

Prevalence of Ruminants Gastro-Intestinal Parasites in Kirkuk province, Iraq

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Abstract

The present study was established on the slaughtered ruminants in Kirkuk central abattoir between June 1st till December, 31st 2015. The aim of the study is to determine the prevalence of gastro-intestinal parasites (GIP^s) of slaughtered grazing ruminants in Kirkuk province. Fresh faecal specimens (n=276) were obtained from slaughtered grazing ruminants (85 sheep, 71 goats and 120 Cattle) in Kirkuk province. The investigational processing represented as direct and concentration methods were carried out using faecal direct smear, flotation and sedimentation protocol to investigate the fecal specimens to determine eggs/oocysts/trophozoites of the parasites. The obtained data showed that overall prevalence of GIP^s among slaughtered ruminants was 78.98%. Six different GIP^s species were recognized in the present study, namely: *Haemonchus contortus*, *Strongyloides papillosus*, *Trichuris* spp., *Ostertagia* spp., *Entodinium caudatum*, and *Eimeria* spp. The highest prevalence of GIP^s was among goats (91.55%). While, lowest infections was observed among cattle (69.17%). The highest recorded results was *Eimeria* spp. among adult goats (42.2%), followed by *S. papillosus* (28.6%) in young sheep. The lowest infection was 5.33% in adult cattle by *Trichuris* spp. By age groups, young and adult goats showed the most prevalence of GIP^s with infection ratio of 93.33% and 88.46%, respectively. Data in the present study revealed that the GIP^s prevalent rates among grazing ruminants in Kirkuk province was about 79%. Adult goats seem to be the most infected ruminants GIP^s with *Eimeria* spp., followed by young sheep with *S. papillosus*. This finding may be due to using unorganized traditional management systems in which huge numbers of the animals are kept together.

Keywords: Ruminant; Intestinal parasites; Protozoa; Helminthes; Prevalence; Kirkuk; Iraq.

انتشار الطفيليات المعديّة- المعويّة للمجترات في محافظة كركوك- العراق

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الملخص

اجريت هذا البحث على المجترات المذبوحة في المجزرة المركزية لمحافظة كركوك للفترة من الاول من حزيران لغاية نهاية كانون الاول 2015. هدفت الدراسة للكشف عن مدى تفشي الطفيليات المعوية-المعدية بين المجترات في محافظة كركوك. شملت الدراسة المسحية 276 من الحيوانات المذبوحة، كان الاغنام 85، المعز 71 والابقار 120. وكانت نسبة الاصابة الاجمالي 78.98%. تم التعرف على ستة انواع من الطفيليات المعوية-المعدية خلال الدراسة الحالية وهي:

Haemonchus contortus, *Strongyloides papillosus*, *Trichuris* spp. *Ostertagia* spp. *Entodinium caudatum* and *Eimeria* spp.

بلغت أعلى نسبة اصابة بين المعز (91.55%)، بينما أدنى اصابة كانت بين الابقار (69.17%). اثبتت الدراسة الحالية بأن نسبة الاصابة بالطفيليات المعوية-المعدية بين الفئات العمرية الفتية كانت أعلى مقارنة بالفئات العمرية للحيوانات البالغة وباختلاف معنوي، حيث سجلت أعلى اصابة بالطفيلي *Eimeria* spp. بين الاعمار الفتية للمعز (42.2%)، كذلك سجلت أعلى اصابة بالطفيلي *Strongyloides papillosus* بين الضأن (28.6%). أدنى اصابة تم تسجيلها خلال الدراسة الحالية كانت بالطفيلي *Trichuris* spp. بين الابقار (5.33%). كما اظهرت الدراسة بأن طفيليات المعوية-المعدية كانت أكثر انتشارا بين المجموعتين من الفئة العمرية البالغة والفتية من المعز وبنسبة 93.33% و88.46% على التوالي.

الكلمات الدالة: المجترات، الطفيليات المعوية، الأوالي، الديدان، انتشار، كركوك، العراق.

