



Prevalence of Trichostrongyle eggs infecting sheep and goats in Dakahlia Governorate, Egypt

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Abstract:

Gastrointestinal nematodes, principally those of family trichostrongylidae are considered one of the most important parasitic diseases all over the world, that causing significant drop of small ruminants productivity. This study was performed from October 2017 to September 2018 in 5 centers geographically located in and around Dakahlia governorate, Egypt. Faecal samples were examined using modified wisconsin technique. Examination of 455 faecal samples from sheep and goats revealed an overall incidence of 28.5% (130 out of 455). Sheep is found more affected by trichostrongyles (33.23%) than goats (14.78%). The highest infection rate of trichostrongyle eggs was recorded in El Mahella - Elkubra (92.5% and 27.8% in sheep and goats, respectively) while, the lowest infection rate was detected in Biyala city (10% and 0% in sheep and goats, respectively). Females are found more infected than males and young ages are found more infected than older ones in both examined sheep and goats. Regarding the seasonal fluctuation; the infection rate in sheep reached at its maximum level during Winter (57.1%) while in goats was during Summer (18.7%).

Key Words: Trichostrongyles, Prevalence, Sheep and goats, Dakahlia governorate, Egypt.

INTRODUCTION

Sheep and goats represent a major source for protein and wool as well as manure especially in rural economy for non-agricultural low class of people (Nawathe et al., 1985). Most health

obstacles in small ruminants are parasitic infection (Gadahi et al., 2009) which can cause death (Pawel et al., 2004; Abouzeid et al., 2010). Multiple investigations were described the parasitic nematode species (Garcia et al., 1993; Rehbein et al., 1996;

Fakae et al., 1990) to decrease feed intake followed by little work capacity that lead to low productivity (**Pedreira et al., 2006; Odoi et al., 2007; Chaudhary et al., 2007**). In addition, anthelmintic resistance has extended overall major parasite species (**Veale, 2002**) particularly Trichostrongyloidea (**Coop et al., 1977; Steel et al., 1982; Waller, 1997; Pawel et al., 2004**). Family Trichostrongylidae is one of the worldwide serious gastrointestinal parasites infecting sheep and goats. They include; *Haemonchus contortus*, *Ostertagia leptospicularis*, *Cooperia curticei*, *Teladorsagia circumcincta*, *Trichostrongylus axei* and *Trichostrongylus colubriformis*. They are lead to severe economic losses such as declined fleece production, weight loss and considerable morbidity. *Teladorsagia spp.* and *Ostertagia spp.* are ordered secondly after the more pathogenic blood sucking *Haemonchus contortus* in their pathogenicity levels (**Zarlenga et al., 2016**). Considering significance of both sheep and goats in our community and the substantial losses that are caused by GIT nematodes, the current study was designed to assess infection rate of trichostrongyle eggs influencing sheep and goats in 5 centers located in and around Dakahlia governorate; bearing in the mind the associated determinants like age and sex as well as seasonal fluctuations.

MATERIAL AND METHODS

Study area, animals and sampling:

In this study, 340 sheep and 115 goat faecal samples of different ages and sex are collected from animals reared in the major private farms, little non composed ranches as well as animals owned by agriculturists from Dakahlia governorate and surrounding centers. The period of study is extended from October 2017 till September 2018. Sheep samples were represented as 160 samples from Talkha, 40 samples from Dekernes, 83 samples from Nabrouh, 27 samples from El Mahella – Elkubra and 30 samples from Biyala.

Goat samples were represented as 68 samples from Talkha, 7 samples from Dekerense, 12 samples from Nabrouh, 18 samples from El Mahella -Elkubra and 10 samples from Biayla.

Collection of faecal samples:

A total of 455 fresh faecal samples were collected from rectum of the examined sheep and goats into plastic bags and labelled with site, age, sex and date. They were kept cool and eventually transferred to Parasitology Lab., Fac. of Vet. Med., Mans. Uni. for faecal analysis.

