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SEASONAL ABUNDANCE OF HARD TICKS (IXODIDAE) IN TWO LOCALITIES (GIZA AND ESMAIELIYA GOVERNORATES) OF EGYPT.

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ABSTRACT

The seasonal dynamic of ixodid ticks on human, domestic animals (camels, goats & sheep, cattle, and buffaloes), and pet animals (dogs) were investigated in Imbaba, Giza governorate and El- Tal El- kebeer, Esmaieliya governorate for 2 successive years from Mar. 2000 to Feb. 2002. A total of 9098 and 9454 adult ticks were collected from domestic animals in Giza and Esmaieliya governorates, respectively. Five species of ticks were collected from Giza and identified as: *Hyalomma dromedarii* (50.8 %), *Hyalomma excavatum* (15.5 %), *Rhipicephalus sanguineus* (20.51 %), *Boophilus annulatus* (9.29 %), and *Amblyomma sp.* (3.9 %). However, only four species of ticks were collected from Esmaieliya and identified as: *Hyalomma dromedarii* (24.76 %), *Hyalomma excavatum* (41.5 %), *Rhipicephalus sanguineus* (10.97 %), and *Boophilus annulatus* (22.77 %). In both regions, the highest number of collection was recoded in *Hyalomma sp.* In both regions, the tick population densities of adults in each species were relatively high during the period from June to Nov. In Giza, the number of females in each species was higher than males, while, it was the opposite in Esmaieliya .

KEYWORDS: ixodid ticks – seasonal prevalence – domestic animals – pet animals – EGYPT .

INTRODUCTION

Ticks are a group of the most common ectoparasites that attack livestock in tropical and subtropical areas in which it is responsible for many economic losses either by consumption of their blood causing many defects such as: reducing milk production, reducing live weight gain, paralysis, anemia, and death, or by acting as vectors of pathogens (virus, rickettsia, bacteria, and protozoa), that cause diseases for domestic animals, and human such as: East Coast fever, Heartwater, relapsing fever, Lyme disease (Soulsby, 1982 & Khalaf-Allah, 1996). Moreover, Gonza - lezacun and Guglielmone , (2005) recorded that *R. sanguineus* may cause severe anemia to their hosts, including humans. The last two diseases are caused by different species of *Borrelia* and are transmitted by several species of argasid and ixodid ticks. Animal disease in general and tick borne diseases in particular plus the direct losses caused by tick attack are among the major factors that hamper the growth of the livestock industry in developing countries (Soneshine, 1991). *Hyalomma dormedarii* and *Rhipcephalus sanguineus* were collected on sheep and camels in Sinai (El Kady, 1998& Lange *et al.*, 1992). Sheep were infested with *H. dromedarii*, *Rhipicephalus sanguineus sanguineus* and *R. turanicus.* While, goats were found to be infested with two species *R. s. sanguineus* and *R. turanicu* in the north-western coastal belt of Egypt (Abdel Rahman *et al.,* 2000). Therefore, the aim of the present study to identify the ixodid tick- vectors of the pathogenic diseases in two localities in Egypt including: Giza (Imbaba) and Esmaieliya (El-Tal El-kebeer) governorates. Where, the Embaba market and surrounding region represented for domestic animals specially the camels which are imported or illegally smuggled from Sudan through Halayeib and El Shalatein triangular region.

MATERIALS AND METHODS

Tick collection:

Tick were collected monthly for two years (from Mar. 2000 to Feb. 2002) from man and animals (camels, goat & sheep, dogs, cattle, and buffaloes) at two localities, Giza (Imbaba) and Esmaieliya (El-Tal El-kebeer) governorates as desert area. Tick were captured from host by forceps and orientated anticlockwise until the capitulum detaches from the host. Ticks were placed in polyethylene tube, 13 or 25 mm. in diameter and 100 mm. in height, sealed at one end by a mixture of gypsum and graphite at a ratio of 5:1. The tube was covered with a piece of muslin cloth securely held by rubber bands. The gypsum-graphite was moistened to provide adequate humidity for the ticks during transportation to the laboratory (kaiser, 1966). In laboratory the contents of each tube were placed in a Petri dish in which each sex or stage, i.e. males, and females, from different species (identified according to Hoogstraal,. 1956 & Walker *et.al.*,1998) were separated by the aid of a binocular dissecting microscope. Each of them were counted, placed in separate tube which labeled by the appropriate host number, tick stage & species, and date of collection until examined. The tubes were placed in a large (1 liter) plastic jar containing a 50 ml beaker full of a saturated solution of NaCl to provide a 75% RH. The jar was securely covered and held inside an incubator at 28± 1°C and 16 hour light/ day.

