Prevalence of gastrointestinal parasites infections in sheep in the Zoo garden and Sinai district and study the efficacy of anthelmintic drugs in the treatment of these parasites.

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Abstract: A survey of the prevalence of gastro-intestinal tract (GIT) parasites in 240 sheep was conducted in different area in the zoo garden (110) and in Sinai district (130) during the period of March 2009 to February 2010. The overall prevalence of infections with nematodes; fasciola and coccidiosis in sheep in Sinai and zoo garden were 66/240 (27.5%); 24/240 (10.0%) and 16/240 (6.7%) respectively. Of the 240 examined sheep, 12.5%; 0.0% and 8.6 % young lambs (1-6 month), 37.7%; 6.9 % and 9.2 % immature sheep (>6-12 months) and 17.1 %; 21.4 % and 1.4 % adult sheep (>one yr) were infested with nematodes, fasciola and coccidia respectively. Most of the animals examined during the present survey had low to moderate infestation. Serum biochemical parameters revealed that serum calcium, inorganic phosphorus, magnesium, copper and iron levels were significantly decreased in all parasitic infested animals. All treated sheep showed significant improvement & disappearance of most clinical signs and significant decrease of egg per gram (EPG) with complete disappearance of eggs in 5th day; 4th day and 6th day post treatment with albendazole (valbazine); doramectin (dectomax) and trichlabendazole (fasinex) respectively. There were gradual increases in the levels of biochemical parameters in 3 groups after one and two weeks post treatment and their levels reached nearly similar to standard levels after 3 week post treatment. Study surveys suggest, appropriate parasitic control approach be explored and tried in order to alleviate the problem of worm burden.
[Abouzeid. N.Z.; Selim. A. M. and El-Hady K. M. Prevalence of gastrointestinal parasites infections in sheep in the Zoo garden and Sinai district and study the efficacy of anthelmintic drugs in the treatment of these parasites. Journal of American Science 2010;6(11):544-551]. (ISSN: 1545-1003).

Key words: gastro intestinal parasites, sheep, Zoo garden, Sinai, anthelmintics & biochemical parameters.

1. Introduction

Gastrointestinal tract (GIT) parasites are known to be widespread in animals. The direct losses caused by these parasites are attributed to acute illness and death, premature slaughter and rejection of some parts at meat inspection. Indirect losses include the diminution of productive potential such as decreased growth rate, weight loss in young growing animals and late maturity of slaughter stock ***(Hansen and Perry 1994)***. The infections are either clinical or sub clinical, the latter being the most common and of great economic importance ***(Allonby and Urquhart 1972; Msanga 1985; Makundi et al 1998)***. Although clinical parasitism has received considerable attention as a result of obvious severity, the study of parasitism in herds without clinical signs of infection has been largely neglected. A review of the literature, however, indicates that only a limited number of studies have been undertaken to provide information on the prevalence, distribution and epidemiology of various species of parasites in sheep . A study was designed to determine the prevalence and intensity of GIT helminthes in sheep in the zoo garden and in Sinai district and determine the efficacy of anthelmintics in treatment of gastrointestinal nematodes and fasciola.

2. Material and Methods

2.1. Animals

Sheep used in this study belonged to Sinai district and zoo garden during March 2009 to February 2010. A total of 240 sheep of all sexes and ages, categorized into: young stock (1-6months) [n =40], immature (6-12months) [n =130] and adult (>one yr) [n =70] were used in the study. The animals had not been drenched for at least 8 week prior to sampling. The study herd selection was carried out with the help of veterinarians who were trained to carry out veterinary services in their respective wards or villages in Sinai. Due to the absence of written records, the age of animal was estimated by dentition. Jugular blood for serum collection was also harvested from treated groups in Sinai before and weekly (up to 3 weeks) after treatment. Obtained sera were used to determined serum biochemical parameters.