Coprocological examination:

Fresh faecal samples were examined for trichostrongyle eggs using modified wisconsin technique according to **Cox and Todd, (1962)**. The used saturated sugar solution as a flotation fluid was titrated up

to reaching the specific gravity of 1.26 using hydrometer (high S.T. = 75 mN/m, Germany). The samples were inspected under microscope using x 4 and x 10 objective lenses.

RESULTS

I- Incidence of trichostrongyle eggs revealed from sheep and goats faecal samples in study area:

Morphologically, except for the large characteristic *Nematodirus spp.* eggs, trichostrongyle eggs are small, ellipsoid in shape, colourless with thin wall and containing undifferentiated contents (Soulsby, 1982). **Figure, 1.**

Microscopic detection of trichostrongyle eggs in faecal samples from sheep and goats in 5 districts (3 in Dakahlia governorate and 2 districts at its borders) revealed an overall incidence of 33.23% (113/340) in sheep and 14.78% (17/115) in goats. In sheep; the highest infection rate was recorded in faecal samples from El Mahella -Elkubra (92.5%, 25 out of 27) followed by Talkha (34.3%, 55 out of 160), Dekernes (30, 12 out of 40) then Nabarouh (21.6%, 18 out of 83) and finally Biyala (10%, 3 out of 30). In goats; the more incidences were found in faecal samples from El Mahella -Elkubra (27.8%, 5 out of 18) followed by Nabrouh (16.6%, 2 out of 12), Dekernes (14.2%, 1 out of 7) and ultimately Talkha (13.2%, 9 out of 68)

whereas no infection in goats was noted in Biyala city, (Table, 1).

II- Incidence of trichostrongyle eggs revealed from sheep and goats faecal samples in relation to ages:

Young aged animals less than 1 year are found highly infected with trichostrongyle eggs (78.35% for sheep and 20.27% for goats) than those more than 1 year (15.22% for sheep and 4.87% for goats), **Table, 2.**

III- Incidence of trichostrongyle eggs in sheep and goat faecal samples regarding to animal sex:

Females of both examined animal species are found highly infected with trichostrongyle eggs (36% in sheep and 20.27% in goats) more than males (8.57% in sheep and 4.87% in goats), **Table, 3.**

IV- Seasonal incidence of trichostrongyle eggs in sheep and goat faecal samples:

In sheep faecal samples, the rate of infection with trichostrongyle species is found to increase gradually during Autumn (33.9%, 19 out of 56) reaching its maximum level during Winter (57.1%, 84 out of 147) then declined slightly during Spring (33.3%, 10 out of 30) and completely disappear in Summer season (0%, 0 out of 107).

In goats, the infection with trichostrongyles is recorded only during Summer (18.7%, 15 out of 80) and Winter (13.3%, 2 out of 15),

while was absent during Autumn and Spring seasons (0%), **Table, 4.**

DISCUSSION

In the present study, the faecal examination showed a high incidence of trichostrongyle eggs (33.2%) in sheep in Dakahlia governorate and two centers at its borders. Lower incidences were reported from other governorates in Nile Delta. For instance, **Khalafalla et al., (2011)** recorded 10.4% incidence at El Mahella -Elkubra, Gharbiya governorate whereas, 19.21% was found in Kafr- Elsheikh governorate by **Sultan et al., (2016)**. The incidence of infection was 8.91% in Aswan by **Hamad, (2018)**. Moreover, high incidences were found in various regions as 26.15% infection rate was in the following governorates (Ismailia, Port-Said and Damietta) by **Assasa, (2018)** while 27.5% was in Sinai (**Abouzeid et al., 2010**) and also 31.4% from Sohag (**Al-Aboody and Omar, 2016**). Meanwhile, higher incidences of 44.57 and 75.77% were found in both Menofia and Beheira governorates, respectively (**El-khtam, 2011; Menshawy, 2011**). In addition, **El-Alfy (2017)** reported a much higher incidence of 51.63% in Dakahlia, the same study governorate. Globally, high incidences were recorded within various regions from the same country. Incidence of trichostrongyles in this study (30-40%) is found within the range that recorded in Iran by **Nabavi et al.**

