

**Research Article** 

# Prevalence, Larvae Burden and Gross Pathological Lesion of *Cephalopina titillator* in Camels Slaughtered at Addis Ababa Abattoir Akaki Branch, Ethiopia

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#### Abstract

Cephalopina titillator (C. titillator) is an obligate parasite of the camel and causes nasal myiasis in camels throughout the world. The adult fly deposits larvae in the nasal cavity and these remain parasitizing the animal for a considerable period of time. A cross sectional study was conducted on randomly selected camels, Camelus dromedarius (C. dromedarius) slaughtered at Addis Ababa abattoir, Akaki branch, Ethiopia during the period from November 2016 to April 2017 to determine the prevalence of larvae infestation with associated risk factors and gross pathological lesions and larvae burden. Out of total 334 camel heads examined, 276 were infested by C. titillator larvae which give an overall prevalence 82.6%. Analysis of potential risk factors has revealed that the rate of infestation was significantly higher in older camels (88.2%) as compared with younger camel (76.8%) (P<0.05). The rate of infestation was also significantly higher in female camel (88%) than that of male camel (77.8%). On the other hand the difference was not statistically significant (p>0.05) between parasitic infestation with origin and body condition score of camels. But relatively higher prevalence (84.3%) was recorded in camels originated from Borena as compared to those originated from Kereyu (80.4%). Moreover prevalence was relatively higher in camels with poor body condition (91.3%) as compared to that of camels with medium (81.8%) and good body condition score (80.3%). On average 126 C. titillator larvae were counted per animal, and abundant mucous secretion, congested mucus membrane, diffused petechial hemorrhage and development of multiple granuloma were among the major gross pathological lesions observed in nasal cavity, nasopharynx and turbinates. In conclusion the present finding has demonstrated that C. titillator was one of the highly prevalent myiasis in camel rearing area. Therefore further epidemiological investigation on the diagnosis, control and prevention method and its economic impacts are required.

**Keywords:** Addis Ababa; Abattoir; *C. dromedarius*; *C. titillator*; Myiasis; Prevalence

#### Introduction

Camels (*C. dromedarius*) are vital domestic animal species that are best adapted to harsh environments and fluctuating nutritional conditions of arid, semi-arid and extreme arid areas [1] and are drought-tolerant and survive and flourish by browsing on available browses and shrubs [2]. As a pseudo-ruminant, the camel has evolved as a browsing herbivore with the ability to utilize forages that are rich in fiber but contain a range of anti-nutritional factors. Its ability to survive and thrive under the harsh desert conditions of arid and semiarid regions is believed to be due to its distinctive feeding behavior, anatomical and physiological characteristics of its digestive system, and other unique adaptation features [3].

The one-humped camel plays an important role as a primary source of subsistence in the lowlands of Ethiopia, and they live in arid and semi-arid areas which are not suitable for crop production and where other livestock species hardly thrive [4]. They are important sources of milk, meat, draught power and transportation service for the pastoralists in Eastern and Southern Ethiopia. But Camel production and its contribution to herders especially in Ethiopia pastoralists is inadequate. Infectious and parasitic diseases appear to be the major constraints that are hampering the potential performance of camels. Trypanosomiasis, camelpox, contagious skin necrosis, pneumonia, mange mite, dermatophytosis, tick infestation, internal and external parasites and calf mortality are among the major health problems that are affecting the potential contribution of camels to Ethiopian pastoralists [5].

Camel nasal myiasis is a serious veterinary problem worldwide. Several factors contribute to parasitic infestation, including the free movement of camels between different localities due to the lack of closed-farm systems for camel breeding, the absence of strict controlling methods on imported animals, and the absence of specific and sensitive techniques for routine diagnoses of infestation in living camels [6]. Camel nasopharyngeal myiasis is caused by larvae of *C. titillator.* The larvae of this fly are deposited in the nostrils of camels. They moult twice while attached larvae to the nasal cavity and pharynx causing extensive irritation, tissue damage and respiratory disorders [7]. Infestations impair animals'' welfare, reduce host physiological functions, destroy host tissues and cause significant economic losses to livestock through abortion, reduction of milk production and that losses in terms of weight gain, infertility and low hide quality [8].