2.2. Sampling and faecal analysis

The faecal samples were collected per rectum and or freshly dropped faeces with new, unused gloves for each animal. Collected samples were put into faecal pots, labelled and kept cool prior to transportation to the laboratory where they were immediately examined or stored at refrigerated temperature (4 °C) for a maximum of one day before processing. The sedimentation and floatation technique as described by ***Soulsby, (1986)*** was used to detect the presence of eggs of liver fluke (fasciola) and nematodes in the samples. The presence of coccidian oocysts was also recorded. Worm identification through culturing faecal samples were done according to ***(Abd El-Gwad, 1974)*** and the identification of gastrointestinal nematodes larvae were done according to ***Moning (1963)***. The degree of infestation was determined by counting the ova per gram faeces through MC Master Technique according to ***Moning (1963)*** (100-250 EPG – Not a significant amount ; 250-500 EPG – Low infection level ; 500-1000 EPG – Moderate infection level and >1,000 EPG – High infection level).

The degree of anaemia was determined through The FAMACHA© system (system involves checking the color of the mucous membrane of the eye in order to determine the extent of anemia and thus, the level of infestation by internal parasites ***(Waller, 2004)***. The system categorizes animals on a scale of 1 to 5, with 5 being reserved for the most anemic animals.

2.3. Studying the efficacy of valbazine, dectomax and fasinex

Fifteen naturally infested sheep in Sinai were selected and classified into 3 groups.

1st group: five sheep naturally infested with gastrointestinal nematodes and administered orally with albendazole tablet (Valbazine) at dose level 10 mg/kg B.W.

2nd group: five sheep naturally infested with gastrointestinal nematodes and administered S/C with doramectin (dectomax) at dose level 200 µg/kg B.W.

3rd group: five sheep naturally infested with fasciola and administered orally with trichlabendazole (fasinex) at dose level 12 mg/kg B.W.

Daily observation of all treated sheep and record any changes of clinical signs. Faeces from each sheep were examined daily to evaluate the efficacy of the used drugs using the following equation (Clearance %= a-b/aX100). Where a –mean No. of EPG recorded at zero day; b= mean No. of EPG recorded at day of observation. Serum samples of sheep in the 3 groups before and weekly (until 3 week) after treatment were subjected to determine the calcium, inorganic phosphorus, Magnesium, iron and copper by buck scientific atomic absorption spectrophotometer according to ***Official Method of Analysis (1974)***.

2.4. Statistical analysis

The statistical analysis of data using T. test and ANOVA was carried out according to the method of ***Snedecor and Cochran (1989)***

3. Results

Regarding to clinical signs due to parasitic infestation which were varied from asymptomatic to adverse signs as diarrhea, paleness or ictric of visible mucous membrane (more than 3 scores), emaciation, shedding of wool and submandibular edema.

The overall prevalence rates

The overall prevalence of infections with nematodes; fasciola and coccidiosis in sheep in Sinai and zoo garden were 66/240 (27.5%); 24/240 (10.0%) and 16/240 (6.7%) respectively (Tabel 1 and Fig. 1&2).

Table 1. Farm prevalence of parasites according to localities

Locality	NO	Nematodes		Fasciola		Coccidia	
		+ve	%	+ve	%	+ve	%
Sinai	130	32	24.6	5	3.8	4	3.1
Zoo	110	34	30.9*	19	17.3**	12	10.9**
Total	240	66	27.5	24	10.0	16	6.7

At the column level *Significant at ≥ 0.05 ** significant at 0.01

Prevalances of GIT parasite infection in animals

Nematodes

Nematodes formed the most prevalent gastrointestinal infection with average prevalence of 27.5 % (66 out of 240). Of the 40 young stock (lambs) examined, 5 (12.5 %) were positive for nematodes eggs; out of 130 immature sheep, 49 (37.7%) were infected, while out of 70 adult sheep12 (17.1%). Egg excretion rate was significant high in the zoo garden (30.9%) than in Sinai (24.6%). The observed threshold level of egg numbers in this study may be regarded as low to moderate that mainly manifests as sub-clinical infections (Tabel 2 and Fig. 1&2).

