

## Study On The Prevalence Of Internal Parasitic Infection In Diarrheic And Apparently Healthy Sheep At Assiut Governorate, Egypt

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### ABSTRACT

The prevalence of different internal parasites in both diarrheic and clinically healthy sheep was studied on 157 sheep from different localities at Assiut governorate-Egypt during the period extended at the beginning of April till the end of September 2014. The animals were divided into 3 groups, according to the clinical signs (severe diarrhea, mild diarrhea and clinically healthy) and according to age wise (<3 months, from 3-12 months and >12 months). Fecal samples were collected and examined by concentration sedimentation-floatation technique. The results indicated that the prevalence rate of total internal parasitic infestation in sheep was 76.43% (120 out of 157). Concerning the total helminth prevalence rate; it was 47.13% (74/157), while the prevalence rate for coccidial infection was 49.04% (77/157). Mixed infection with helminthes and coccidia was recorded in 31 animals with a prevalence rate about 19.74%. The highest prevalence rates for helminthes infestation were recorded in the age group more than 12 months 64.93% (50/77) and in animals suffer from mild diarrhea 81.25% (52/64). While, the highest prevalence rates for coccidian infection were recorded in animals suffering from severe diarrhea 78.68% (48/61) and in the age group less than 3 months was 82.6% (38/46). Infestation by coccidian was not detected in any of the clinically healthy sheep. Twelve helminthes parasites were detected in the present study; *Trichostrongylus spp* was the predominant worm in examined sheep (19.74%).

Key words: Sheep – Diarrhea – Helminthes – Coccidia - Assiut

### INTRODUCTION

Sheep are considered one of the important sources of income for the villagerian peoples as they are reared mainly for meat, wool and to some extent milk production. As a result of bad managerial conditions and grazing on grasses grow alongside the small river canals they get infected with a variety of parasites. The economic importance of parasitic infection can be attributed to their both direct and indirect losses (1). The severity of sheep gastrointestinal parasitism is greatly affected by many factors such as quality and quantity of pastures, grazing behavior and warm and humid climates (2).

Gastrointestinal parasites reduce the financial importance by decreasing the

productivity, growth rate, and reproductive performance and increased the mortality rate (3).

Clinical signs due to parasitic infestation were varied from asymptomatic to adverse signs as diarrhea, paleness or ictric of visible mucous membrane, emaciation, shedding of wool and submandibular edema (4).

Cocidiosis is a major threat facing sheep health and its prevalence is greatly affected by different managerial and husbandry practices (5).

Poor performance was recorded in sheep infected with cestodes (6).

*Moniezia expansa*, *Moniezia benedeni* and *Avitellina centripunctata* are the most commonly cestodes encountered in sheep and they are greatly affect their performance (7,8).

Stomach and intestinal worms occur in all species of animals. Young animals of both sexes and lactating animals are most suitable to these parasites. Stomach worms affect specially camels, goats and sheep (9).

Studies have shown that helminthes parasites are by far the most serious causes of production losses in farmed ruminants and the nematodes are indisputably the cause of serious production losses to ruminants (10).

The present study aims to give information about the prevalence rate of internal parasites in sheep and their common species. Also studying the relationship between the prevalence of different parasites with the clinical status or age of sheep.

## MATERIALS AND METHODS

### Animals

Sheep used in this study were located in different localities at Assiut governorate. A total of 157 sheep of different ages and sexes

were categorized into 3 age groups: Group I less than 3 months [n= 46], Group II from 3-12 months [n= 34], and Group III more than 12 months [n= 77].

According to the clinical signs they were categorized into 3 groups: severe diarrhea [n=61], mild diarrhea [n=64], and apparently healthy [n=32]. These animals had not been previously drenched with any anthelmintics.

### Sampling

The fecal samples were collected using disposable gloves for each animal from the rectum. Collected samples were put into fecal cups with lid, labeled and identified, and kept cool prior to and during transportation to the laboratory where they were immediately examined or stored at refrigerator (4 °C ) for not more than 24h.

### Fecal examination

The concentration sedimentation and flotation techniques were done according to (11) to detect the presence of helminthes eggs and coccidian oocysts.

Faecal culture was conducted on each positive nematodes specimen independently according to (12) for identification of parasites and Strongyle species were identified based on standard criteria which were mentioned by (11, 13).