1. Introduction

Gastro-intestinal parasite (GIP^s) infections considered the most important problem in the herds around the world [1] especially in tropical and sub-tropical regions [2,3]. Small ruminants infections with GIP^s may be cause biggest health status, which have a major effect on the animal's efficacies and cause great economic losses to the producer [4-6] on the level of clinical and subclinical infection [7]. Certain GIP^s causes diarrhea [8], anemia, loss of weight, recumbency, odema, anorexia, death in chronic cases due to blood sucking from abomasum of grazing ruminants such as *Haemonchus contortus* which known as barber-pole worm [9].

Actually, most economic losses caused by GIP^s are due to production loss [10,11]. GIP^s cause variable economic losses, such as; lower fertility, reduction of work capability, involuntary culling, a reduction in feeding and fatigue, lower milk production and mortality in heavily parasitized animals [12,13]. Ruminants infection with GIP^s leads to increased management and treatment costs and may increase rates of the mortality [14]. The losses due to gastro-intestinal parasitism can be controlled by early diagnosis and preventative measure opportunely [15].

This study was conducted, to determine the prevalence of gastro-intestinal parasites GIP^s in local ruminants, and to assure the awareness about grazing ruminant's serious parasite in Kirkuk province.

2. Materials and Methods

2.1 Sample collection

This survey was conducted in Kirkuk city during June, 1st till December, 31st 2015. Disparately, faecal specimens (n=276) of sheep (85), goat (71) and cattle (120) were collected from the slaughtered ruminants in Kirkuk central abattoir in transparent, clean, dry, tight cover sampling containers. Each container was labeled with necessary data, such as number, time, date and kept in ice box *in situ*, then transferred immediately to the post graduate's parasitology laboratory of the Biology Department, College of Science, Kirkuk University. The specimens were directly examined microscopically, parasitic data were recorded and stored at 4 C° until laboratory examinations processing within 24 h.

2.2 Parasitological Procedure

The obtained fresh faecal specimens were investigated for detection of intestinal parasites (eggs, oocysts and/or trophozoites) separately, using concentration methodology by using Sugar/salt solution and sedimentation protocol to investigate the fecal specimens, as described by [16,17]. The procedure in brief; preparing of direct smears for eggs/oocysts/trophozoites, sedimentation protocol for eggs and helminthes and Flotation method (Scheathers solution) for detection of nematode eggs and protozoan oocysts were performed.

2.3 Analysis of Results

The obtained data from the collected ruminant's specimens were tested and analyzed using IBM SPSS Statistics (ver. 22.0) program package. The chi-square (χ^2) test was confirmed to assess difference in the frequencies of GIP^s between the animals and to evaluate the association between independent factors of prevalence GIP^s. Confidence interval was depended at 95% and statistical analyses was considered significant at $p \leq 0.05$.

3. Results

Data obtained of the slaughtered ruminants infection with GIP^s in Kirkuk central abattoir throughout the total period of the current study is summarized in Table 1. Six different GIP^s were detected in the present study, these are: *Haemonchus contortus*, *Strongyloides papillosus*, *Trichuris* spp., *Ostertagia* spp., *Entodinium caudatum* and *Eimeria* spp. seven *Eimeria* species were diagnosed; *E. crandallis*, *E. ahsat*, *E. pallida*, *E. parva*, *E. oviniodalis*, *E. intricate*, and *E. faurei*.

Table 1: Overall prevalence rate of GIP^s of ruminants in Kirkuk province.

Ruminants	No. of examined animals	No. of infected animals	%	$\chi^2 (p)$
Sheep	85	70	82.3529	28.7 (0.005)
Goat	71	65	91.5493	
Cattle	120	83	69.1667	
Total	276	218	78.9855	

Out of 276 investigated ruminants fecal specimens, 218 found to be infected with one or more GIP^s with overall prevalence of 78.98% Fig. 1. The highest prevalence with significant differences ($p < 0.05$) was among goat with infected ratio of 91.55%, followed by sheep and cattle 82.35%, 69.45, respectively.