(2011). Furthermore, a report of **Nwosu et al. (2007)** in Nigeria recorded a lower incidence (22.5%), while a higher incidence of 71% was recorded from the same country by **Gana et al. (2015)**. The incidence was ranging from 47.8% to 97.03% in Ethiopia (**Abede and Esayas, 2001; Thomas et al., 2007; Zeryehun, 2012; Demissie et al., 2013; Lemma and Abera, 2013; Ayana and Ifa, 2015; Mohammed et al., 2015**). On the other hand, the analysis of goat faecal samples showed approximately low incidence of trichostrongyle eggs (14.7%) which is slightly lower than that reported in Menofia governorate (18.42%) by **El-khtam, (2011)**. A very lower incidence of 3.7% was detected at Aswan governorate by **Hamad, (2018)**. Higher incidences were recorded from many African countries as Nigeria (35.4 - 93% by **Nwosu et al., 1996; Nwosu et al., 2007; Gana et al., 2015**), Ethiopia (53.3% - 100% by **Abede and Esayas, 2001; Zeryehun, 2012; Demissie et al. 2013; Ayana and Ifa, 2015**), Zimbabwe (31% by **Zvinorova et al., 2016**) and also Somalia 72.1% by **Abdi-Soojeede, (2018)**, while the incidence was 43.8% in Saudi Arabia by **El-Azazy, (1995)**. The overall incidence of trichostrongyle eggs in sheep was much higher than goats. Similar reports which support this result as **Zeryehun, 2012** (67.75 and 55.47% for sheep and goats,

respectively), **Yagoob and Razi, 2013** (88% and 79.5%); **Adediran et al., 2014** (96.1% and 89.3%) and **Gana et al., 2015** (71% and 62%). On the opposite, some authors noted similar incidence in both sheep and goats like **Ayana and Ifa, 2015** (47.8% for sheep and 53.3% for goats); **Dilgasa et al., 2015** (68.4% for sheep and 70.7% for goats) and **Jegade et al., 2015** (34.1% for sheep and 37.5% for goats). These incidence variations in both animal species may be attributed to their grazing habits. In addition, the disparity in their immunity levels could play an important role in this difference (**Le Riche et al., 1973; Suh et al., 1980; Javed et al., 1992**). The incidence according to districts revealed the highest infection rate of trichostrongyle eggs in El Mahella -Elkubra in both sheep (92.5%) and goats (27.8%), whereas the lowest incidence was found in the examined sheep and goat in Biyala (10 and 0%, respectively). Other districts showed relatively similar incidences. For instance, the incidence was 34.3%, 30% and 21.6% for sheep samples in Talkha, Dekernes and Nabrouh, respectively. Whereas, the incidence was 13.2%, 14.2% and 16.6% in goat samples from the same previously districts, respectively. The high incidence rate of trichostrongyles for small ruminants in El Mahella -Elkubra may be due to the management pattern in this district. The most samples were collected

from small herds which kept by the Bedouins who are relatively neglectful about their animal's health. In addition, systematic program of anthelmintic drugs were not applied. Moreover, few number of various animal species like cattle, buffaloes, sheep and goats which are found jointly in these herds that retain the parasite's life cycles and also increase the chance of its transmission among various hosts. Regarding the incidence rate of trichostrongyle eggs in sheep according to age groups in this study, the results revealed that young aged animals less than 1 year (78.35%) were extremely affected than old aged ones more than 1 year (15.22%). Most of the previous studies mentioned similar results. For instance, **Tariq et al., 2008** from India (87.7% for young sheep and 46.6% for old sheep); **Khan, 2010** (27.04% and 15.67%, respectively); **Zeryehun, 2012** (64.52% and 56.29%); **Lemma and Abera, 2013** (79.6% and 62.4%); **Daniel et al., 2014** (97.4% and 79.0%); **Hassanen, 2014** (70.6% and 51.9%); **Mesele et al., 2014** (28.5% and 25.9%) and **Mohammed et al., 2015** (85.5% and 56.5%). In contrast, **Yagoob and Razi, (2013)** said that adult sheep and goats aged 3-5 years were more susceptible to the infection than young animals aged 1-2 years as well as **Ayana and Ifa, 2015** (75% and 48.4%, respectively).