Statistical analysis:

The percentages of the different species of the tick in each monthly in two localities collection were determined. Data were analyzed with the chi-square test. Data analysis was carried out with

the aid of Statistical Package for Social Science (SPSS), version 8.0 for Windows.

RESULTS

Climatic conditions:

During the period of study in Imbaba, Giza governorate and El-Tal El-kebeer, Esmaieliya governorate, the highest mean maximum temperature were in Aug. (38.2°C) & in July (36.2°C) and Aug. (36.9°C), respectively. While in Giza, the lowest mean maximum temperature was in Dec. (20.1°C), Jan. (19.3°C) and Feb.(20.5°C) and in Esmaieliya was in Jan. (18.8°C) and Feb. (18.2°C), respectively. The highest relative humidity (RH) in Giza and Esmieliya governorates were in Mar. (71.9%) & in Oct. (75.9%), respectively. while the lowest RH was in June (66.5%) & April (63.2%), respectively.

Seasonal dynamics of ticks collected:

A. Giza governorate:

During the period of study, about 9098 ticks (4042 males and 5056 females), representing 5 tick species were collected from Giza governorate, and identified as *Hyalomma dromedarii*, *Hyalomma excavatum*, *Rhipicephalus sanguineus*, *Boophilus annulatus*, and *Amblyomma sp.* The adult of *H. dromedarii* was the highest abundant among species (50.8%), ($p < 0.001$), followed by *R. sanguineus* (20.51%), *H. excavatum* (15.5%), *B. annulatus* (9.29%), and *Amblyomma sp* (3.9%). The total collected females and males were (55.57%) & (44.43%), respectively. The highest percent of the collected females was that of *H. dromedarii* (48.85%), ($p < 0.001$), followed by *R. sanguineus* (20.91%), *H. excavatum* (18.02%), *B. annulatus* (8.29%),

and *Amblyomma sp* (3.94%). Also, the highest percent of the collected males was that of *H. dromedarii* (53.24%), ($p < 0.001$), followed by *R. sanguineus* (20.01%), *H. excavatum* (12.35%), *B. annulatus* (10.54%), and then *Amblyomma sp* (3.86%). There was a highly significant difference between males in different species (except between males of *H. dromedarii* and of *B. annulatus*, $p < 0.05$).

As showing in (Fig. 1A), Monthly collection of *H. dromedarii* showed a gradual increase in adult percentages from May (6.97%) and reaching its maximum in Oct. (13.76%), then decreased to reach its minimum in Jan. and Feb. (4.37% & 4.46%), respectively. Generally, adults of *H. dromedarii* were the highest abundance in autumn (36.46%), followed by summer (28.99%), spring (17.72%), and winter (16.83%). Monthly collection revealed that percentage of collected males and females of *H. dromedarii* were highly significant difference between them (46.56%) & (53.44%), respectively during the period of study. The highest seasonal abundance of the collected males of *H. dromedarii* were in winter (Maximum point was in Dec. 66.22%), and spring in April (62.45%). While, the lowest seasonal abundance of males was in summer (33.88%) (Minimum point was in June 30.23%). While, the highest seasonal abundance in the females of *H. dromedarii* was in summer which the maximum collection was in June (69.77%), and declined gradually in autumn which the maximum collection was in October (62.89%), spring which represented the maximum level in March (46.03%), and winter in February (45.15%), whereas the minimum occurrence was in Dec. (33.78%).

Monthly collection in *H. excavatum* (Fig. 1.B) showed an increase of adult percentages from April (10%), reaching its maximum in July (23.76%) and began to decline in late autumn (Nov. 4.89%), reaching

the minimum in Jan. (2.41%) and completely disappeared in Dec. In general summer showed the highest abundance (43.76%). while the lowest abundance was in winter (8.37%), ($p < 0.001$). The highest number of males of *H. excavatum* was recorded in Mar. (61.84%) decreased gradually in autumn (Max. in Sep. 37.96%) and summer (Max. in June 29.25%), and then increased again in winter (in Jan. 42.37% except in Dec. 0.0%). While, the highest abundance of females was in July (76.42%), and decreased gradually, reaching a minimum level in Dec.(0.0%) and increased again ($p < 0.05$) in April (43.97%). However, the females of *H. excavatum* predominated during summer (74.39%), autumn (66.37%), and winter (57.63%), and the female decreased in spring (47.15%). In general the total number of females (64.61%) was highly significant than males (35.39%).