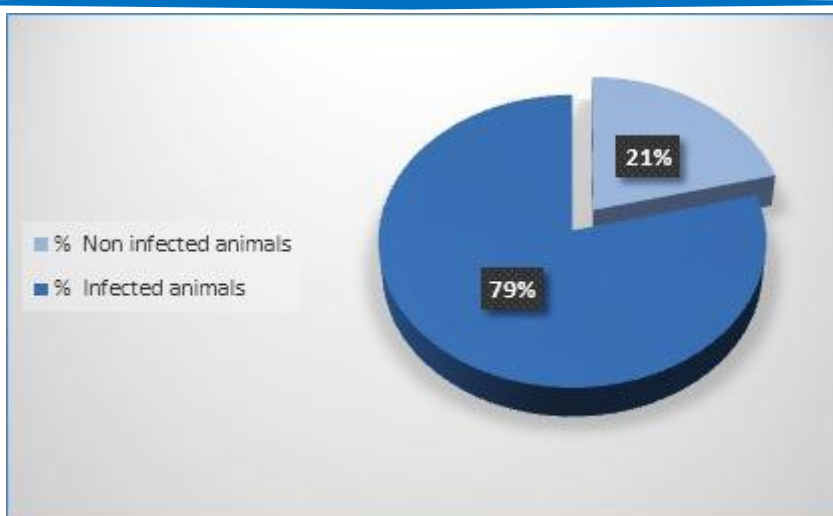


Fig. 1: Overall percentage of infected ruminants with GIPs in Kirkuk province.

Table 2 presents the detected gastrointestinal parasites throughout fecal specimen's investigation in the current study with their prevalence among the subjected ruminants. The highest recorded results of GIP^s in all three group of ruminants was *Eimeria* spp. oocysts, whereas the prevalence ratio were 42.2% among adult goats and followed by *Strongyloides papillosus* with infected ratio of 28.6% in young sheep, and the lowest infection was 5.33% in adult cattle by *Trichuris* spp. with significant differences ($p < 0.05$). The highest infection with *Haemonchus contortus* was among young goats with infected rate of 26.9 %, while the least rate found in adult cattle with infection percentage of 9.33%. Generally, moderate prevalence was recorded of *Ostertagia* spp. and *E. caudatum* in the present study ($p < 0.05$). Regarding to GIP^s ciliate, *E. caudatum* was observed in young and adult aged group of cattle ($p < 0.05$) with infection rate of 13.3% and 20%, respectively. It is noteworthy that no infection was found in adult aged goats with *Ostertagia* spp.

Table 2: Prevalence rates of detected GIP^s of ruminants in Kirkuk province.

Parasites species	Sheep				Goat				Cattle			
	Young (n=35)		Adult (n=50)		Young (n=26)		Adult (45)		Young (n=45)		Adult (n=75)	
	I.A.	%	I.A.	%	I.A.	%	I.A.	%	I.A.	%	I.A.	%
<i>Haemonchus contortus</i>	7	20	11	22	7	26.9	5	11.1	9	20	7	9.33
<i>Strongyloides papillosus</i>	10	28.6	10	20	2	7.69	4	8.89	6	13.3	8	10.7
<i>Trichuris</i> spp.	3	8.57	5	10	4	15.4	9	20	5	11.1	4	5.33
<i>Ostertagia</i> spp.	4	11.4	6	12	5	19.2	5	11.1	4	8.89	8	10.7
<i>Entodinium caudatum</i>	0	0	0	0	0	0	0	0	4	8.89	10	13.3
<i>Eimeria</i> spp. oocysts	5	14.3	9	18	5	19.2	19	42.2	10	22.2	8	10.7

n= examined animal No.,

I.A.= infected animal No.,

%= prevalence percentage

Regarding to mix GIP^s infections, the obtained data shows that most investigated ruminants had mix infections **Table 3**. Generally, the highest combination infections among three kinds of ruminants were by *H. contortus*, *Trichuris* spp. and *Eimeria* spp. in young aged sheep with infection ratio of 42.86%, while the lowest mix infection (2.67%) was by *H. contortus*, *Eimeria* spp. and *E. caudatum* significantly ($p < 0.05$).

Table 3: Prevalence rates of GIP^s mixed infections of ruminants in Kirkuk province.