In goats; samples of young animals illustrated a higher incidence of 20.27%. Meanwhile, older animals revealed a lower incidence of 4.87%. These results are agreed with **Arafa and Fouad, 2008** (97.4% and 87.3%); **Khan, 2010** (27.14% and 20%) and **Zvinorova et al., 2016** (76% and 38%). On the other hand, reverse results were recorded by **Ma et al., 2014** and **Jegede et al., 2015** (32.1% for adults and 5.4% for young goats). The variations in incidence of different ages may be attributed to the immunity factor. Young animals displayed low immunity in compared to adults so that they are more susceptible to the infection of trichostrongyles than adults (**Abd El Tawab, 1998; Asif et al., 2008; Abouzeid et al., 2010**).

With regard to animal sex, females of both sheep and goats are found more infected with trichostrongyle eggs (36% in sheep and 20.27% in goats) than males (8.57% in sheep and 4.87% in goats). In sheep, these results are agreed with those previously recorded by **Khan, 2010** (28.67% for females and 19.81% for males); **Kuchai et al., 2011** (76.28% and 63.05%); **Zeryehun, 2012** (62.53% and 60.41); **Adediran et al., 2014** (94.1% and 87.8%); **Muhammed et al., 2015** (66.9% and 60.8%) and **Jegede et al., 2015** (26.8% and 10.7%). However, nearly similar incidences were detected by **Tariq et al., 2008** (70.2% for males and

68.7% for females); **Ayana and Ifa, 2015** (50% and 48.5% for males and females, respectively) and **Dilgasa et al., 2015** (71.3% and 68%, respectively). Furthermore, earlier investigations on goats support these results; **Valcarcel and Romero (2002)** and **Khan (2010)** found much trichostrongyles incidence for females (91 and 30.33%) than males (86 and 19.72%), respectively and **Jegede et al., 2015** (26.8% for females and 10.7% for males), while **Zvinorova et al. (2016)** noted opposite results (77% for males and 55% for females).

The higher infection rate of trichostrongyles was in females may be attributed to several stress factors considering a challenge for their immunity system as pregnancy and parturition as well as lactation which can decline their immunity levels (**Urquhart et al., 1996**). Dealing with seasonal incidence of trichostrongyles infection in sheep, it is observed that the rate of infection increased gradually in autumn (33.9%) to reach at its maximum level in winter (57.1%) then, declined slightly in spring season (33.3%) and completely disappeared during Summer. This result is found coincided with **Anene et al., 1994; Kuchai et al., 2011; Zeryehun, 2012** who stated that wet season has higher incidence than dry season. Also, the highest infection of GIT nematodes was recorded in winter by **Hassanen, 2014**.

In goats, infection with trichostrongyle eggs is observed only during Winter (13.3%) and Summer (18.7%). This result is found to agree with **Sharma, (2012)** who reported that the maximum range of infection was during July. The variation in seasons may be due to the hypobiosis phenomenon of trichostrongyles in antagonistic environmental conditions which gravitate to be higher in intensely cold winter or highly hot summer (**Soulsby, 1982**) or due to the variable number of samples examined in each season.

CONCLUSION& RECOMMENDATION

Trichostrongyles eggs were recorded in small ruminants at variable rates with respect to risk factors as age, sex and animal species. Emphasis should be kept in mind for the control of GIT nematodes infection.

From our opinion, further studies about molecular characterization are needed for accurate identification of different trichostrongyle species, rather than the non-reliable and more labor microscopic differentiation.