Table 2. Prevalence of faecal gastrointestinal nematodes egg counts in lambs (1-6 months), immature (6-12 months) and adult sheep (> one year)

Localities	Lambs (1-6 months)		Immature (6-12 months)		Adult (> one year)		Overall	
	No	+ve & %	No	+ve & %	No	+ve & %	No	%
Sinai	25	3(12.0)a*	60	22 (36.7)a**	45	7(15.6)a	130	32 (24.6)a
Zoo	15	2 (13.3)a*	70	27 (38.6)a**	25	5(20.0)b*	110	34 (30.9)b
Total	40	5(12.5)	130	49 (37.7)	70	12(17.1)	240	66 (27.5)

At the row level *Significant at ≥ 0.05 ** significant at 0.01
Column has different letter was significant

Fasciolasis

Overall, Fasciola eggs were detected 24 out of 240 (10.0%) of examined samples. The highest prevalence rate occurred in adult sheep (21.4%). The prevalence rates of fascioliasis in zoo garden (17.3%) was higher than that in Sinai (3.8%) (Table 3 and Fig. 1&2).

Table 3. Prevalence of fasciolaisis in lambs (1-6 months), immature (6-12 months) and adult sheep (> one year)

Localities	Lambs (1-6 months)		Immature (6-12 months)		Adult (> one year)		Overall	
	No.	+ve & %	No.	+ve & %	No.	+ve & %	No.	+ve & %
Sinai	25	0(0)	60	2 (3.3)a*	45	3(6.7)a**	130	5 (3.8)a
Zoo	15	0 (0)	70	7 (10.0)b*	25	12 (48.0)b**	110	19 (17.3)b
Total	35	0 (0)	130	9 (6.9)	70	15 (21.4)	240	24 (10.0)

At the row level *Significant at ≥ 0.05 ** significant at ≥0.01. Column has different letter was significant

Coccidiosis

Sixteen samples (6.7%) all 240 collected samples had coccidial oocysts. Coccidial infection was limited to animals of less than one year old. The prevalence rate was significant higher in zoo garden (10.9%) than in Sinai (3.1%) (Table 4 and Fig. 1&2).

Table 4. Prevalence of coccida oocysts counts in lambs (1-6 months), immature (6-12 months) and adult sheep (> one year)

Localities	Lambs (1-6 months)		Immature (6-12 months)		Adult (> one year)		Overall	
	No	+ve & %	No	+ve & %	No	+ve & %	No	+ve & %
Sinai	25	1(4.0) [a]	60	3 (5.0) [a] **	45	0(0)[a]	130	4 (3.1)[a]
Zoo	15	2 (13.3)[b] **	70	9 (12.9) [b] *	25	1 (4.0) [b]	110	12 (10.9)[b]
Total	35	3 (8.6)	130	12 (9.2)	70	1 (1.4)	240	16 (6.7)

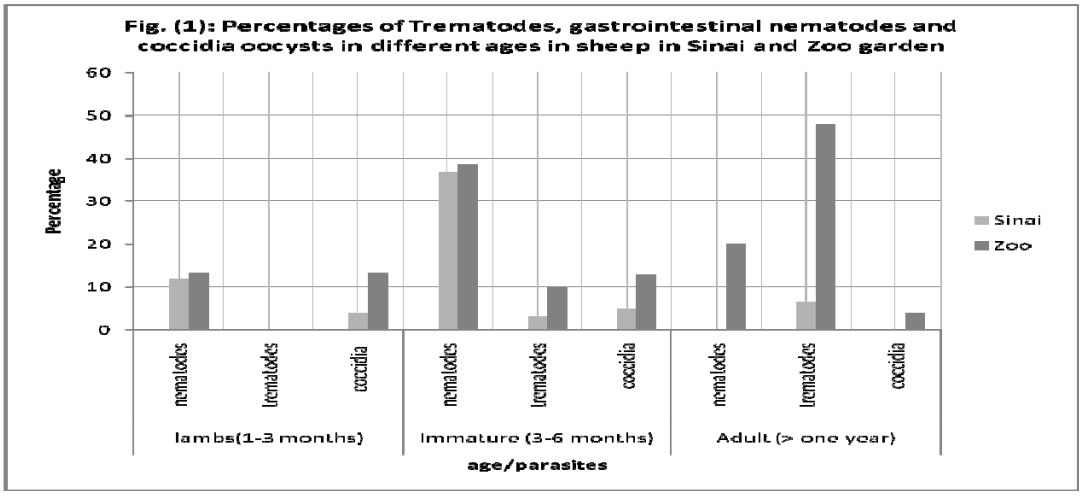
At the row level *Significant at ≥ 0.05 ** significant at 0.01. Column has different letter was significant