Generally, the adult of *R. sanguineus* completely disappeared in Dec and Jan. The percentages of adults of *R. sanguineus* (Fig. 1C) were highest in summer (40.78%), ($p < 0.001$), (maximum level was in Aug. 16.99%), and followed by autumn (34.73%) (Except in Nov. 6.54%) and decreased after that in winter (3.38%) (The minimum level was in Dec. and Jan. 0.0%) and then began to increase in spring (21.11%)(The elevation started in Mar., 5.68%). Males predominated females during winter (58.73%), and late spring (May, 2.28 male/female ratio). The highest occurrence of males of *R. sanguineus* was in May (69.54%), ($p < 0.001$) and reaching the lowest level in Dec. and Jan. (0.0%). Females predominated males during autumn (60.19%) and summer (58.48%). The females of *R. sanguineus* decreased in spring (49.75%) and winter (41.27%). The maximum level was in May (30.46%). During the period study the total number of females (56.65%) predominated males (43.35%), ($p < 0.001$).

In adults of *B. annulatus* (Fig. 1D), summer, showed the highest seasonal abundance (46.86%), followed by spring (25.33%), autumn (21.66%), and winter (6.15%). Monthly collection of adults of *B. annulatus*, showed a gradual increase from April reaching its maximum in July (26.75%), and decreased to reach its minimum in Dec. (0.0%). Males predominated females during spring (54.67%), (except in April, 0.49 male/female ratio), winter (51.92%), (except in Jan. 0.78 male/female ratio), and summer (51.26%) (Except in June, 0.93 M/F ratio and Aug. 0.98 M/F ratio). Males of *B. annulatus* showed the lowest percentage (43.17%) in autumn. The maximum peak of males of *B. annulatus* was in May (74.71%), however, the minimum peak was in Dec. (0.0%). Unlike other species, the percentage of total number of males of *B. annulatus* (50.41%) pre-dominated the total number of females (49.59%). There was no significant difference between the total number of the collected males and females of *B. annulatus*. Females pre-dominated males during autumn (56.83%) (except in Novamber, 1.18 M/F ratio). There was no difference between the collection of females in summer (48.74%) and winter (48.08%), while spring was the lowest percent in collection (45.33%). The highest abundance of females was in April (67.11%), ($p < 0.001$).

The percentage of adults of *Amblyomma sp* (Fig. 1E), was begin to increased in late spring (May 7.61%), reaching to maximum in summer (47.04%), (maximum level was in Aug., 21.69%), then decreased gradually in autumn (29.3%), winter (6.2%),(minimum level as in Dec., 0.56%),and early spring (Mar. and April). Seasonal abundance of males of *Amblyomma sp* revealed that, the percentage was high in summer (46.71%), and autumn (44.23%); and decreased in winter (27.27%), to rise again in spring (41.94%). The maximum peak

was in July (64.29%), while the minimum was in Jan. (0.0%), ($p < 0.001$). Females predominated males in all seasons. The highest collection of females was in winter (72.73%), (the maximum peak was in Jan. 100%), followed by spring (58.06%), autumn (55.77%), and summer (53.29%). The minimum abundance of females was in July (35.71%). During the period of the study the total number of females (56.06%) predominated males (43.94%), ($p < 0.001$).

B. In Esmaeilyia governorate:

During the period of study, about 9454 tick (5277 males and 4177 females), representing 4 tick species were collected from Esmaieliya governorate, and identified as *Hyalomma dromedarii*, *Hyalomma excavatum*, *Rhipicephalus sanguineus,* and *Boophilus annulatus.* The adult of *H. excavatum* was the highest abundant among species (41.5%), ($p < 0.001$), followed by *H. dromedarii* (24.76%), *B. annulatus* (22.77%), and *R. sanguineus* (10.97%). In general males (55.82%) predominated females (44.18%) in total ticks collected. The highest percentage of the collected males was that of *H. excavatum* (42.28%), ($p < 0.001$), followed by *B. annulatus* (24.31%), *H. dromedarii* (22.57%), and *R. sanguineus* (10.84%). However, the highest percentage of the collected females was that of *H. excavatum* (40.51%), ($p < 0.001$), followed by *H. dromedarii* (27.53%), *B. annulatus* (20.83%), and *R. sanguineus* (11.13%).

