonaga and Kano, 1966, *S. varipes* Bezzi, 1907 and *S. xanthomelas* Roubaud, 1937). Stomoxys flies named as stable flies and dog flies, stable flies look like house flies but have smallest size, and under anatomical microscope appear wider and striated abdominal region, adults 6 to 8 mm in length with light color in contrast with house flies, and mouth part adapted for sponging fluid, while the mouth part of stable flies adapted for piercing and sucking the blood of mammals (Gregor et al., 2002 and Talley 2008).

Muller et al, (2011) observed that the flies of Muscidae that classified as Stomoxyini, it's a small group with ten genera, and 49 species around the world, these groups consider flies with large wing, some of them feed on nectar, and others on sucking the blood which easily recognized under the microscope. The Muscoid flies persist as cosmopolitan pest of human and domestic animals because of ability of immature phase to develop in the human waste and animals organic materials such as manure, garbage (Keiding, 1974).

Parasitic diseases consider major causes of economic losses in the production of meat and milk in camels. As well as the camel plays a role in transmit of a lot of zoonotic pathogens (Tafti et al, 2013), and for incidence of infection with *Parabronema* must obtain the final hosts (camels) and intermediate hosts (flies), adults *Parabronema* live in the mucosa of abomasum. The infection of camels with *Parabronema skrijabini* causes inflammation and bleeding and ulceration in abomasum, with diarrhea and malnutrition, and some time death, and the economic losses for long

period make this parasite one of the important infection in camels (Zhao, 2011). Campbell et al. (1978), Catangui et al. (1997) and Mramba et al. (2007) observed that the presence of stable flies with a huge group causes anemia and decreases in milk production, a bite of stable flies not painful, but it transmits the *Trypanosoma evansi*, *T. brucei*, Brucellosis, Equine infectious anemia, African horse sickness, fowl pox, *Bacillus anthracis*, Staphylococcus and *Enterobacter sakazakii* and many viral diseases. Borji et al, (2010) found that uses of anti-parasitic drugs in camels lead to the increasing in production, as the infection with gastro-intestinal parasite in camels lead to decrease of absorption of food, diarrhea and malproduction. *Stomoxys calcitrans* and *Haemonchus irritans* causes losing a billion dollar in cattle industry (Byford et al., 1992). As well as the bite of flies is painful, a lot of biting causes loss of body weight and decrease of milk production and biting man where there are no animals (Foil and Hogsette, 1994).

In purpose of classified of intermediate hosts of *Parabronema skrijabini* in Iraq camels, this study searched for that in abattoir and in farm.

Material and methods

Between October and December 2015, 43 samples abomasum contains were taken from camels in Al-Diwanyah. Samples were collected from abattoir and transported to college of veterinary medicine for checking the infection with gastro-intestinal parasites.

Lactophenol used for clearing of parasites and classification, parasites were fixed on the slide by Canada-balsam and covered with cover slip. 10% of parasites were fixed in

Formalin (5%) and sent by mail to the United state department of agriculture, Agricultural research Service, U.S. National Parasite Collection Log to confirm diagnosis.

423 flies were hunted by net, 6 species of flies recognized, 26.7% of them were Stable flies (Zumpt, 1973).

Results

Parabronema skrijabini was identified in 19 of 43 collected sample with ratio 44%, density of infection ranged 1-13 parasite\infected camel (Table 1,2)(Figure 1,2,3).

Table (1) Rate of infection in camel in Diwanyiah abattoir.

Month	No. of examined camels	No. of infected	Rate of infection%
October	13	4	30.7
November	19	6	31.6
December	11	9	81.8
Total	43	19	44

Table (2) Density of infection with Parabronema skrijabini in camel.

No. of parasites	No. of infected camels	No. of isolated parasites	Mean Number of parasites per camel
1-5	5	13	2.6
6-10	11	93	8.5
11-13	3	35	11.6
Total	19	141	7.4



Figure (1) anterior end of *Parabronema skrijabini*.



Figure (2) posterior end of *Parabronema skrijabini* female.

