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EFFICACY OF VALBAZEN (ALBENDAZOLE) AGAINST GASTRO-INTESTINAL NEMATODES IN GOATS

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ABSTRACT

Efficacy of Valbazen against gastro-intestinal nematodes was evaluated in 48 naturally infected goats, divided into A and B groups (n=24 each), which were further sub-divided (n=8 each) into A-I and B-I (Pure *Haemonchus contortus*), A- II and B-II (mixed infection with *H. contortus*), and A-III and B-III (mixed infection without *H. contortus*). Group A, was treated with Valbazen, while group-B served as positive control. The eggs per gram (EPG) were determined at day zero, 3, 7, 10 and 14 post- treatment. The EPG counts significantly ($P<$ 0.05) decreased from 4787.5 (day zero) to 1425; and 543.8 in A-I, from 1050 to 350 and 125 in A-II and from 856.3 to 375 and 100 in A-III at day 10 and 14, respectively. The study indicated significant increase ($P<$ 0.001) in PCV percentage at day 14, i.e., 29.19±1.5; 28.6 ± 2.4 and 27.1 ± 2.5, in group, A-I, A-II and A-III, respectively. The Hb concentration increased significantly in treated goats as compared to control group on day 14 post treatment.

Keywords: epg, goat, concentration, nematodes, PCV, Valbazen

INTRODUCTION

There are 1005.80 million goats world-wide producing about 17.84 million tons of milk and 5.30 million tons of meat. The goat population in Pakistan is 64.9 million heads, which produces about 0.78 million tons of milk and over 0.29 million tons of mutton. In addition, goats provide hair, leather and manure (FAO, 2015). Gastro-intestinal helminths cause production losses, weight loss and mortality in small ruminants (Chaudary *et al.* 2007). Gastro-intestinal nematodes (GINs) such as *Haemonchus contortus,, Trichostrongylus spp, Strongyloides papillosus, Oesphagostomum columbainum, Oestertagia spp., Trichurisovis, Bunostomum spp., Chabertiaovina, Nematodirus spp., Cooperia spp.,* are most common in Pakistan (Raza *et al.,* 2007; Ijaz *et al.,* 2008). The helminths cause adverse

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effects on the host like haematological and biochemical disturbances, loss of body weight and huge economic losses (Iqbal *et al.,* 1993). The use of chemicals for the treatment and control of GIT parasites is widely practiced throughout the world (Terrill *et al.,* 2001; Ancheta *et al.,* 2004).The control of GI nematodes through drugs is becoming difficult as a consequence of the development of resistant nematode population to most commonly used anthelmintics (Coles, 2002).The aim of present study was to determine the present day efficacy of Valbazen against naturally occurring GINs of goats.

MATERIALS AND METHODS

Field trials were conducted on small farmer goat farms around Tandojam and Livestock farm, Sindh Agriculture University, Tandojam, Pakistan. Climatically, the study area is sub-tropical humid area with average annual rainfall of about 129 mm. The average maximum temperature reaches 40.8°Ċ in May and minimum 7.9°C in January. The relative humidity is highest (73 %) in the month of August and lowest (50%) in the month of April. Forty eight goats (6 months to one year of age) were selected randomly on the basis off aecal egg count and were divided into 02 groups i. e., A and B with 24 goats in each group. Both groups were further sub-divided into A-I and B-I (Pure *Haemonchus contortus*), A- II and B-II (Mixed infection with *H. contortus)*, and A-III and B-III (Mixed infection without *H. contortus*) with 8 animals in each sub-group. Animals in group A, were treated with Valbazen (Pfizer, Pakistan Pvt. Ltd.) orally at the rate of l ml/20 kg body weight, while Group-B was kept as positive control to monitor time related changes.

Faecal and blood samples were collected from each animal at 0 day (pre-treatment) and at 3rd, 7^{th,} 10th and 14th day (post-treatment). The EPG were determined by modified McMaster technique, (Urquhart *et al.,* 1996). The gastro-intestinal nematode eggs were identified by the culture of positive faecal samples, recovery and identification of L_3 Larvae of different species of gastro-intestinal nematodes were carried out according to the techniques described by MAFF (1986), Baermann technique (1917), respectively. The estimation of anthelmintic efficacy was carried out according to the field controlled faecal egg count reduction test (Coles *et al.,* 1992; Taylor *et al.,* 2002; Coles *et al.,* 2006). The reduction percentage of faecal egg counts (FECR) was calculated by the following formula:

% FECR =a-b/a×100.

Where, a = EPG pre-treatment, and b = EPG post treatment.

For determination of haematological values (i.e. packed cell volume; PCV %, haemoglobin concentration (Hb g/d) the blood samples were collected in vial with EDTA and analyzed by using the automatic cell counter (A$^{c.}$T diff analyzer, Beckman Counter, Mervue, Galwat, Ireland).

Statistical analysis

Results were expressed as mean ± SD, and were analysed through ANOVA followed by Tukey's Test. Statistical significance was set at $P< 0.05$ marginally. GraphPad Instat V3.05 was used for data analysis.

RESULTS AND DISCUSSION

The goat producers are facing increasing problems due to the rapid spread of anthelmintic resistance. Efficacy of the drug is one of the most important steps in establishing and maintaining the effective parasite control of nematode parasites of livestock particularly for small ruminants. The faecal egg, count reduction test (FECRT) is the test of choice to detect problems of anthelmintic efficacy, because it uses few resources, is easily performed and is applicable in the evaluation of the performance of any anthelmintic under field conditions. The experiments were conducted to determine the efficacy of Valbazen under field conditions against gastro-intestinal nematodes (GINs) in goats.

