PREVALENCE OF GASTROINTESTINAL NEMATODES PARASITES FROM SHEEP AND EVALUATION OF SOME ANTHELMINTHIC RESISTANCE IN ERBIL GOVERNORATE

*Ahmed Ibrahim Ahmed *Khalid Jabar Aziz **Sherzad Othman Abdullah

*Department of Animal resource , College of Agriculture ,university of Salahaddin Erbil .Iraq.

**Erbil veterinary Directorate, animal health section,

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ABSTRACT

Prevalence and anthelmintic resistance status of gastrointestinal nematodes in 430 sheep investigate by faecal examination was conducted in Qushtapa, Khabat, Benslawa, Salahaddin subdistricts in Erbil, from April to July 2012.

The mean eggs per gram (EPG) count determined by using modified McMaster technique, showed that (40.46%) of the sheep were infested, the higher infection was 17.2% *Nematodirus* spp., 13.02% *Strongylus* spp., 4.18% *Marshaligia* spp., 2.79% *Trichurus* spp. and 3.25% with *coccidia*.

Four farms were selected randomly each divided to control and three treatment groups: Levamisol, Albendazole and Ivermectin groups. Anthelmintic efficacy was measured after treatment dates were investigated with faecal egg count reduction test, the FECRT percentage for Levamisol in sheep ranged from 80.3 to 94.7 which show most effective in Khabat with FECRT of 94.7% while with Albendazole ranged from 75.5% to 80.2%, suspected resistant in all group, but the injectable Ivermectin in sheep ranged from 85.2 to 94.8 and show effective in Bnaslawa and Salahaddin with FECR of 94.6% and 94.8% respectively.

All the anthelmintic were found to be low effective, but resistance to Albendazole was suspected. Based on the findings, it was concluded that development of anthelmintic resistance could be prevented by avoiding frequent dosing and under dosing, while strategic deworming should be practiced by both animal health workers and animal owners.

INTRODUCTION

Internal parasitism is one of the biggest problems in the small ruminant animals, infections of herds can cause major health issues, which have a major effect on the animal's performance and cause great economic losses to the producer. In fact, most of the economic losses caused by internal parasites are actually not due to mortality but production loss (1). Nematode parasites of small ruminants result in low productivity due to stunted growth, poor weight gain and poor food utilization (2).

Anthelmintic resistance continues to be an increasing problem worldwide. Also it is one of the most serious threats to the effective control of gastrointestinal nematodes especially in sheep and goats. The problem has reached very high proportions in some countries, particularly in Iraq. Recent research reported that presence of anthelmintic resistance can reduce live weight 2.8kg and reduction in body condition scores (3). Anthelmintic resistance can be measured in a number of ways including field tests such as a simple drench test, Faecal Egg Count Reduction Test (FECRT). The parasite considered resistant if it survives exposure to the standard recommended dose and a fully effective anthelmintic is expected to reduce the faecal egg count to zero after administration. If the reduction is 95% or less, resistance has been detected (4). Different parts of the world reported there was significant association among FEC, climate and seasons. Furthermore, they reported faecal egg counts (FEC) were higher in rainy summer season compared to cold dry season in Turkey (5).In Kazakhstan (6).

Since the early reports on resistance of *Haemonchus contortus* to thiabendazole done in America by (7) and many more reports have emerged from other parts of the world including Kenya (8,9,10,11,12).

Control programs in United Kingdom using limited and strategic anthelmintic treatments have been recommended in areas where resistance has developed (13, 14). There is need to find out the current status of anthelmintic resistance in sheep/goat farms in the country because it would be useful in making recommendations on helminthes control strategies. The objective of this study was to investigate the usage of anthelmintic by sheep and goat farmers in both small and large scale farms and the level of drug resistance in the region.

MATERIALS AND METHODS

2.1 Experimental *area*

This study was carried out in the subdistricts around Erbil governorate / North of Iraq from April to July 2012. The farms in this study were randumly selected form four subdistricts (Qushtapa, Khabat, Benslawa and Salahaddin).

2.2 Farms selection

A total of nine farms participated in this trial and four farms among selected for anthelminthic resistance studying. The farms had flock sizes of 65 to 160 sheep and goats. Those farms that had not treated their animals for the last 8 weeks were involved. A short interview was administered. The interview gathered information on history of anthelmintic usage, including last treatment, brands used in the last 6 months, frequency of drenching as well as basis for decision by farmers on choice of brands and dosages.

2.3 Study design

Animals (sheep) in each farm were randomly divided into the following 4 groups: Group 1 treated with Levamisol e orally (Loramisole®, Damloran Razak Ltd, at a dose of 7.5mg per kg body weight); Group 2- treated with Albendazole orally (Dieverm® 600mg, Damloran Razak Ltd, at 7mg per kg body weight; Group 3- injected sub-cutaneously with Ivermectin 1% (Intermectin®, Interchemie-werken Holland at a dose of 1 ml per 50kg body weight and Group 4- untreated controls. The manufacturers' recommendations were used for all drugs with a constant dose in each farm flock based on the leaflet.