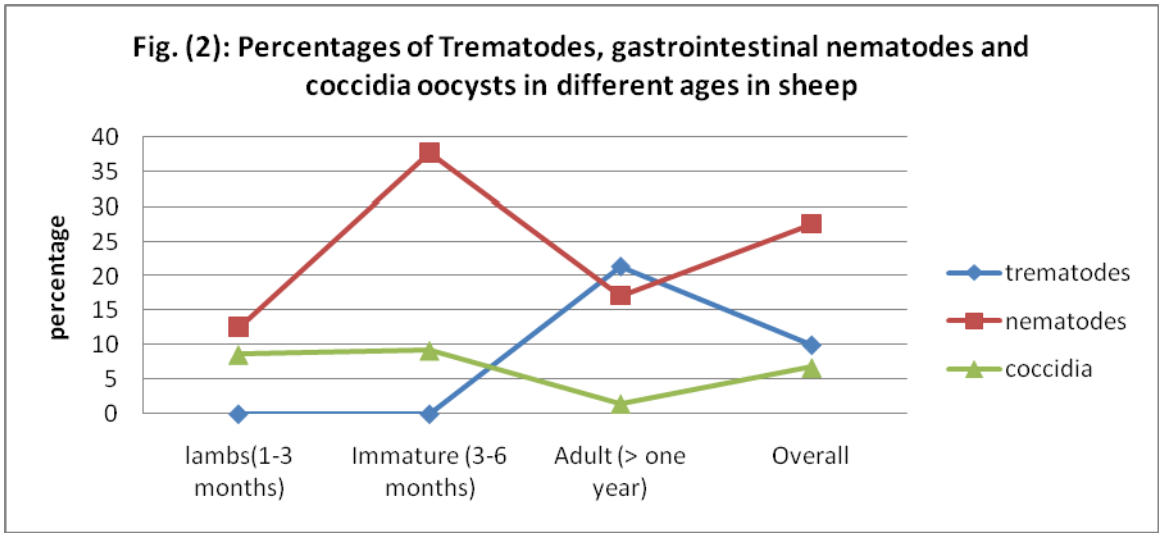
Mixed infection

There were 10 out of 240 samples had mixed nematodes and fasciola infestations. Whereas mixed nematodes and coccidia spp. was recovered in 15 samples.

Faecal culture to infested sheep with GIN

Haemonchus Spp., Ostertagia Spp., Strongylus Spp. Chabertia Spp., Trichostrongylus Spp. and *Cooperia Spp.* were recovered in the faecal culture of gastrointestinal nematodes positive samples (66 samples). There were 26 out of 66 (27.5) had single infestation with one nematode parasite (ten had only *Haemonchus Spp*, seven had only *Ostertagia* spp., five had only *Trichostrongylus Spp* and four had only *Strongylus* spp.). Whereas 12 animals had mixed infestation with two nematodes (three had *Haemonchus Spp* and *Ostertagia spp*, two had *Haemonchus Spp.* and *Strongylus* spp., three had *Ostertagia* spp and *Trichostongylus* spp. and four had *Ostertagia* spp. and *Strongylus* spp.). The others 28 gastrointestinal nematodes positive sheep had mixed infestation with more than 2 nematodes spp. There was significant correlation between FAMACHA score and parasitic infestations especially those infested with haemonchus spp.





Efficacy of valbazine, dectomax and dasinex on naturally infested sheep

All treated sheep showed significant improvement and disappearance of most clinical signs (diarrhea was decreased; mm became rosy red; improvement of body weight and disappearance of submandibular edema). Parasitological examination revealed that a significant decrease of EPG with complete disappearance of eggs in 5th day; 4th day and 6th day post treatment in the 1st; 2nd and 3rd group respectively. Serum biochemical parameter revealed that serum calcium, inorganic phosphorus, magnesium, copper and iron levels were significantly decreased in all parasitic infested animals. There were gradual increases in the levels of these elements in 3 groups after one and two weeks post treatment and their levels reached nearly similar to standard levels after 3 week post treatment (Table 5).

Table 5. Serum biochemical results before and after treatment with valbazine, dectomax and dasinex.