## RESULTS

**Table 1. Prevalence of parasitic infection in diseased and apparently healthy sheep**

	Examined animals		Infected animals		Helminthes		Coccidia		Mixed infection		Total			
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%		
Severe diarrhea	61	95.08	58	95.08	10	16.39	42	68.85	6	9.85	16	26.23	48	78.68
Mild diarrhea	64	87.5	56	87.5	27	42.18	4	6.25	25	39.06	52	81.25	29	45.31
Apparently healthy	32	18.75	6	18.75	6	18.75	0	0	0	0	6	18.75	0.0	0.0
Total	157	76.43	120	76.43	43	27.38	46	29.29	31	19.74	74	47.13	77	49.04

Table (1) revealed that 120 sheep out of 157(76.43%) were infected with endoparasites. The prevalence rate was 27.38% (43/157) for helminthes parasites only, while the prevalence rate was 29.29% (46/157) for coccidian parasite only. 31 sheep out of 157 were found to be infected by both helminthes of different genera and coccidian with a prevalence rate 19.74%. The highest infection rate with coccidia was recorded to be 48/61 in the animals suffering

from severe diarrhea, while in mild diarrhea the infection rate was 29/64.

Infections by different types of helminthes were recorded in 16 out of 61 (26.23%) severely diarrheic sheep, 52 out of 64 (81.25%) with mild diarrhea and 6 out of 32 (18.75%) apparently healthy sheep. Mixed infection by coccidia and helminthes was higher in mild diarrheic (25/64) 39.06% than in severely diarrheic (6/61) 9.85% and apparently healthy (0/32) 0.0%.

**Table 2. Prevalence of infection in different age groups**

	Examined animals	Infected animals		Helminthes		Coccidia		Mixed infection		Total			
										Helminthes		Coccidia	
		No	%	No	%	No	%	No	%	No	%	No	%
< 3 mon	46	41	89.13	3	6.52	34	73.91	4	8.69	7	15.22	38	82.6
3-12 mon	34	28	82.35	4	11.76	11	32.35	13	38.23	17	50.0	24	70.58
> 12 mon	77	51	66.23	36	46.75	1	1.29	14	18.18	50	64.93	15	19.48
Total	157	120	76.43	43	27.38	46	29.29	31	19.74	74	47.13	77	49.04

Table (2) reveals that the highest infection rate by coccidian was recorded in the age group less than 3 months (38/46) from them 34 were present as a single infection and 3 were mixed with different types of helminthes. While the highest helminthes infection (50/77), 36 of them as single

infection and 14 mixed with coccidian, was recorded in the age group more than 12 months. Mixed infection by coccidia and helminthes was less frequently to occur in the age group less than 3 months (4/46), although it was more prevalent in the age group 3-12 months (13/34).

**Table 3. The prevalence of different types of helminthes in infested and apparently healthy sheep**

	Severe diarrhea N= 61		Mild diarrhea N= 64		Apparently healthy N =32		Total N= 157	
	No.	%	No.	%	No.	%	No.	%
<i>Trichostrongylus colubriformis</i>	7	11.4	24	37.5	-	-	31	19.74
<i>Haemonchus contortus</i>	6	9.8	16	25	6	18.75	28	17.83
<i>Oesophagostomum columbianum</i>	2	3.28	15	23.4	1	3.1	18	11.46
<i>Bunostomum trigonocephalum</i>	2	3.28	18	28.125	-	-	20	12.74
<i>Ostertagia circumcincta</i>	3	4.91	18	28.125	-	-	21	13.37
<i>Chabertia ovina</i>	1	1.64	13	20.31	-	-	14	8.91
<i>Neoascaris vitulorum</i>	-	-	1	1.6	-	-	1	0.64
<i>Trichuris ovis</i>	4	6.56	7	10.94	1	3.1	12	7.6
<i>Skrajabinema spp.</i>	-	-	1	1.6	-	-	1	0.64
<i>Fasciola spp</i>	-	-	10	15.62	-	-	10	6.36
<i>Moniezia spp</i>	-	-	2	3.12	-	-	2	1.27
<i>Avitellina spp</i>	-	-	1	1.6	-	-	1	0.64

Table (3): Infection by *Trichostrongylus* was the more prevalent helminthes (19.74%) followed by *Haemonchus* (17.83), while infection by *Neoascaris*, *Skrajabinema* and *Avitellina* were the least prevalent (0.64% for each). In case of severe diarrhea the infection by *Trichostrongylus colubriformis* was the highest 11.4% followed by *Haemonchus contortus* 9.8%. While in mild diarrhea the *Trichostrongylus colubriformis* was the most prevalent type 37.5% followed by *Bunostomum*

*trigonocephalum* and *Ostertagia circumcincta* 28.125 % (for each). In apparently healthy; the high prevalence rate was recorded with the infection by *Haemonchus contortus* (18.75%).