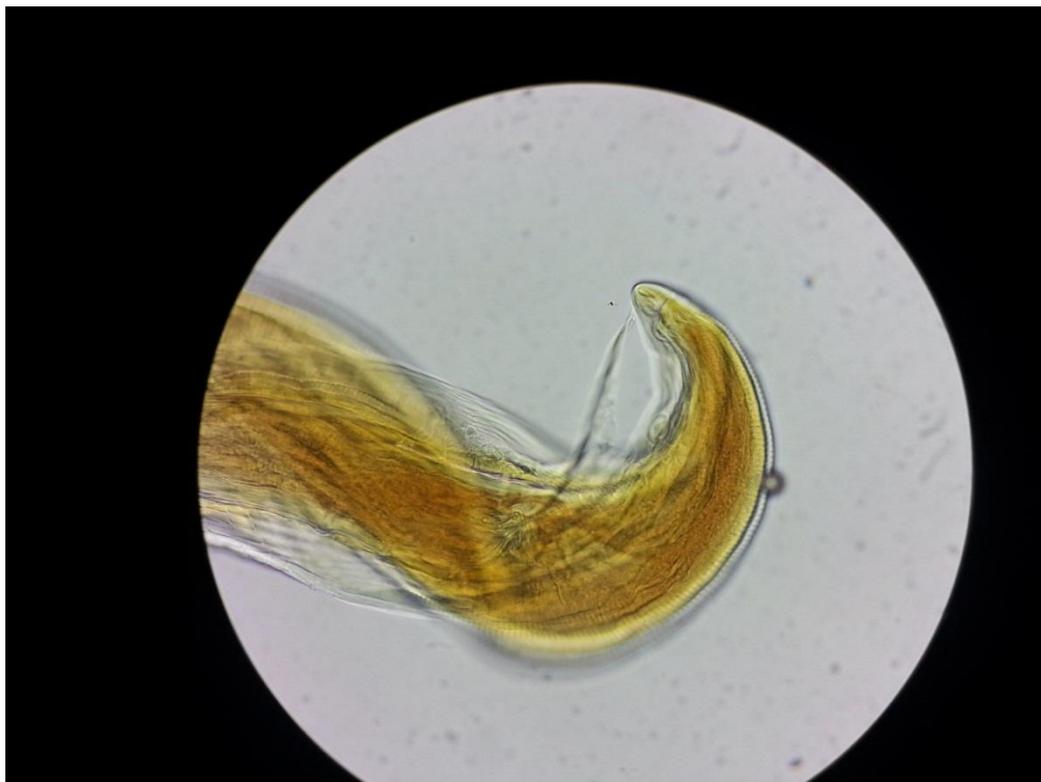


Figure (3) posterior end of *Parabronema skrijabini* male.

Some of *Parabronema skrijabini* have been sent to United state department of agriculture, Agricultural research Service, U.S. National Parasite Collection Log for confirm diagnosis (Figure, 4).

**U.S Department of Agriculture
Agricultural Research Service**

U.S. National Parasite Collection Log

USNPC No.	106352.00	Storage No.	M1982-C		
PARASITE: Genus	PARABRONEMA	Species	SKRJABINI	Type	VOUCHER
Stage	Adult	Fixative	Formalin	Stain	
HOST: Taxon	MAMMALIA/ARTIODACTYLA/CAMELIDAE	Species	DROMEDARIUS	Class	NEMATODA
Genus	CAMELUS	Orig. Field #		Body Loc.	ABOMASUM
Political	IRAQ, Al Diwania City	Museum No.		Lat.	deg ' " N
Collector	Al-Fatlawi, Monyer Abd	Collection Date	02 NOV 2012	Long	deg ' " W
Identifier	ABRAMS, A; HOBERG, E P	Identification Date	11 DEC 2012		
Comments 2 vials of males, 3 specimens per vial, 2 vials of females, 7 specimens per vial. Specimens kept separate based on whether they were shipped in formalin or 70% ethanol. 70% Ethanol specimens currently in formalin. Additional specimens frozen in 100% ethanol. Infection rate: 71.66%, infection intensity: 17.44 worms/camel. Prevalence 86/120 (34%) range 6 to 33 worms per infected camels.					

Figure (4) report of united state department of agriculture, Agricultural research Service.

Stomoxys was classified as one of 6 species of flies were hunted in this study (Table, 3).

Table (3) Number of Stomoxys according to months of study.

Month	No. of hunted flies	No. of Stomoxys	Rate of Stomoxys
October	151	34	22.5
November	133	35	26.3
December	139	44	31.7
Total	423	113	26.7

Discussion

Parabronema skrijabini is widely distributed in sheep in Mosul (Al-Saeed and Al-Khalidi, 1990), in Basrah found in goat (Al-Asadi and Al-emarrah, 2014), But in camels not studied yet, that what we have studied in our research.

In our study, *Parabronema skrijabini* found in camels. Rate of infection and number of parasite increased parallel with decrease temperature of weather, that may be due to increasing the number of flies. Infection of camels with *Camelostrongylus mentulatus*, *Haemonchus longistips*, *Moniezia benedeni* and *M. expansa* recorded. Borji et al, (2010) examined 306 *camelus dromedarius*, 10% infected with *Parabronema skrijabini* in Mashhad in Iran, and they found also *Trichostrongylus probolurus*, *Trichuris globulosa*, *Camelostrongylus mentulatus*, *T. colubriformis*, *Stilesia globipunctata*, *Nematodirella dromedarii*, *Haemonchus longistips*, *Nematodirus oiratianus*, *Cooperia onchophora*, *Trichuris barbetonensis*, *Nematodirella cameli*, *Marshallagia marshalli*, *Teladorsagia circumcincta*, *Moniezia benedeni*, *M. expansa* and *Trichostrongylus vitrines* in rate ranged 2-64%. Zhang (2009) in China found

72.5% of camels were infected with *P. skrijabini*, and the intensity of infection was 1315 parasite/camel. Wang(2009) found during examination of flies searching for *P. skrijabini* in China, 11 species of flies found fly around camels, and the *Haematobia irritans* was the mean vector of this parasite. Gu (2011) and Zhao (2011) found 25 species of flies live around camels in centra Mongolia\China, and Zhao isolated *P. skrijabini* from *Stomoxys calcitrans*, *Haematobia titillans* and *Haematobia irritans*, intensity of parasites was 1-22 larvae \ fly, and Larvae were spiral in shape and in different length.

We founded that flies of species *Stomoxys calcitrans* were the most probability vector of *P. skrijabini*. Hadi and Al-amery (2012) found the larvae of Spiruridii in the intestine of stable flies. Hassan and Alkafagi (2013) determined increasing the intensity of flies in December in Abu Garyb in Iraq.

Our study determined also another species of flies (*M. crassirostris*, *M. larvipara*, *M. mesopotamiensis*, *M. nebulo* and *M. determinate*) which don't act any role as vector of *P. skrijabini* around the world. And we found increasing of intensity of flies in cold weather, and that agreement with

that Gilles et al, (2005) which founded that flies capable still alive in 15-17 C for 70 days.

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