Parasites species	Sheep				Goat				Cattle			
	Young (n=35)		Adult (n=50)		Young (n=26)		Adult (n=45)		Young (n=45)		Adult (n=75)	
	I.A	%	I.A	%	I.A	%	I.A	%	I.A	%	I.A	%
<i>H. contortus</i> & <i>Eimeria</i> spp.	6	17.14	13	26	9	34.62	10	22.2	13	28.9	19	25.33
<i>Ostertagia</i> spp. & <i>Eimeria</i> spp.	7	20	15	30	0	0	0	0	10	22.2	17	22.67
<i>S. papillosus</i> & <i>Trichuris</i> spp.	4	11.43	8	16	10	38.46	12	26.7	12	26.7	14	18.67
<i>Trichuris</i> spp., <i>H. contortus</i> & <i>Eimeria</i> spp.	15	42.86	12	24	5	19.23	14	31.1	6	13.3	22	29.33
<i>H. contortus</i> , <i>Eimeria</i> spp. & <i>E. caudatum</i>	0	0	0	0	0	0	0	0	3	6.67	2	2.67

n= examined animal No., I.A.= infected animal No., %= prevalence percentage

Age wise, throughout the present investigation, 276 slaughtered ruminants has been surveyed including 170 adults and 106 young animals. The prevalence percentages of the latter were; adult goats showed the most prevalence of GIP^s with infection ratio of 93.33%, followed by the young goats with ratio of 88.46%, while the least prevalence was noticed in adult cattle with ratio of 60%. Generally, the total prevalence of GIP^s between both age groups of ruminants, it was observed that the youngest ruminants had the highest prevalence than adults groups (84.9%, 75.29%), respectively **Fig. 2**, no significant differences was observed between the two age groups ($p \geq 0.05$).

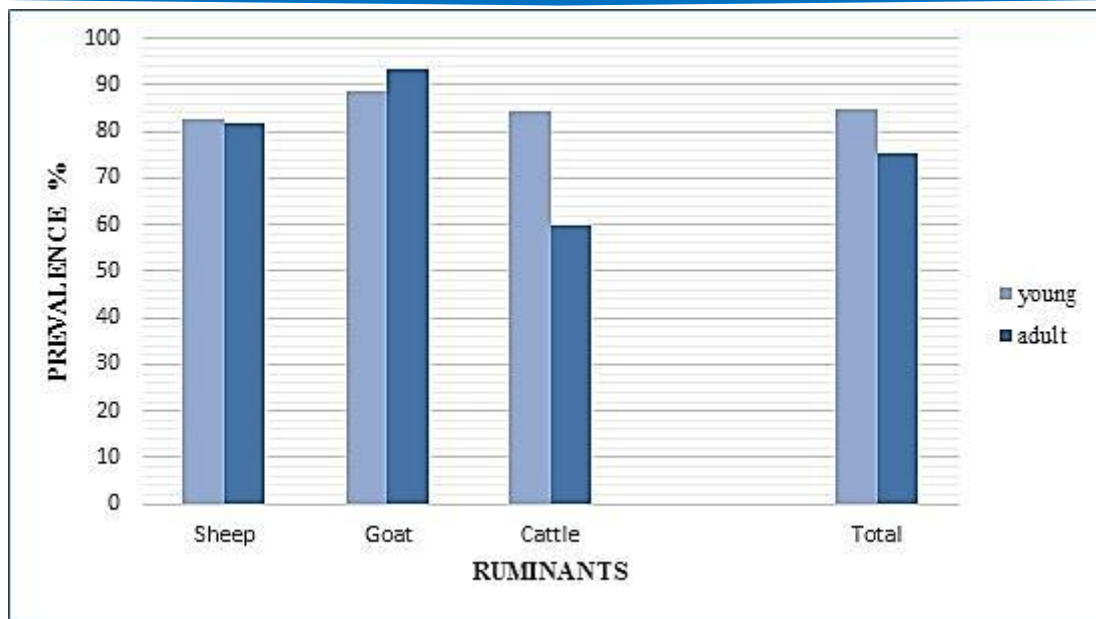


Fig. 2: Age wise prevalence of GIP^s ruminants in Kirkuk province.

4. Discussion

In our knowledge, no reports found in the literatures to be deal with gastro-intestinal parasites (GIP^s) infections of grazing ruminants in Kirkuk province, except few, for instans [18]. However, the results obtained in the preset study were compared with other studies of authors in other provinces of Iraq.

In the present investigation, the obtained data revealed that the infection of the grazing ruminants with GIP^s species in Kirkuk province was vary. Generally, out of 276 subjected ruminants to the present study, about 79% found to be infected with five different GIP^s, these are *Haemonchus contortus*, *Strongyloides papillosus*, *Trichuris* spp. *Ostertagia* spp. and *Eimeria* spp.