Table (1): Incidence of trichostrongyle eggs revealed from sheep and goat faecal samples in study area:

Animal	Centers															Total	
	Talkha			Dekernes			Nabrouh			ElMahella-Elkubra			Biyala				
Sheep	No. ex.	No. +ve	%+ve	No. ex.	No. +ve	%+ve	No. ex.	No. +ve	%+ve	No. ex.	No. +ve	%+ve	No. ex.	No. +ve	%+ve	No. +ve	+ve%
		160	55	34.3	40	12	30	83	18	21.6	27	25	92.5	30	3	10	113
Goats	No. ex.	No. +ve	%+ve	No. ex.	No. +ve	%+ve	No. ex.	No. +ve	%+ve	No. ex.	No. +ve	%+ve	No. ex.	No. +ve	+ve%	No. +ve	+ve%
	68	9	13.2	7	1	14.2	12	2	16.6	18	5	27.8	10	0	0	17	14.78

Table (2): Incidence of trichostrongyle eggs in sheep and goat faecal samples in relation to ages:

Animals	Less than one year			More than one year			Total	
	No. ex.	No. +ve	% +ve	No. ex.	No. +ve	% +ve	No. +ve	% +ve
Sheep	97	76	78.35	243	37	15.22	113	33.23
Goats	74	15	20.27	41	2	4.87	17	14.78

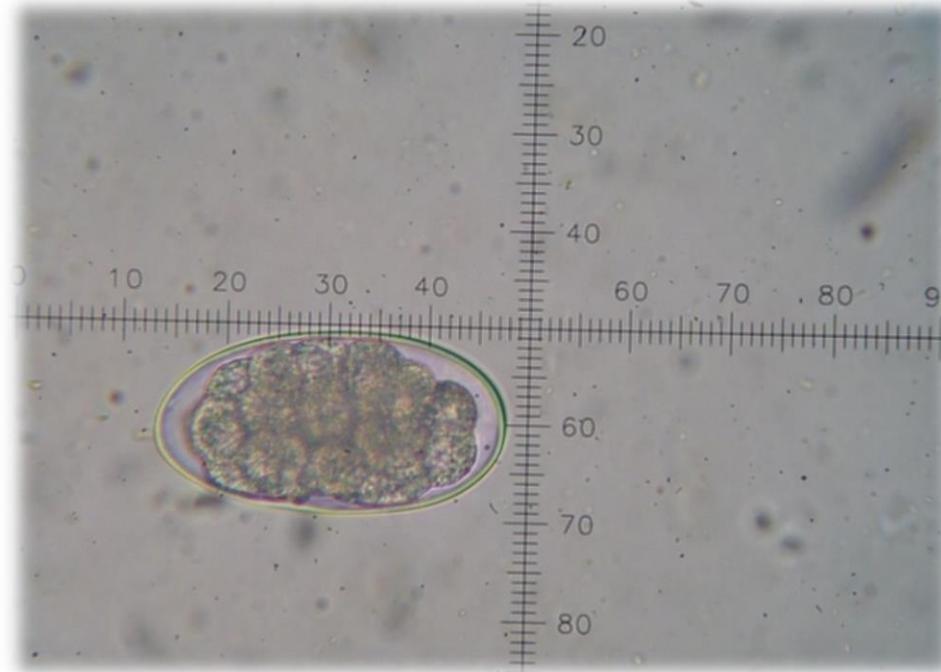
Table (3): Incidence of trichostrongyle eggs in sheep and goat faecal samples regarding to animal sex:

Animals	Females			Males			Total	
	No. ex.	No. +ve	% +ve	No. ex.	No. +ve	% +ve	No. +ve	% +ve
Sheep	305	110	36	35	3	8.57	113	33.23
Goats	100	14	20.27	15	3	4.87	17	14.78

Table (4): Seasonal incidence of trichostrongyle eggs in sheep and goat faecal samples:

Animals	Seasons												Total	
	Autumn			Winter			Spring			Summer			No. +ve	% +ve
	No. ex.	+ve		No. ex.	ve+		No. Ex	ve+		No. ex	+ve			
No.		%	No.		%	No.		%	No.		%			
Sheep	56	19	33.9	147	84	57.1	30	10	33.3	107	0	0	113	33.23
Goats	10	0	0	15	2	13.3	10	0	0	80	15	18.7	17	14.78

