

PREVALENCE OF THIELERIASIS AND ITS VECTOR IN CATTLE IN NEW-VALLEY GOVERNORATE, EGYPT

By

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Abstract

The present study was conducted for one year period extended from April 2018 to March 2019 which aimed to evaluate some epidemiological, clinical and diagnostic state of tropical theileriasis and tick infestation on cattle in New-Valley Governorate. For this purpose a total of 414 cattle of different ages, sexes and from different localities were examined for *Theileria annulata* infection and tick infestation. The result of tick infestation on cattle showed that the prevalence was 116 out of 414 examined samples (28%) were positive for tick infestation. Only one tick species, *Hyalomma anatolicum* was identified during the present study. Also, the results revealed that 160/414 (38.65%) of examined cattle were positive for *Theileria annulata* infection.

Keywords: Egypt, Cattle, *Theileria annulata*, Ticks, *Hyalomma anatolicum*.

Introduction

Theileriasis is economically an important disease in several countries worldwide. Losses in terms of vaccination and treatment cost, reduction in live weight of sub-clinical cases, mortality in animals, increase in inter calving interval, reduction in milk off take, delay in the age of maturity of affected female animals were reported (Gharbi *et al*, 2006). In Egypt bovine theileriasis is a tick-borne disease caused by *T. annulata* and led to severe losses in production and reproduction of cattle (Al-Hosary, 2009). Tick infestation in cattle is one of the major constraints to the livestock industry in developing countries which adversely affects economic performance, mainly by transmission of serious pathogens of animals (Das *et al*, 2005). Tropical theileriasis caused by the hemoprotozoan parasite *Theileria annulata*, is exclusively transmitted by ticks of the genus *Hyalomma* Uilenberg (1981). Its infestation cause losses in livestock production exceed \$2.26 billion annually Byford *et al*. (1992). Optimal relative humidity and temperature requirements for growth and reproduction of ticks are 85% and 26-37°C and respectively (Aktas *et al*, 2004). The patho-

gens transmission by ticks depends on a variety of factors including duration of feeding time, pathogen titer, and extent of tissue (e.g., gut, salivary glands) infection at the time of blood feeding. Some pathogens require a period of replication and/or expansion (in response to a blood meal) prior to transmission from a tick. Also, the prevalence of tick infestation in livestock is much higher in developing countries (Roelandt *et al*, 2010).

This study aimed to assess the prevalence of theileriasis and its vector among cattle in New Valley Governorate Egypt

Material and Methods

Study Area: A total of 414 cattle were examined for presence of *Theileria spp.* infection and tick's infestation in 13 villages of El-Kharga and Baris (New Valley Governorate).

Ticks collection: Before collection of ticks animals were restrain properly and their whole body was thoroughly inspected visually for the presence of tick. Ticks specimens were taken from predilection sites on the hosts as on the ears, dewlap, axillae, udder, groin, shoulders, and belly and around the anus. After detachment of ticks through

forceps from the animal body, collected ticks were transferred to suitable capped bottles containing 70% alcohol solution and shifted to the laboratory for permanent slide preparation and identification basing on the characters of the basis-capitulum, pedipalps, presence or absence of festoons, eyes, anal groove, adenal shields, coxa-1, coxa-IV, accessory adenal shields and designs of colors present on scutum (Walker, 2003).

Blood samples collection: Two ml blood samples were obtained from Jugular vein of 414 cattle of both sexes (300 females & 114 males, aged from 1 to 10 years) into clean dry sterile tubes containing EDTA as an anti-coagulant to prepare blood smears. Smears were air dried, fixed in methanol and stained with Giemsa and microscopically examined for *Theileria* spp. (Levine, 1985).

Results

Clinical signs: The present study revealed that infected cattle showed various degrees of the characteristic clinical signs of the tropical theileriosis like fever ($>40^{\circ}\text{c}$), enlargement of the superficial lymph nodes (Fig.1), congestion of the visible mucous membranes and corneal opacity (Fig. 2), diarrhea in addition to ticks infestation (Fig. 3).

Prevalence of tick infestation in cattle: From total examined cattle (414), the results showed that 116 (28%) of examined cattle were positive for tick infestation. the highest infestation rate was observed in summer (53.85%), followed by autumn and spring (33.33% & 29.2%, respectively). However, the lowest rate of infection was observed in winter (4%). Cattle at age > 2 years (36.3%) have highest percentage of infestation than cattle at age ≤ 2 years (31%). The higher ticks infestation was present in female (32%) compared with male (17.54%). All ticks examined were hard ticks belonging to

genus *Hyalomma*, species *Hyalomma anatolicum anatolicum*, which were as follows: Grossly, adult male *Hyalomma* tick showed conscutum dorsal aspect (Figs. 4 & 5), and engorged female ticks with striations in integument texture (Fig.6)

Microscopic appearance: Mouthparts are anterior and palp articles 2 are longer than articles 1 and 3 (Fig.7). Basis capituli has medium angular lateral margins (Fig. 8). Eyes are always very convex (Fig.9). Legs are slender; usually have pale rings (Fig.10). and anal groove was posterior to anus (Fig. 11). Pulvilli were always present and Ventral plates were present in males only; usually three distinct pairs (Fig. 12). Festoons were in males and in females but unclear in fed females (Fig.13). Coxae 1 have large and equal paired spurs (Fig.14).