The seasonal abundance of adult of *H. dromedarii* (Fig. 2A) showed that, the highest occurrence was recorded in summer (46.39%), ($p < 0.001$), followed by autumn (26.36%), spring (16.96%), and winter (10.29%). Monthly collection in adults of *H. dromedarii* showed gradually increase in percentage from May (8.16%), reaching its maximum in July (19.69%), after that it decreased gradually until

reach the minimum at Jan.(2.35%),and Feb (2.39%). Males of *H. dromedarii* predominated females during spring (61.96%), winter (52.28%), (except in Feb., 0.87 M/F ratio) and autumn (52.19%), (except in Sep. 0.84 M/F ratio). The highest percent of males of *H. dromedarii* was recorded in April (67.86%), and declined gradually to reach the lowest in Aug. (40.29%), and then increased gradually until Dec. (55.38%), and declined again from Jan. Summer was the lowest season in collection of males (45.76%). During the period of study males of *H. dromedarii* (50.88%) predominated females (49.12%), however, there was no significant difference between the collection in males and females of *H. dromedarii.* Females of *H. dromedarii* predominated males during summer (54.24%), (except in June, 1.33 M/F ratio)). The highest percentage in collection of females was in Aug. (59.71%), and declined gradually after that in autumn (47.81%), winter (47.72%), and spring (38.04%).

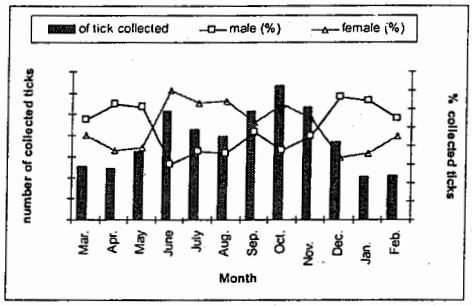
Adults of *H. excavatum* (Fig. 2B), recorded the highest abundance in autumn (35.66%), ($p < 0.001$), followed by summer (27.61%), spring (19.17%), and winter (17.56%). The percentages of adults was increased in July (8.92%), to reach a maximum in Sep. (17.33%) and then declined gradually until reached the minimum in Feb. (3.95%). Males of *H. excavatum* predominated females in all seasons, The highest seasonal abundance of males was recorded in autumn (61.47%), ($p < 0.001$), followed by summer (55.59%), spring (55.32%), and winter (51.23%).The maximum peak of males collected was in Nov. (70.23%), while, the minimum peak was in Feb.(41.94%), ($p < 0.001$). In *H. excavatum*, the percent of the collected females was relatively high in winter (48.77%), (the maximum was in Feb. 58.06%) and declined after that in spring (44.68%), summer (44.41%), and

autumn (38.53%). Generally, during the period of study males of *H. excavatum* (56.87%), predominated females (43.13%), ($p < 0.001$).

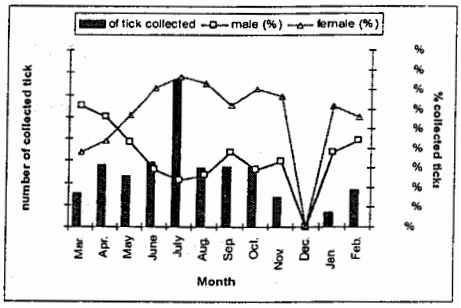
The seasonal abundance in adults of *R. sanguineus* (Fig. 2C), showed that, the highest collection was recorded in summer (42.82%), ($p < 0.001$), followed by autumn (27.29%, spring (20.15%), and winter (9.74%). Monthly collection of *R. sanguineus* revealed that, the highest percentage of the collected adults was in Aug. (15.81%), and declined gradually after that until reaching the lowest level in Dec. (2.41%), and then increased again from Jan. to July. Males of *R. sanguineus* predominated females during winter (78.22%), and summer (59.23%). Spring (43.54%), showed the lowest number of the collected males, however, a minimum percentage was recorded in Mar. (36.36%), the maximum percentage was in Feb. (82.61%). Females of *R. sanguineus* predominated males during spring (56.46%), (maximum percentage was in Mar. 63.64%), and autumn (50.88%).The lowest percentage of female was recorded in summer (40.77%), and winter (21.78%), (minimum was in Feb. 17.39%). In general males of *R. sanguineus* (55.16%), predominated females (44.84%), in total collection ($p < 0.001$).