Figure (1): Trichostrongyle egg



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الملخص العربي

مدى انتشار بويضات التريكوسترونجيل في الاغنام والماعز في محافظه الدقهليه ومحيطها مع اعتبار عوامل الخطر المحتملة

رنا مجدي السعداوي مصطفى عبد السلام العربي ابراهيم السيد عباس صلاح احمد ابوالوفا
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أجريت هذه الدراسة علي بويضات ديدان التريكوسترونجيلس التي تصيب الاغنام والماعز في محافظه الدقهليه وعدد ٢ من المراكز الحدوديه لها (المحله الكبرى التابعه لمحافظة الغربية- بيلا التابعه لمحافظة كفر الشيخ) , لتحديد نسب الاصابه ودراسه العوامل الخطر المحتمله التي تزيد من حدوث الاصابه بهذه الديدان في الاغنام والماعز. وقد تم فحص عدد ٤٥٥ عينه براز من الاغنام والماعز من المدن الاتيه : طلخا ونبروه ودكرنس والمحله الكبرى وبيلا في الفترة ما بين أكتوبر ٢٠١٧ وسبتمبر ٢٠١٨, ووجد أن نسبة الاصابة بديدان التريكوسترونجيلس في الاغنام والماعز كانت ٣٣.٢% و ١٤.٧% علي الترتيب.

وقد وجد ان اعلى نسبة للاصابة في الاغنام كانت بمركز المحله الكبرى (٩٢.٥%) يتبعها طلخا (٤٣.٣%) ثم دكرنس (٣٠%) وبعدها نبروه (٢١.٦%) ثم بيلا (١٠%)، اما بالنسبة للماعز فكانت اعلى نسبة اصابه في المحله الكبرى (٢٧.٨%) يتبعها نبروه (١٦.٦%) ثم دكرنس (١٤.٢%) وبعدها طلخا (١٣.٢%) ولم تسجل اي اصابة بمركز بيلا .

و بالنسبة لمدي انتشار تلك الديدان علي حسب الاعمار المختلفه، فقد لوحظ ان نسبة الاصابة في الاعمار الاصغر من سنه (٧٨.٣٥%) كانت الاكبر باكتساح عن نسبة الاصابة في الاغنام الاكبر من سنه (١٥.٢٢%)، اما بالنسبة للماعز فقد لوحظ ان نسبة الاصابه في الاعمار الاصغر من سنه (٢٠.٢٧%) كانت ايضا الاكبر باكتساح عن نسبة الاصابه في الماعز الاكبر من سنه (٤.٨٧%) و بدراسة مدي تاثير الجنس على نسبة الاصابة فقد وجد ان الاناث (٣٦% و ٢٠.٢٧%) اكثر اصابة من الذكور (٨.٥٧% و ٤.٨٧%) في الاغنام و الماعز علي الترتيب.

وبدراسه تباين الاصابه الموسمي في الاغنام فقد وجد ان نسبة الاصابه بدأت في زياده في فصل الخريف (٣٣.٩%) لتصل الي اعلي معدل لها في فصل الشتاء (٥٧.١%) ثم تصل لاقل معدل اصابه في فصل الربيع (٣٣.٣%) ولم تسجل نسب للاصابه في فصل الصيف, اما بالنسبه للماعز فقد سجلت الاصابه فقط أثناء فصلي الصيف (١٨.٧%) والشتاء (١٣.٣%) ولم تسجل نسب للاصابه في فصلي الخريف والربيع.

وقد خلصت هذه الدراسة الي التوصيه باستخدام البيولوجيا الجزيئيه في تصنيف الانواع المختلفه من ديدان التريكوسترونجيلس لضمان التشخيص الدقيق فضلا عن استخدام الطرق الروتينييه لفحص البراز باستخدام الميكروسكوب في فحص البويضات و اليرقات نظرا للفروق البسيطة بين الانواع المختلفه.