Infection by *Fasciola*, *Neoascaris*, *Skrajabinema*, *Moniezia* and *Avitellina* were recorded only in mild diarrheic animals. While *Haemonchus*, *Oesophagostomum* and *Trichuris* were the only helminthes which detected in apparently healthy animals.

**Table 4. The prevalence of different types of helminthes at different ages**

	< 3 Months N= 46		3-12 Months N= 34		> 12 Months N= 77		Total N= 157	
	No.	%	No.	%	No.	%	No.	%
<i>Trichostrongylus colubriformis</i>	3	6.5	12	35.29	16	20.77	31	19.74
<i>Haemonchus contortus</i>	2	4.3	1	2.94	25	32.47	28	17.83
<i>Oesophagostomum columbianum</i>	1	2.17	5	14.7	12	15.58	18	11.46
<i>Bunostomum trigonocephalum</i>	1	2.17	6	17.65	13	16.88	20	12.74
<i>Ostertagia circumcincta</i>	1	2.17	2	5.88	18	23.37	21	13.37
<i>Chabertia ovina</i>	-	-	7	20.58	7	9.1	14	8.91
<i>Neoascaris vitulorum</i>	-	-	1	2.94	-	-	1	0.64
<i>Trichuris ovis</i>	1	2.17	-	-	11	14.3	12	7.6
<i>Skrajabinema spp.</i>	-	-	-	-	1	1.3	1	0.64
<i>Fasciola spp</i>	-	-	-	-	10	12.98	10	6.36
<i>Moniezia spp</i>	-	-	2	5.88	-	-	2	1.27
<i>Avitellina spp</i>	-	-	1	2.94	-	-	1	0.64

Table (4): infection by *Haemonchus contortus* was higher in the age group >12 months (32.47%) followed by *Ostertagia* (23.37%), also infection by *Fasciola* and *Skrajabinema* were recorded only in this age group. In the age group < 3 months infestation by *Trichostrongylus colubriformis* was (6.5%), while in the age group from 3-12 months the most prevalent helminthes was

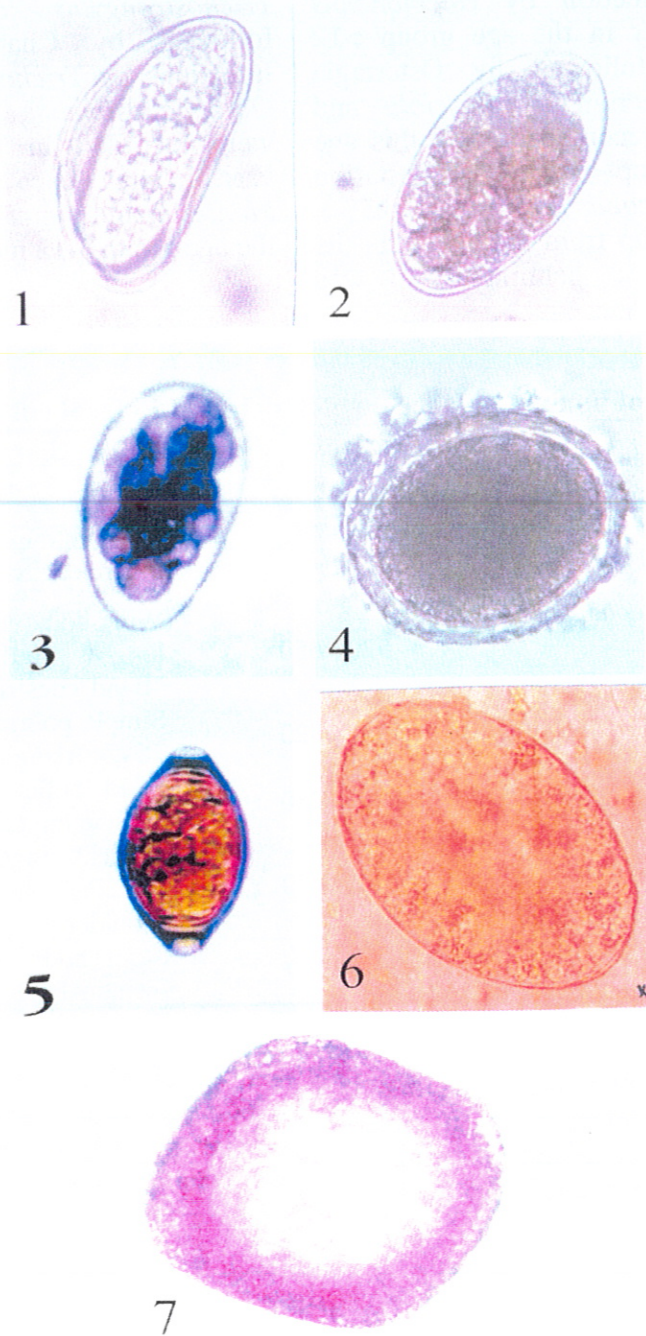
*Trichostrongylus colubriformis* (35.29%) followed by *Chabertia ovina* (20.58%). Infections by *Trichostrongylus*, *Haemonchus*, *Oesophagostomum*, *Bunostomum*, *Ostertagia* were recorded in the 3 age groups with variable prevalence rates. While *Neoascaris*, *Moniezia*, and *Avitellina* were recorded only in the age group 3-12 months.