Prevalence of *Theileria annulata* infection in cattle: From total of 414 cattle blood samples, the results showed that 160 (38.65%) were positive for *Theileria* spp. infection (Fig. 15) and the highest percent of infection rate was observed in summer (58.97%), followed by autumn (57%). However, the lowest infection in spring and winter (41.66% and 9.8%, respectively), and the prevalence was (40.91%) in cattle aged > 2 years while (36.08%) at aged ≤ 2 years. Also, higher *Theileria* spp. infection was found in female (40.66%) compared to male (33.33%). As to parasitemia in blood films was categorized regarding the degree of infected RBCs with *Theileria* spp. in to (5) divisions as follow; Of 160 infected animals, 90 (56.25%) of cattle were infected with the first degree of infection (1-2%), 28(17.5%) were present in of infected cattle (> 2 -5%), (> 3 -5%) and (> 10 -15%) recorded in 10 (6.25%) of infected cattle, 34 (27.5%) of infected cattle were the last degree of infection (> 15 %).

Table 1: Relation of hard tick infestation with *Theileria annulata* infection.

Relation of infection with infestation	No. of animals	Percentage
Infested – infected	80	69%
Non infested - infected	80	69%
Infested - non infected	36	12%

Discussion

In the present study, *Hyalomma anatolicum* infestation was 116 (28%) among (414) cattle. This agreed with Khan *et al.* (1993) in Pakistan, who reported (28.2%) of tick infestation, but it was higher than that reported by Ramadan *et al.* (2016) who reported (6.17%), and lower than that reported by Hassanain *et al.* (1997) 80.44 % in Behiera Governorate, Egypt. Ticks distribution varied depending on environmental conditions, host density, host susceptibility, grazing habits and pasture-herd management (Ahmed *et al.*, 2019).

In the present study, the highest tick infestation was in summer (53.85%), and the lowest one in winter (4%), which agreed with Singh and Rath (2013). No doubt, ticks favor warm summer to infest cattle for their development. As to age, the tick infestation was higher on cattle at age > 2 years (69%). This agreed with Egyptian authors as Abd El-Baky (2001), Abdel-Rady *et al.* (2008), Abdou *et al.* (2005), Fadly (2012), Ramadan *et al.* (2016) and Ahmed (2019).

In the present study, of 414 cattle examined 160 (38.65%) were positive for *Theileria annulata*. This agreed with Abdou *et al.* (2005) and Abd-El Rady *et al.* (2008) who revealed (40.3 %) and (40%), respectively and higher than (30.98%) reported by El-Fayoumy *et al.* (2005). But, El-Metenawy (2000) in Saudi Arabia found (76.5%). The difference may be attributed to geographical and, climatic conditions, as well as management practices (Gul *et al.*, 2015). The highest prevalence of *Theileria* infection was recorded in summer (58.97%), followed by autumn (57%), then spring (41.66%) and the lowest rate was in winter (9.8%).

In the present study, the tick infestation, the cattle were categorized into 3 groups, 1st group in which were 80 (69%), 2nd group in which non infested-infected cattle were also 80(69%), and 3rd group in which infested - non infected cattle were 36 (12%). The reason for presence of non-infested infected cattle is that tick-vector spend most of their

life in the soil, and leaf litter in a period of dormancy and only a small fraction of their time seeking out and feeding on hosts. Even in tick species that engage several hosts in their life cycle, more than three-quarters of their lives are spent off-host in the soil or among the leaf litter (Varma, 1993; El Kammah *et al.* (2001)

Conclusion

Based on the outcome results the theileriasis was found in New Valley Governorate in high percent among cattle. The presence of theileriasis and its tick vector in other Egyptian governorates affect the meat production and thus the economy. Control of ticks to minimize the disease-transmission is a must by using environmental friend acaricides.

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Explanation of figures

- Fig. 1: Enlargement of superficial lymph nodes (Prescapular lymph nodes), X2 (arrow).
- Fig. 2: Corneal opacity, X2 (arrow).
- Fig. 3: Diarrhea and tick infestation, X2 (arrow).
- Fig. 4: Grossly, adult male *Hyalomma* tick showing conscutum (dorsal aspect).
- Fig. 5: Grossly adult male.
- Fig. 6: Histogram showing engorged female ticks with striations in integument texture.
- Fig. 7: Palp articles 2 longer than articles 1 & 3 lens 4/0.1 160/0.17x (arrow).
- Fig. 8: Basis capituli with medium angular lateral margins lens 4/0.1 160/0.17x (arrow).
- Fig. 9: Eyes very convex lens 4/0.1 160/0.17x (arrow).
- Fig. 10: Slender legs with pale rings, lens 4/0.1 160/0.17x (arrow).
- Fig. 11: Anal groove posterior to anus. lens 4/0.1 160/0.17x (arrow).
- Fig. 12: Ventral plates are present in males only. lens 4/0.1 160/0.17x (arrow).
- Fig. 13: Festoons very clear in male *Hyalomma* tick, lens 4/0.1 160/0.17x (arrow).
- Fig. 14: Coxae 1 have large and equal paired spurs, lens 4/0.1 160/0.17x (arrow).
- Fig. 15: Thin blood film showing ovoid shape piroplasm of *Theileria annulata* 1000X (arrow).