	Period / Element	Ca	P	Mg	Cu	Fe
	Standard level	11.5-12.8 mg	5.0-7.5 mg	3.6-5.05mg	107-120µg	190.5-254 µg
1st group	Before treatment	8.73 ± 1.44	4.26 ± 0.85	2.62 ± 1.08	92.30 ± 0.19	167.12 ± 0.25
	One WPT	9.44 ±0.85	5.70 ± 0.26	3.2 ± 0.6	105.12 ± 0.04	175.2 ± 0.12
	two WPT	9.91 ± 1.47	5.96 ± 0.15	4.22 ± 1.15	107.30 ± 0.45	194.2 ± 0.65

	three WPT	11.82 ± 0.84*	6.94 ± 0.31*	4.95 ± 0.35*	110.72 ± 0.32*	210.14 ± 0.65*
2nd group	Before treatment	8.59 ± 1.46	4.33 ± 0.65	2.61 ±0.08	95.23 ± 0.19	166.13 ± 0.15
	One WPT	10.62 ± 0.85	5.50 ± 0.26	3.32 ± 0.32	102.91 ± 0.14	174.41 ± 0.22
	two WPT	11.21 ± 1.27	6.16 ± 0.05	4.42 ± 0.75	105.98 ± 0.45	198.1 ± 0.25
	three WPT	12.02 ± 1.24*	7.04 ± 0.53*	4.95 ± 0.45*	110.32 ± 0.42*	225.01 ± 0.95*
3rd group	Before treatment	7.78 ± 1.54	4.66 ± 0.58	2.45 ± 1.08	87.60 ± 0.29	167.12 ± 0.25
	One WPT	8.92 ± 1.05	5.90 ± 0.16	2.92 ± 0.8	98.31 ± 0.04	172.41 ± 0.32
	two WPT	9.91 ± 0.41	6.14 ± 1.31	3.46 ± 0.75	105.2 ± 0.05	185.41 ± 0.65
	three WPT	11.52 ± 1.74*	7.04 ± 1.93*	3.94 ± 0.45*	107.52 ± 0.42*	95.21 ± 0.64*

*Significant at level ≥ 0.05. WPT= weeks post treatment.

4. Discussion

Gastrointestinal parasite infections are a world-wide problem for both small- and large-scale farmers. Infection by gastrointestinal parasites in sheep can result in severe losses. Economic losses are caused by gastrointestinal parasites in a variety of ways: they cause losses through lowered fertility, reduced work capacity, involuntary culling, a reduction in food intake and lower weight gains, treatment costs, and mortality in heavily parasitized animals ***(Hansen and Perry 1994 and Waller, 2006)***.

Regarding to 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. The clinical finding of parasitic infestation varied depending on the number of infective stage and the time taken after ingestion. A similar signs were observed by ***Maingi and Mathenge, (1995) and Anwaar (2000)***.

With regard to the level of parasitic infestation by parasitological examination of 240 faecal samples revealed that gastrointestinal nematodes, fasciola eggs and coccidia oocysts were detected in 66 (27.5 %), 24 (10.0%) and 16 (6.7%) examined faecal samples respectively. The prevalence of gastrointestinal parasites was higher in zoo garden than that in Sinai. This variation may be due to different mangemental system. This result was concordant with that recorded by ***Hashem, (1997); Zakaria (2001); Arafa et al., (2007) and Ibrahim et al., (2008)***. But this result was lower than that recorded by ***Abd El-Tawab, (1998); Anwaar, (2000) and Al- Gaabary et al., (2007)***. This variation may be attributed to the variation in climatic which necessary for development of infective larvae and to the different methods used in diagnostic, also the percentage of infestation varies from time to time according animal species, location and season.

Regarding to the relation between gastrointestinal infestation and age, the rate of infestation was highest among young animals and decrease with age. This result was agreement with that recorded by ***Dikov and Nekipelova (1984) and Abd El-Salam and Mahran (2004)***. This may be attributed to the development of immunity against gastrointestinal nematodes, while the rate of fasciola increases with the age. This might be due to the fact that young animals have less chance to take the infestation than adults as most breeders keep them indoors fed on concentrate and fresh water ***(Abd El-Tawab 1998)***. Moreover sheep don't normal develop a protective immune response to re-infection with fascioliasis (***Radostits et al., 2010)***.