**Table 5. Characters of nematode larvae which detected in fecal culture**

Parasite species	Species, with range of total length ( $\mu\text{m}$ )	The characteristic points of their infective larvae
<i>Trichostrongylus colubriformis</i> .	610-700	Short straight larva end with small tubercle, conical tail sheath.
<i>Bunostomum trigonocephalum</i> .	520 - 650	Wide body with sudden tapering to thin long tail (Threads-like). "Band" constriction on oesophagus.
<i>Oesophagostomum columbianum</i>	750 - 920	Simple pointed long tail, gut wavy with 16 -24 triangular intestinal cells.
<i>Haemonchus contortus</i>	650 - 730	Head bullet-shaped, and had kinked pointed tail of larva.
<i>Ostertagia circumcincta</i>	790 - 900	Conical, finger like tail. has no tubercle on like' sheath, head with distinct shoulder
<i>Chabertia ovina</i>	700 -760	Stout body with 24 - 32 rectangular intestinal cells

The gastrointestinal nematodes (Strongylide) which detected in the present work had been differentiated through the infective third stage larvae (filariform larvae)

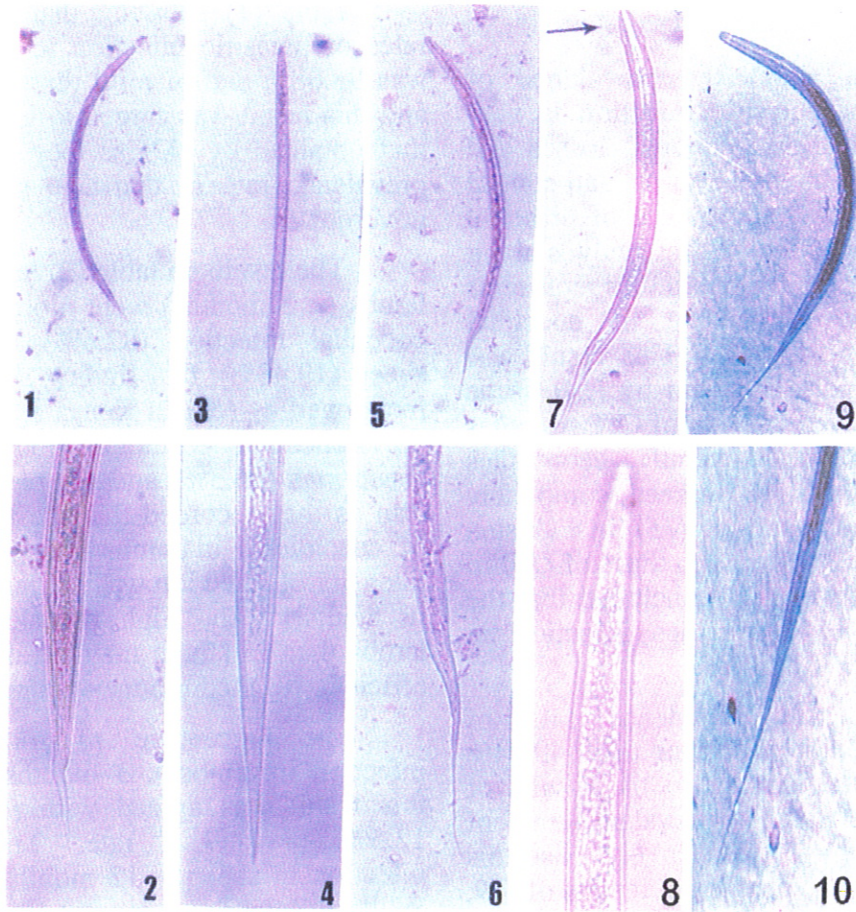
which obtained through coproculture of positive fecal samples (plate2). The characteristic larval features of each species were summerized in table (5).