Despite the fact that camels provide lots of socio-economic reward and are the preferred domestic animal species in the ever-changing climate, so far it was neglected by researchers and development planners in the past [9]. Although the camel population is growing, lack of effort to improve camel productivity is still the main constraint for developing marketable products for different parts of the world. Interest in camel research has been growing in the past few decades, with most scientific publications covering veterinary aspects such as anatomy, physiology and diseases [10]. Despite the high incidence of nasopharyngeal myiasis in many camel rearing countries, very few epidemiological surveys have been carried out in Ethiopia on the prevalence and larvae burden of parasite with gross pathological lesion at site of attachment. Therefore the present study was conducted with objectives of determining the prevalence of *C. titillator* larvae with its associated risk factor, larvae burden or larvae load per camel and its gross pathological lesions on affected tissue.

# **Materials and Methods**

#### Study area and study population

This study was conducted at Addis Ababa abattoir, Akaki branch, Ethiopia. The abattoir slaughter 6-11 camel daily and supplies meat and edible organs to the consumers. All camels slaughtered at this abattoir were originated from the Borana (semi-arid), and Kereyu (arid) areas of Ethiopia. Borana was located at approximately 600 km South of Addis Ababa at an altitude of 500 to 2500 m above sea level. It has an annual rainfall of 450 to 650 mm in bimodal pattern with long rains expected between March and May and the short rains between October and November. Kereyu is located at about 250 km East of Addis Ababa at 80° 54 E longitude and altitude of 930 m above sea level. It has an average annual rainfall of 504 mm. The mean annual maximum and minimum temperature are 32.40 and 18.5°C, respectively [11].

# Study design

A cross-sectional type of study was employed with the objectives of determining the prevalence, associated risk factors, larvae burden and gross lesions of *C. titillator*.

#### Sampling method and sample size determination

The appropriate sample was taken by using simple random sampling method in the abattoir during ante mortem examination of the animals. During ante mortem examination possible risk factors and background information about the animal such as sex, age and origin of the animals was recorded. The estimation of the required sample size for this study was determined by the formula

 $N=1.962 \times PP(1-PP)/d^2$ 

Thrushfield with 95% confidence interval and 5% desired absolute precision [12] and by using 68.2% previous prevalence reported by Regasa et al. [13] to obtain maximum sample size.

Where n=sample size, Pp=previous prevalence (68.2%) and d=desired absolute precision (5%). Hence sample size was calculated to be 334 camels.

#### Study methodology

During the active study period, ante mortem examination of camel was conducted on each camel approved for slaughter and the sex, age and origin of animals were recorded. Camels were categorized in to less than seven years and above seven years old based on camel age estimation using rostral dentition [14]. In addition camels were classified in to three groups based on their body condition namely poor, medium and good according to Faye et al. [15]. After slaughtering, the head of camel dissected from the rest of the body and parasite was examined and counted from nasal cavity, turbinates and nasopharnyx. The mouth cavity was opened, the soft palate was incised from the hard palate from the posterior side and further nasal cavity and brain was opened after the larvae was examined and counted from turbinate and nasopharyx. The parasitic load, location and gross pathological lesion of were recorded simultaneously.

## Data analysis

Data generated from ante mortem and post mortem examination was recorded in the Microsoft excel program. The data were transferred to SPSS version 20 and the prevalence of infestation was determined using descriptive statistics. The rate of infestation was calculated as percentage by dividing the number of animals recorded as infested with parasite to the total number of animals examined in the abattoir. Significance of the factors was determined by calculated P value obtained during analysis of the data through chi square of descriptive statistics and the frequencies of the lesion were also determined.

# Results

#### Prevalence

In this study out of 334 camels that were examined, 276 were found to be positive for *C. titillator* larvae giving an overall prevalence of 82.6%. Among the infested camels, the larvae was found in turbinate only, nasal cavity and turbinate, and nasopharnyx and turbinate at frequency of 160 (47.9%), 93 (27.8%) and 27 (8.1%) respectively.