The percentages of adults of *B. annulatus* (Fig. 2D) were highest in summer (39.94%), ($p < 0.001$), and followed by autumn (23.27%), spring (22.48%), and winter (14.31%). Monthly collection of *B. annulatus* showed that, the percentage of adults began to rise in May (9.43%), until reached to a maximum in July (14.86%), and Aug. (14.4%), then declined gradually reaching a minimum in Jan. (3.99%). Males of *B. annulatus* (59.59%), predominated females (40.41%), ($p < 0.001$), in all months (except in Jan., Feb., and Mar., where the M/F ratio was 0.76, 0.98, and 0.83, respectively).The highest seasonal

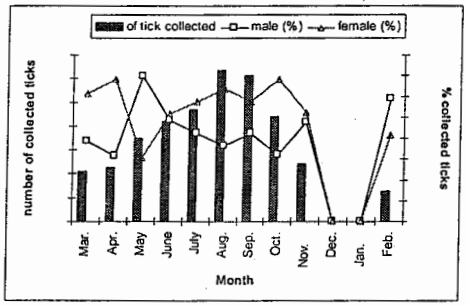
abundance in males of *B. annulatus* was in autumn (65.27%), followed by spring (60.33%) summer (59.07%) and winter (50.65%). The maximum peak of males was in Sep. (77.72%), however, the minimum peak was in Jan. (43.02%), ($p < 0.001$). In *B. annulatus*, winter (49.35%), showed the highest percent of the collected females ($p < 0.001$), (the maximum percent was in Jan. 56.98%, and Mar. 54.55%), followed by summer (40.93%), spring (39.67%), and autumn (34.73%), (the lowest percent was in Sep. 22.28%).



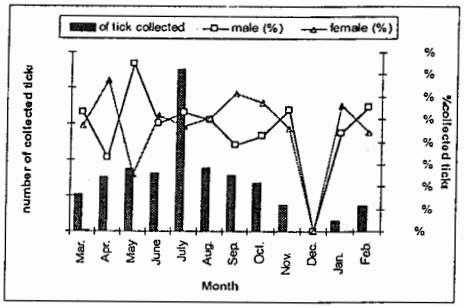
A. Adult of *H. dromedarii*



B. adult *H. excavatum*



C. Adult of *R. sanguineus*



D. Adult of *B. annulatus*

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الكثافة الموسميّة للقراد الجامد (اكسوديدى) فى (محافظتى الجيزة و الإسماعيلية) بمصر.

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٥. المعهد القومى لعلوم البحار والمصايد.

تم دراسة التغيرات الموسمية للقراد إكسوديد (القراد الجامد) فىالأنسان والحيوانات المستأنسه(الجمال و الماعز والغنم والبقر والجاموس) وكذلك فى الحيوانات الأليفة (الكلاب) لمدة عامين من مارس ٢٠٠٠الى فبراير ٢٠٠٢ فى كل من محافظتى الجيزة (إمبابه) والأسماعيليه (التل الكبير). و لقد أسفرت الدراسة عنى تجميع عدد ٩٠٩٨ و٩٤٥٤ من القراد من الحيوانات المستأنسه فى كل من الجيزة والأسماعيليه على التوالى. و لقد تم تجميع خمسة أنواع من القراد وهم :- *هيالوما دروميدراى*(٥٠,٨٪) و*هيالوما إكسكفاتم*(١٥,٥٪) و*ريبيسفلس سانجنيس* (٢٠,٥١٪) وبفلس *أنيولاتس*(٩,٢٩٪) و*أمبليوما* (٣,٩٪) فى محافظة الجيزة. بينما تم تجميع أربعة أنواع فقط فى محافظة الأسماعيليه وهم :- *هيالوما دروميدراى*(٢٤,٧٦٪) و*هيالوما إكسكفاتم*(٤١,٥٪) و*ريبيسفلس سانجنيس* (١٠,٩٧٪) و*بفلس أنيولاتس*(٢٢,٧٧٪). كما وجد أن *الهيالوما* كانت أعلى عدد تم تجميعه فى كلا المنطقتين. كما أوضحت الدراسة أن نسبة القراد البالغ فى كلا المنطقتين كانت عالية نسبياً فى الفترة من يونيو الى نوفمبر. كما لوحظ فى الجيزة أن عدد الأناث فى كل نوع كانت أكبر من عدد الذكور والعكس صحيح فى الأسماعيليه.