**Plate 1. Some helminthes eggs of examined sheep**

- (1) *Skrajabinema* sp egg.
- (2&3) Strongylide eggs
- (6) *Fasciola* spp egg

- (4) *Neoascaris* egg
- (5) *Trichuris ovis* egg
- (7) *Moniezia* spp egg



**Plate 2. Nematode larvae of from sheep fecal culture:**

- (1) 3<sup>rd</sup> stage larva of *Ostertagia circumcincta* X 40.
- (2) Posterior end of 3<sup>rd</sup> stage larva of *Ostertagia circumcincta* X 100.
- (3) 3<sup>rd</sup> stage larva of *Trichostrongylus colubriformis* X 40.
- (4) Posterior end of 3<sup>rd</sup> stage larva of *Trichostrongylus colubriformis* X100.
- (5) 3<sup>rd</sup> stage larva of *Oesophagostomum columbianum* X 40.
- (6) Posterior end of 3<sup>rd</sup> stage larva of *Oesophagostomum columbianum* X 100.
- (7) 3<sup>rd</sup> stage larvae of *Haemonchus contortus*, note bullet -shaped head (arrow) X 40.
- (8) Anterior end of 3<sup>rd</sup> stage larvae of *Haemonchus contortus* X 100.
- (9) 3<sup>rd</sup> stage larva of *Bunostomum trigonocephalum* X 40.
- (10) Posterior end of 3<sup>rd</sup> stage larva of *Bunostomum trigonocephalum* X 100.

## DISCUSSION

Information about the prevalence of different types of parasitic infection is very helpful in reducing the economic losses and application of suitable preventative and control measures. The overall prevalence of different parasites infection in the present study is about 76.43% (the infection by helminthes represents 47.13% and the percentage of coccidial infection represent 49.04%). This result was nearly similar to that obtained by (14) as he found that the prevalence rate of GIT parasites was 68.22%. The overall helminthes prevalence rate (47.13%) agreed completely with the recorded result of (15) in Pakistan 45.9%, and nearly similar with that's of (16) in Iraq 34.3%. However (17) concluded that the prevalence rate of helminthes infection in Dakahlia province was 56.8%.

Concerning the prevalence rate of coccidial infection, it was found to be 49.04% and this result was similar to the results of (1,5,18), as they found a prevalence rate of 54.68%, 43% and 44% respectively. Also this result is partially agree with the results of (19, 20) as they recorded a prevalence rate about 34% and 24.12% respectively.

The present investigation reveal that the prevalence rate of coccidial parasite in severe diarrhea was 78.68% and in apparently healthy to be 0.0%. This result is coincide with that obtained by (21) in Iran as they mentioned that the prevalence rate in severe diarrhea and normal sheep was 69.6% and 1.8% respectively.

The association between infection by coccidial and severe diarrhea is also recorded by (19) in Poland and (22) in Egypt.

The high prevalence rate of coccidiosis in this study may be attributed to the hot weather at Assiut governorate as the high temperature play important role in sporulation of coccidial oocysts (18). Also the variation in prevalence rates may be due to differences in managerial conditions, grazing behavior and agro-climatic conditions.

Table (1) showing that the prevalence rates of parasitic infection in severe diarrhea was 95.08% and in mild diarrhea was 87.5% and this result was agreed to great extent with that obtained by (22) as they recorded 100% prevalence rate in diarrheic sheep at Assiut governorate.