Data shows that highest GIP^s prevalence rate infection among three kind of ruminants was by *Eimeria* spp. in adult goats (42.2%). This result is harmonious with findings of [12, 19], and discordant with [7] whose recorded of 86.09%, followed by *S. papillosus* (28.6%) in young sheep this finding is agree with [20] who noted of 25%, and in contrary with [7] who reported of 67.37%. The third higher GIP^s prevalence rate infection was *H. contortus* (26.9%) in young goats, this result is in correspond with [21,22] and discordant with finding of [23] who recorded 13.8%. Respecting to cattle, the highest infection with GIP^s was observed among two aged groups was *Eimeria* spp. 22.2%. This finding is in agreement with [24] who were recorded 17.8%.

Concerning the age wise infection with GIP^s, generally, the obtained data shows that the infection was significantly higher in younger ruminants than adults (84.9%, 75.29%), respectively. This finding agree with those findings of [25, 26] and. Data in Fig. 2 shows that the most common infections was observed between both age groups of goat, 84.46% and 93.3%, respectively comparing with other two kind of ruminants sheep and cattle. No significant differences was noticed in both age groups of goat ($p \geq 0.05$). This result is in correspond with the finding of [12].

Regarding to cattle, most common prevalent GIP^s was *Eimeria* spp. in young aged group (22.2%), this finding is agree with [24] who observed of 20.14%. Similar prevalence rate was observed with *H. contortus*, *Ostertagia* spp. and *S. papillosus* in the young aged group 20%, 17.8 % and 13.3%, respectively. This finding is agree with [27] whose observed of 37.8%, 20% and 24.4%, respectively. However, concerning to *S. papillosus* the recorded result is contradicts the finding of [28] that recorded 0.45%. However, *Entodinium caudatum* was found in both young and adult group aged cattle with infection rate of 4.44% and 13.33%, respectively. This result is in agreement with [29] who recorded (4.6%).

Data obtained in the present study shows that mixed infection rates with GIP^s was not so high compering with other studies. The highest recording was observed to be among young aged sheep (42.86%) with *Trichuris* spp., *H. contortus* and *Eimeria* spp., followed by *S. papillosus* and *Trichuris* spp. (38.46%) and by *H. contortus* & *Eimeria* spp (34.62%) in young aged goat and of 28.9% in young aged cattle. The findings agree with those of [7], and discordant with [30] who recorded 7.9%.

In northern Iraq, ruminants are managed under traditional management systems in which huge numbers of the animals are routinely kept together. This could increase the pasture contamination level, and this may be leading to prevalence rate of the gastro-intestinal parasites among the animals. In addition, the higher prevalence rate of GIP^s among grazing ruminant in Kirkuk province might be due to poor management systems, weak sanitation conditions and/or reduced the grazing ruminants' immunity. However, higher prevalence of GIP^s in young ruminants may also be attributed to failure in separating between young animals and adults at pre ab lactating age.

This study detected the potential risk factors associated with high prevalence rate of GIP^s among grazing ruminant. Hence, officials at the Ministry of Agriculture and livestock must

planning to design promising control strategy of protozoa and/or helminthes parasites of ruminants.

5. Conclusions

Data in the present study revealed that the gastro-intestinal parasites significantly prevalent among grazing ruminants in Kirkuk province. The obtained results in the present study indicate that the prevalent rates exceeded 78%. Significantly, the most prevalent GIP^s was *Eimeria* spp. (42.2%) in adult goats, followed by *Strongyloides papillosus* (28.6%) in young sheep, while lowest infection was in adult cattle (5.33%) by *Trichuris* spp. However, the youngest ruminants had the highest prevalence than adults groups (84.9%, 75.29%), respectively. This finding may be due to mingling between young animals and adults at pre ablactating age, subsequently; this leads to high prevalence of GIP^s among the young aged ruminants. This is a big problem which facing the livestock in the country. Hence, a serious strategy required to prevent the prevalence more GIP^s among the local ruminants. Additionally, encourage furthermore studies are required on GIP^s in different parts of the country to assess its importance as a cause of health hazard.

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