The faecal samples were processed to determine the number of nematode worm eggs per gram of faeces using the modified McMaster technique (15). While pooled samples were cultured, identified and counted using established procedures. The trial used the faecal egg count reduction test (FECRT) as described by (16). Resistance was considered present if the percent FECR was less than 95%. If only one of these was met, resistance was suspected (16).

2.4 Sampling

Collection and examination of faecal samples

Total of (430) faecal samples of sheep were collected from selected farms of different areas of Erbil district. The faecal samples were collected directly from rectum of sheep. The samples were kept in polythene bags, labeled and brought to Microbiology laboratory of Animal resource Department/Agriculture College/ Salahaddin University-Erbil,

All samples were individually analyzed for qualitative and quantitative examination according to the techniques described by (17). Briefly, a small amount of fresh faeces, 3.0 g was added to 10 ml of the flotation solution hyper saturated sugar solution and following thorough mixing the suspension was poured into a test tube and more flotation solution added to fill the tube to the top. A cover glass was then placed on top of the surface of the liquid and the tube and cover slip left standing for 10-15 minutes. The cover slip was then removed vertically and placed on a slide and examined under the microscope.

Faecal egg counts (quantitative examination) were carried out by using a modified McMaster technique as described by (17). The data of FECRT result was subjected to statistical analysis by Complete Random Design (CRD). The means of group were compared by Duncan multiple range test at level ($P \leq 0.05$).

RESULTS

Out of 430 sheep in several flocks examined 174 (40.46%) were infected with gastrointestinal nematodes. Five species of parasites were recorded in this survey. The high prevalence 74 (17.2%) was *Nematodirus*, then *Strongylus* 56 (13.02%), *Marshaligia* 18 (4.18%), *Trichurus* 12 (2.79%) and *Coccidia* 14 (3.25%) as show in table (1).

Table 1. Prevalence of gastrointestinal nematodes of sheep in Erbil.

Parasite egg types	Number of animals examined	Positive samples nematode eggs	Prevalence (%)
Nematodirus spp.	430	74	17.20
Strongylus spp.	430	56	13.02
Marshalagia spp.	430	18	4.18
Trichuris spp.	430	12	2.79
Coccidia spp.	430	14	3.25
Total	430	174	40.46

Four small scale sheep farms were selected randomly each divided to four treatment groups: Control, Levamisol , Albendazole and Ivermectin groups were fecal sample collected before treatment several gastrointestinal parasites have been identified as show in table (1) then treated with three studied anthelminthic and 14 days after treatment fecal egg reduction test done.

Table (2) show results of efficacy of anthelmenths in Erbil districts in sheep farms. The faecal egg reduction percentage for Levamisol in sheep ranged from 80.3 to 94.7 show significant effect in comparison with Albendazole and Ivermectin in Khabat with FECR % of 94.7% but moderate resistant in rest area, while Albendazole resistant is suspected in all regions (farms) with FECR ranged from 75.5%-80.2%. The injectable Ivermectin in sheep ranged 85.2 to 94.8 shows significant effect in comparison with Levamisol and Albendazole in Bnaslawa and Salahaddin with FECR of 94.6% and 94.8% respectively.

Table (2): FECRT calculated on pre and post anthelminthic treatment egg count.

Farm	No. / group	Control	Levamezol		Albendazole		Ivermectin	
		X´ epq	A X´ epq	FERC %	A X´ epq	FERC %	A X´ epq	FECR %
Qushtapa	**15**	429.333 ± 18.707 **a** (B)	84.467 ± 4.496 **bc** (A)	80.3	105.267 ± 5.395 b (C)	75.5	57.667 ± 4.560 c (B)	86.6
Bnaslawa	**14**	400.786 ± 12.802 **a** (B)	70.643 ± 4.892 **b** (B)	82.4	87.786 ± 4.149 b (D)	78.1	21.643 ± 1.993 c (D)	94.6
Salahaddin	**12**	612.250 ± 16.857 **a** (A)	78.917 ± 3.370 **c** (AB)	87.1	121.000 ± 3.859 b (B)	80.2	32.000 ± 2.517 d (C)	94.8
Khabat	**13**	632.385 ± 14.348 **a** (A)	33.692 ± 1.916 **d** (C)	94.7	137.154 ± 6.367 b (A)	78.3	93.769 ± 5.352 c (A)	85.2

***Different capital letters are significant vertically at level (P≤0.05).**

***Different small letters are significant horizontally at level (P≤0.05).**

DISCUSSION

This study conducted to demonstrate the prevalence and anthelminthic resistance of gastrointestinal parasites in sheep Erbil province north of Iraq. Overall prevalence of infection was 174 (40.46%), and five species of parasites were found among them; the most important pathogenic in a high prevalent (17.2%) was *Nematodirus* and lowest prevalent was *Trichurus* (2.79%). However a similar study done by (18) found a distribution of intestinal parasite in sulaimania province which neighboring to Erbil, the rate was (34.3%), they found five species of nematodes namely *Nematodirus* spp (29.8%), *Strongylus* spp (19.8%), *Marshalagia* (9.9%), *Trichurus* (6%) and *Coccidian* (21.8%). In Pakistan (19) found a high prevalent rate of *Haemonchus* (80.64%), *Coccidia* (51.61%), *Trichurus* (32.25%) and *Nematodirus* (29.03%). This variability in prevalent rate of gastrointestinal parasites in this study as compared with other authors finding may

be due to the number of sample size, analysis techniques used, the mode of infection related to pastures, climatic different and indiscriminate use of anthelminthic by farmers.