The results in table (2) indicated that the lambs (< 3 months) were more susceptible to coccidial infection (82.6%) than the adult sheep (19.48%), this finding agreed with that mentioned by (23) in Kenya as they found the prevalence of coccidial oocysts in young sheep was (85.3%) and the results of (24) in Iran as they recorded that the prevalence rate of coccidiosis in lambs was 90.5% and the intensity of infection was higher in lambs than in adults. The high prevalence in young lambs than in adults may be attributed to the efficiency of the immune system in adults.

The percentage of total helminthes infection in lambs < 3 months was 15.22%, this result was agreed with (4) who found 12.5% prevalence rate. The helminthes infection in sheep > 12 months was 64.93%. While in lambs < 3 months was 15.22%, this result is in accordance with (25) as they concluded that the sheep with 1-2 years old was 3.8 times more susceptible to helminthes infection than young lambs.

Results in table (3) showed that the various genera of helminthes recorded in this study have been reported by many authors either in Egypt or allover the world but with different prevalence rates (6, 14, 19, 22, 26-30).

The *Trichostrongylus colubriformis* was more prevalent in either severe or mild diarrhea (11.4% and 37.5% respectively). Followed in severe diarrhea by *Haemonchus contortus* 9.8% and in case of mild diarrhea by *Bunostomum trigonocephalum* and *Ostertagia circumcincta* (28.125% for each). However (22) found that the *Trichostrongylus*, *Bunostomum*, *Oesophagostomum* and *Ostertagia spp* were more prevalent in either diarrheic or apparently healthy sheep but with different rates than that recorded in this study.



While (28) noticed the association between *Trichostrongylus* and gastroenteritis and they concluded that *Trichostrongylus spp* was the most prevalent gastrointestinal parasite in sheep.

In the present study the overall prevalence of *Trichostrongylus* was 19.74% and this result is similar to that obtained by (14) who recorded a prevalence rate to be 18.33%. While the prevalence of *Haemonchus* was 17.83%, however (14) recorded 27.5%.

The difference in prevalence rates may be attributed to the difference in hygiene, managerial conditions, feeding style and localities. Different prevalence rates may be due to grazing habits of sheep and the educational and economic status of the owners (15) and management system (25).

Concerning the association between the infection by different types of helminthes and diarrhea. The present study reveal that, the eggs of *Trichostrongylus colubriformis*, *Haemonchus contortus*, *Oesophagostomum columbianum*, *Bunostomum trigonocephalum*, *Ostertagia circumcincta*, *Chabertia ovina*, and *Trichuris ovis* were noticed in severe diarrheic sheep. While in addition to the previously mentioned types *Neoscaris*, *Skrajabinema*, *Fasciola*, *Moniezia* and *Avitellina* were recorded in mild diarrheic sheep. Bastauerous et al (22) notice the relation between diarrhea and infection by *Trichostongylus*, *Oesophagostomum*, *Bunostomum*, *Trichuris*, *Ostertagia* and *Chabertia* but in different prevalence rates. And this difference may be attributed to the small number used in their study. Gorski et al, (19, 28) noticed the association between infection by *Trichostrongylus* and *Haemonchus* and diarrhea.

Gorski et al, (19) reported 7% prevalence rate for *Moniezia spp* while (25) fail to detect any cestodes in their study. Ullah et al. (6) found that the prevalence of *Moniezia expansa* was 1.68% and this is nearly similar to the present findings 3.12%.

In the present study infection by different types of parasites was noticed in both diarrheic

and apparently healthy sheep, and this difference in the clinical signs may be related to the degree of infection. This result was supported by the result of (4) as they mentioned that the clinical signs of parasitic infection was varied from asymptomatic to adverse signs as diarrhea, icteric mucous membrane, shedding of the wool, and submandibular edema, also the occurrence of mixed infection and their synergistic effect (1).

Lashari and Tasawar (15) concluded that the prevalence of *Fasciola* infection was 21.41% and this is agreed with the present finding 15.62%. While (25) reported a prevalence rate 8.4% for fascioliasis (12.8% in poor health and 2.5% in apparently healthy). Gorski et al, (19) recorded 10.9% prevalence rate for *Fasciola hepatica*. While, (31) found that the prevalence rate for *Fasciola* is 13.2%.