The prevalence of *C. titillator* among origin of camels slaughtered in Addis Ababa abattoir was 84.3% and 80.4% in Borana and Kereyu respectively. The difference in the prevalence of *C. tittillator* among camels of different origin was not statistically significant (P>0.05) as shown Table 1.

The prevalence of *C. titillator* among sex of camels was 77.8% and 80% in male and female respectively. The difference in the prevalence of *C. titillator* among sex of camels was statistically significant (P<0.05) as shown Table 1.

The prevalence of *C. titillator* among different age groups of camels was 76.8% and 88.2% in young (camels less than 7 years old) and adult (camels greater than 7 years old) respectively. The difference in the prevalence of *C. titillator* among ages of camels was statistically significant (P<0.05) as shown Table 1.

The prevalence of *C. titillator* among camels of different body condition score was 80.3%, 81.8% and 91.3% in good, medium and poor body condition respectively. The difference in the prevalence of *C. titillator* among body condition was statistically not significant (p>0.05) as shown Table 1.

Risk factors	No. examined	No. of positive	Prevalence (%)	<b>X</b> <sup>2</sup>	P-value
Origin					
Borena	191	161	84.30%	0.855	0.355
Kereyu	143	115	80.40%		
Sex					

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Male	176	137	77.80%	5.958	0.015
Female	158	139	88%		
Ages					
<7 year	164	126	76.80%	7.568	0.015
>7 year	170	150	88.20%		
Body condition					
Good	210	168	80.30%		
Medium	55	45	81.80%	4.656	0.098
Poor	69	63	91.30%		
Total	334	276	82.60%		

 Table 1: Prevalence of C. titillator in association with risk factors.

# Goss pathological lesions

Areas of larvae attachment were closely examined for the presence of gross lesions. From 334 camels examined 59 (17.7%) of has huge mucus secretion, 81 (21.4%) of camels has shown congested, 62 (18.6%) of camels has shown congestion and mild hemorrhage, 60 (18%) of camels has shown petechial hemorrhage, development of small granuloma and congestion swollen and edematous mucus membrane, 72 (21.6%) of camels were free from any of the lesion (Figure 1 and Table 2).

Types of gross pathological lesion	Frequency	Percent
Mucus secretion	59	17.7
Congestion	81	24.3
Petechial hemorrhage and congestion	62	18.6
Petechial hemorrhage, granuloma and congestion	60	18
No lesion	72	21.6
Total	334	100

**Table 2:** Frequency of gross pathological lesion.



Congested mucus membrane of nasal cavity

F. Parasite along with hemorrhagic mucus membrane in nasopharynx

Figure 1: Gross pathological lesion observed in turbinate and nasopharynx.

#### Larvae burden

The average larvae load of affected camels was 128 larvae of different stages per camel. From 276 positive camels 154 (46.1%) of camels harbor 3-50 larvae, 90 (26.9%) of camels harbor 51-100 larvae, 26 (7.8%) of camels harbor 101-150 larvae, 7 (2.1%) of camels harbor 151-200 larvae and 3 (0.9%) of camels harbor more than 200 larvae (Table 3).

Range of larvae	Frequency of camel	Percent
Mar-50	154	46.1
51-100	90	26.9

101-150	26	7.8
151-200	7	2.1
>200 larvae	3	0.9

Table 3: The larvae burden and frequency of camel.

## Discussion

The present study showed that *C. titillator* is a common parasite of camels in the study area. The overall rate of infestation among 334 examined camel heads was 82.6%. This result was in agreement with report of Arabali and Amare (81.1%) in Dirre Dawa [16]. But it is higher than results of Regasa et al. (68.2%) in Addis Ababa abattoir and Bekele [13], 2001 (71%) in Somali, and lower than the findings of Richard (100%) in Ethiopia [17] and Kassa (99.3%) in Dirre Dawa [18]. Furthermore, when it is compared with reports from other countries, the present prevalence was higher than the result of El-Rahman, (79%) in Libya [19], Oryan et al. (58.1%) in Iran [20] and lower than the results of Khallaayoune (85.7%) in Morocco [21]. This variation in the prevalence of *C. titillator* infestation might be attributed to the different management systems and environmental condition that exist among those study areas.