Also the study evaluate anthelminthic resistance suspects for three anthelminthic amongst sheep farms in Erbil province low level efficiency is that involving Levamisol and Albendazol, this may be due to that this two anthelminthic was the most commonly used previously in the region. At same area other previous study done by (20) who show low level of Albendazol are effective against nematodes of sheep farms in Mosul province which neighboring to Erbil .Absence of a significant level of gastrointestinal parasite resistance to Levamisol and benzmidazol. This finding revealed that Levamisol and Albendazole was suspected for resistance in this region of Erbil this agree with study conducted on the efficacy of the most commonly used anthelmintic in small ruminants (21). While Ivermectin is found to be most effective in Salahaddin and Bnaslawa, but Levamisol were effective in Khabat. The main reasons for this low effectivity of Albendazole and Levamisol drugs was used very frequently when compared with Ivermectin in this area, unnecessary treatments anthelmintic, under dosing and frequently using of anthelmintic. Relationship between anthelminthic resistant and potential risk factors according to (22), the three management factors that have been identified and have contributed to the development of anthelminthic resistant in small ruminants are as follows: (a) under dosing in combination with repeated use of anthelmintic, (b) the proportion of parasite stages at the time of treatment, (c) the introduction of resistant worms through purchase of animals infected with resistant parasites and insufficient quarantine procedures for new arrivals,(d) indiscriminate use and overuse of anthelmintic.

To preserve the few drugs that are still effective, veterinarians and producers must change their attitudes and approaches to parasite control, through treating only those animals that require anthelmintic treatment. The FAMACHA method has proven to be effective in identifying animals that are anemic and thus in most need of treatment (23, 24). Monitoring changes in body condition, body weight, and milk yields in dairy goats can also be used to assist in making selective treatment decisions (25).

Further studies, are needed to determine the anthelmintic resistance status of the different species of GINs in other areas of Erbil province. Moreover, studies are needed to be conducted based on a comparative efficacy on drugs from reliable source and drugs used by the owners from unreliable sources.

نسبة الاصابة بديدان الخيطية المعوية في الاغنام وتقييم بعض المقاومة للديدان في محافظة أربيل

احمد ابراهيم احمد*، خالد جبار عزيز* ، شيرزاد عثمان عبدالله**

كلية الزراعة ، جامعة صلاح الدين-اربيل*، العراق .

مديرية البيطرة في أربيل **

الخلاصة

اجريت الدراسة لتحديد نسبة الاصابة بديدان الخيطية المعوية في الاغنام وتقييم بعض المقاومة للديدان و ذلك من خلال جمع ٤٣٠ عينة براز من الاغنام من مناطق مختلفة من محافظة اربيل شملت مناطق قوشتبة، خبات، بنصلاوة و صلاح الدين للفترة من نيسان الى تموز ٢٠١٢. استخدمت طريقة التطويف المباشر و الفحص المجهري للعينات كوسيلة للعد و التشخيص.

كان معدل ألاصابة الكلية (٤٠.٤٦%) وسجلت خمسة أنواع من الطفيليات والأكثر انتشارا كان *Nematodirus* spp. ١٧.٢ % و يليها *Strongylus* spp. ١٣.٠٢% ، *Marshaligia* spp. ٤.١٨% *Trichurus* spp. 2.79% coccidia 3.25% .

تم اخذ نماذج البراز من حقول الاغنام عشوائيا و اختيرت اربع حقول الاغنام في المنطقة و كل منها قسمت الى اربع مجاميع و لكل مجموعة عشرة اغنام و تم استخدام طاردات الديدان باليفاميزول و البندازول و ايفرمكتين و مجموعة الرابعة بدون علاج (السيطرة) حسب توصية الشركة المصنعة لاختبار كفاءة الادوية الاعلاه و حساب المتوسط عدد البيوض لكل غرام من البراز EPG قبل و بعد المعالجة و كانت نسبة متوسط عدد البيوض الناقصة %FECRT كما يلي: ليفاميزول تتراوح بين ٨٠.٣-٩٤.٧% و لوحظ انها فعالة في منطقة خبات بالسبة ٩٤.٧% ، اما البندازول تتراوح بين ٧٥.٥-٨٠.٢% و تبين البندازول واطئة فعالية و قد تكون مقاومة في جميع المجاميع واما ايفرمكتين كانت تتراوح بين ٨٥.٢-٩٤.٨% و لوحظ انها فعالة في منطقة بنصلاوة و صلاح الدين بالنسبة ٩٤.٦% و ٩٤.٨% على التوالي.

نوصي بوضع البرنامج ستراتيجي لحد من انتشار الطفيلي من قبل الجهات البيطرية و اصحاب الحيوانات و استخدام طاردات الديدان بصورة علمية و تجنب تعدد و تضاعف الجرعات

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