The results in table (4) showed the relation between prevalence of different types of helminthes and age. Some types were prevalent in all the age groups as *Trichostrongylus colubriformis*, *Haemonchus contortus*, *Oesophagostomum columbianum*, *Bunostomum trigonocephalum*, *Ostertagia circumcincta*. While other types were recorded only in adults as *Fasciola spp* and *Skrajabinema spp*. The *Moniezia* and *Avitellina* were noticed only in the age group (3-12 months). Sangma et al., (25) stated that the age of sheep has significant effect on helminthes infection and the infection by *Fasciola* is higher in older sheep. Abouzaid et al, (4) found that the prevalence rates for nematodes in a descending order as following, immature sheep (6-12 mon) followed by adults (more than 12 mon) and lastly young lambs (1-6 mon), while for *Fasciola* was high in the adult sheep (> 12 mon) followed by immature sheep (6-12 mon) and it was 0.0% in young lambs. This infection pattern is relatively agreed with the present findings and this style of infection may be attributed to that most of nematode worms have direct and short life cycle about three weeks while both cystodes and trematodes worms have indirect and long life cycle about several months.

Table (5) showing The identification of different filariform larvae which detected in fecal culture of examined animals and this depends on the close similarity of their morphological features with these previously mentioned by (11, 13). **Abdel-Wahed and Salem (32)** mentioned that diagnosis of gastrointestinal strongylide of sheep through identification of the infective third stage larvae is more practical than the demonstration of eggs in feces of infected animals.

In conclusion the present findings give information about the prevalence rates of different parasitic infection in both diarrheic and clinically healthy sheep at Assiut governorate. The highest prevalence rate for helminthes infection was recorded in animals suffering from mild diarrhea and in the age group > 12 months, while the highest prevalence rate for coccidian infection was recorded in animals suffering from severe diarrhea and in the age group < 3 months so it may be considered one of the main causes of diarrhea in lambs. Also the detected results clear the importance and need for making the fecal examination a routine work applied in sheep aggregates to locate the infested animals as early as possible in order to protect them from the appearance of physical symptoms and also prevent pasture contamination.

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### الملخص العربي

دراسة عن مدى انتشار الإصابة بالطفيليات الداخلية بين الأغنام التي تعاني من الإسهال والسليمة ظاهريا بمحافظة أسيوط - مصر

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أجريت هذه الدراسة بهدف التعرف على مدى انتشار الإصابة بالطفيليات الداخلية في الأغنام التي تعاني من الإسهال والسليمة ظاهريا بمحافظة أسيوط حيث تم فحص ١٥٧ رأس من الاغنام من مختلف المناطق بمحافظة أسيوط خلال الفترة من ابريل حتى سبتمبر ٢٠١٤ . وقد قسمت الأغنام على حسب الحالة الصحية إلى ثلاثة مجموعات (تعانى من إسهال شديد ، تعانى من إسهال متوسط ، سليمة ظاهريا) وعلى حسب العمر قسمت إلى ثلاثة مجموعات أيضا ( أقل من ٣ أشهر ، من ٣ إلى ١٢ شهر ، أكثر من ١٢ شهر) وجمعت عينات البراز من هذه الأغنام وفحصت باستخدام طريقة الترسيب و التطويق وقد أظهرت النتائج ما يأتي:

انتشار الإصابة بالطفيليات الداخلية كان ٧٦,٤٣% وبالنسبة لمدى انتشار الإصابة بالديدان من مختلف الأنواع فقد كانت النسبة ٤٧,١٣% وبالنسبة للإصابة بالكوكسيديا فقد بلغ حوالى ٤٩,٠٤%. وقد لوحظ أن ٣١ حيوان بنسبة ١٩,٧٤% بهم إصابة مشتركة من الديدان والكوكسيديا معا. وسجل أعلى مدى انتشار للإصابة بالديدان في كلا من المجموعة العمرية أكبر من ١٢ شهر بنسبة ٦٤,٩٣% والمجموعة التي تعانى من إسهال متوسط بنسبة ٨١,٢٥% بينما كان أعلى مدى إنتشار للإصابة بالكوكسيديا في كلا من المجموعة العمرية أقل من ٣ أشهر بنسبة ٨٢,٦% والمجموعة التي تعانى من إسهال شديد بنسبة ٧٨,٦٨%. هذا ولم تسجل أى إصابة بالكوكسيديا فى الحيوانات السليمة ظاهريا. كما أظهرت الدراسة إصابة الاغنام بعدد اثني عشر نوع من الديدان المختلفة وقد سجلت ديدان التريكوسترونجليس اعلى نسبة إصابة حيث بلغت ١٩,٧٤%. وقد نوقشت النتائج بالتفصيل فى البحث.