In the present study, *C. titillator* infestation was significantly low in younger (camels of less than seven years age) with prevalence of 76.8% as compared with older ones (camels of above seven years old) (88.2%). This finding agrees with Bekele, Shakerian et al., El-Rahman and Oryan et al. who reported that the prevalence of *C. titillator* larvae infestation was lower in younger camels and significantly higher in older camels [19,20,22,23]. It was documented that older camels may be more tolerant of flies and allow the deposition of egg around the nostrils; while the younger camels actively seek to prevent the flies settling around the nostrils [23].

In this study the infestation rate of C. titillator was significantly higher in female camels (88%) as compared to that of males (77.8%). This result was in agreement with findings of Shakerian et al. in Iran, (86% in female and 76.8% in male) [23] and Arabali and Amare (86% female; 76.8% male) in Dire Dawa and Bekele, 2001 (85% female; 55% in male) in Somalia region [16]. Female camels are kept not very far from the villages even during dry season, because they supply milk for family. This might expose female camels to heavier fly challenge in the valleys near the villages. On the other hand the males move far from fly challenge due to the course of continuous movement as pack animals. Moreover females are under continuous stress which may suppress their immunity [22]. On the other hand Regasa et al. (males 72.6%; female 67.4%) [13], El-Rahman (males 65.0%; female 45.6%) [19] and Oryan et al. (65% in male; female 45%) [20] have reported that the rate of larvae infestation was significantly higher in males than female camels. It is not clear why the male camels were more infected than females. The causes of these variations could be due to differences in management practice of nomads of current and their study areas. Normally the owners use the male camels in transportation. It happens that male camels make journeys of hundreds of kilometers and visit many new places and are easily exposed to new epidemic areas of C. titillator [20].

Relatively higher prevalence rate of *C. titillator* infestation was recorded in camels with poor body condition (91.3%) as compared to that of medium (81.8%) and good (80%) body condition. This finding is in agreement with the report by Regassa et al. (fatty 60.7%; good

66.9%; 65.5%; thin 75.8%) [13] and Arabali and Amare (poor 96.5%; medium 75.1%; good 74.1%) [16]. This might be due to the interference of larval infestation with feeding behavior of the animal and respiration which leads to starvation and lack of oxygen to cells and tissue. As it was also documented this might be because of *C. titillator* larvae infestation has severe impact on body condition of camels and causes losses in terms of body weight gain [24]. It was also documented that *C. titillator* larvae infestation has several impacts on respiratory function, feeding, health and productivity of the animals where infected camels losse their appetite and show respiratory problem and abnormal behavior resembling cranial coenuriasis [25].

This study also shows that 79.4% of positive camels have developed gross pathological lesion such as huge mucus secretion, congestion, petechial hemorrhage, diffused nodule or granuloma, and reddened, swollen and edematous mucus membrane. El-Rahman in Libya [19] and Oryan et al. in Iran [20] also describe these pathological lesion from the camels positive to *C. tittillator* larvae.

On average 126 (ranges from 3-253) larvae were counted per animal during the examination. This result was in agreement with Musa et al. [7] but it was higher as compared with the result of Oryan et al. [20] which shown the minimum and maximum numbers of *C. titillator* found per camel were 6 and 136 respectively with a mean of 23.2 larvae per camel in cold seasons and 3 and 74 with a mean of 14.4 for warm seasons, and according to Arabali and Amare the minimum and maximum numbers of *C. titillator* larvae counted were 5 and 70 respectively [16].

## **Conclusion and Recommendations**

The present investigation revealed that *C. titillator* infestation in the surveyed locality is highly prevalent causing huge problem for camels. In spite of the high incidence of camel nasal botfly, little is known about its life cycle, economic impacts and control and prevention. Even there is a very little well-organized literature which gives full information about the parasite and the most available veterinary parasitological books were not deeply considering this parasite. So further investigation on life cycle, economic impact and control and prevention measures of the *C. titillator* are recommended.

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