The observed threshold level of egg numbers in this study may be regarded as low to moderate that mainly manifests as sub-clinical infections ***(Waruiru et al 2005)***. The effects of these infections can be aggravated by the frequent drought that occurs in some of the study areas ***(Anonymous 2005)***. This is described as the most economically important form of infection since it occurs in most of the cases leading to unthriftiness and animals are more susceptible to other infections and are continuously contaminating pastures ***(Ocaido et al 1996)***.

Haemonchus Spp., Ostertagia Spp., Strongylus Spp. Chabertia Spp., Trichostrongylus Spp. and *Cooperia Spp.* were recovered in the faecal culture of positive samples against gastrointestinal nematodes (66 samples). Nearly similar results were reported by ***Zaghawa et al., (1992); Abdrabo, et al., (1993); Costa et al., (2007) and Tariq et al., (2008)***.

There were 26 out of 66 (27.5) had single infestation with one nematode parasite (10 had only *Haemonchus Spp*, 7 had only *Ostertagia* spp., *5 had*

only Trichostrongylus Spp and 4 had only *Strongylus* spp.). Whereas 12 animals had mixed infestation with two nematodes (3 had *Haemonchus Spp* and *Ostertagia*., 2 had *Haemonchus Spp* and *Strongylus*. 3 had *Ostertagia* spp and *Trichostongylus* spp. and 4 had *Ostertagia* spp. and *Strongylus* spp.). The others 28 gastrointestinal nematodes positive sheep had mixed infestation with more than 2 nematodes spp. There were 10 out of 240 samples had mixed nematodes and fasciola infestations. Whereas mixed nematodes and coccidia spp. was recovered in 15 samples. These results were agreement with ***Hashem (1997), Saleh et al., (2006) and Radostits et al., (2010) and Osman, (2008)***.

Coccidial oocysts that were detected in 6.7% of all animals sampled were sporadic and the burden was light. This parasite is probably not an important factor affecting the health of sheep in the study area. Coccidiosis is more important where animals are housed or confined in small areas. The disease is also more important in young animals. However, they are sources of stress and weight loss to animals when they occur in large numbers (***Maingi, et al., 1993***).

With regard to the efficacy of anthelmintics against gastrointestinal nematodes and fasciola revealed that all treated sheep showed significant improvement and disappearance of most clinical signs (diarrhea was decreased; mm became rosy red; improvement of body weight and disappearance of submandibular edema). These results were concordant with those reported by ***Marques et al., (1996); Tinar et al., (1997) and Radostits et al., (2010).*** Parasitological examination revealed that a significant decrease of EPG with complete disappearance of eggs in 5th day; 4th day and 6th day post treatment in the 1st; 2nd and 3rd group respectively. These results were nearly similar to those obtained by ***Sabry, (1994); Varma and Panda, (1998) and Dorchies et al., (2001).*** While ***Waruiru et al., (1998) and Hertzberg et al., (2001)*** reported that gastrointestinal nematodes eggs disappeared after 2-3 weeks post treatment with valbazine (5 mg/kg BW) and after 8 weeks post treatment with dectomax respectively. Moreover ***Zakaria (2001)*** reported that fasciola eggs were disappeared after 2-3 weeks post treatment with fasenix. This variation may be due to lower dose used by those authors.

Serum biochemical parameter revealed that serum calcium, inorganic phosphorus, magnesium, copper and iron levels were significantly decreased in all parasitic infested animals. These results may be due to impaired absorption or increase excretion of concerned elements on consequence to gastrointestinal parasites and fasciola infestation. Similar results were observed by ***Aly and El-Gwady, (1991); Ali et al., (1994); Koski and Scott, (2001); Zakaria, (2001) and Süleyman et al., (2007).*** There were gradual increases in the levels of these elements in 3 groups after one and two weeks post treatment and their levels reached nearly similar to standard levels after 3 week post. These results were in coincidence with ***Varma and Panda, (1998); Dorchies et al., (2001).***

It could be concluded that most of the animals examined during the present survey had low to moderate parasitic infestation, suggesting that the infections were usually sub-clinical. Appropriate GIT parasite control strategy is needed which should be based on cost effective studies to optimise production.

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9/28/2010