The results of FECRT were interpreted according to WAAVP (World Association for the Advancement of Veterinary Parasitology) recommendations (Coles *et al.,* 1992) for efficacy evaluation of the anthelmintics. The mean EPG and reduction percentage in faecal egg counts of goats treated with Valbazen at the rate of l ml/ 20kg body weight are presented in the Table 1. A significant ($P<$ 0.05 and 0.001) reduction in EPG counts was noted at 10^{th} and 14^{th} days post-treatment. The administration of Valbazen against pure *H. contortus* infection induced significant ($P<$ 0.05 and $P<$ 0.001) EPG reductions on day 10^{th} and 14^{th} post-treatment. The EPG values decreased from 4787.5 to 1425 and 543.8 on 10^{th} and 14^{th}days i. e., 70.2 and 88.6 percent, respectively. The administration of Valbazen against mixed infection (with *H*. con*tortus* and without *H*. *contortus*) induced significant ($P<$ 0.05, $P<$ 0.001 and $P<$ 0.0001) EPG reductions. The EPG values decreased from 1050 to 350 (66.7%) and 125 (88, 1%) and from 856.3 to 375 (56.2%) and 100 (88.3%) on 10^{th} and 14^{th} days, respectively. It is obvious from the results that pre- treatment EPG counts of untreated infected group (control) did not show a significant ($P>$ 0.05) change on 3^{rd}, 7^{th}, 10^{th} and 14^{th} days. The efficacy percentages observed during present study are lower than 95%, of WAAVP's recommendation for suspicion of resistance (Coles *et al*., 1992).The findings of the present study are not in agreement with the observation of other workers, (Keyyu *et al.,* 2002; Waruiru, 2002; Islam*, et al*., 2003; Munyua *et al.,* 2004), who have reported 97%, 100%, 90.11% and > 96% reduction in faecal egg count. It can be assumed that the low efficacy of Valbazen may be due to the extensive use of the drug, perhaps alone or in combination for control of gastro-intestinal nematodes. Another possible reason may be the inefficiency of Valbazen in removing the immature population of nematodes (Grimshaw *et al*., 1996; Waruiru *et al*., 2003). In addition, this may be due to the fact that the dose recommended for goat may not be sufficient to treat for these parasite species. This study indicates that the gastro-intestinal nematodes may have developed the resistance against Valbazen (Albendazole) mainly due to longer and more frequent use of the drug.

Parasitism invariably affects the health and productivity of animals. The examination of blood can provide significant information (Hafeez, 1996). The main objective of this haematological study was to determine the effect of commercial drug (Valbazen) on some hematological values i. e., PCV and Hb concentration. The mean PCV % of goats treated with Valbazen (l ml/20 kg, body weight), in field and of untreated positive control group presented are in Table 2. The results revealed that the mean values of PCV of animals treated with Valbazen, remained non-significant from the 0 day to 7th day post treatment. On

the 10th and 14th day, post treatment there was significant ($P< 0.05$) increase in PCV in all treated groups compared with untreated group (control). The results of the present study are in agreement with the findings of many workers (Gauly and Erhardt, 2002; Islam *et al.,* 2003; Amarante *et al*., 2004; Chaudary *et al.,* 2007; Yacob *et al.,* 2008; Pandit *et al.,* 2009; Walkden- Brown *et al*., 2008; Qamar, 2009; Marshall *et al.,* 2012; Qamar and Maqbool, 2012; Njidda *et al;* 2013;) who have conducted studies on the effect of drugs on PCV values of goats, naturally infected with gastro-intestinal nematodes and reported that the values of PCV (%) were significantly different in goats before and after treatment.

Table 1. Mean ± SD of eggs per gram (EPG) and reduction percentage of different species of gastro -intestinal nematodes in goats before and post- treatment with Valbazen.

Group	No.of goats	Nematode species	Pre-treatment	Post-treatment (days)			
			0 days	3rd	7th	10th `	14th
A-I	8	*H.contortus* (pure)	4787.5	3825±6.5 (20.1)	2312.5±10.4 (51.7)	1425±8.3 (70)*	543.7±5.7 (88.6)**
B-I	8	Control	4912.5	4975 ± 0 (1.27)	4987.5±8.06 (1.53)	5125±14.35 (4.33)	5256.25±12.93 (7.0)
A-II	8	Mixed infection (with *H. contortus*)	1050	862.5±3.3 (17.8)	631± 6.2 (39.9)	350 ± 6.8 (66.7)**(	125 ± 6.3 (88.1)***
B-II	8	Control	837.5	837.5±6.7 (0)	837.5± 6.7 (0)	893.75±15.1 (6.72)	906.25±14.9 (8.21)
A-III	8	Mixed infection (without *H. contortus*)	856.25	743.75±4.4 (13.1)	575± 6.2* (32.8)	375± 13.1 (56.2)***	100 ± 7.0 (88.3)***
B-III	8	Control	962.5	937.5±9.54 (-2.60)	962.5±10.60 (0.0)	993.75±11.87 (3.25)	1006.5±11.70 (4.55)

* = $P < 0.05$, ** = $P< 0.01$, ***= $P< 0.001$
Note: Figures in parentheses indicate the percentage

The mean Hb concentration of goats treated with Valbazen against the three categories of infection (BI, BII and BIII) are presented in Table 3. The results revealed that the mean haemoglobin (Hb) concentration of goats treated with Valbazen, against BI, BII and BIII remained non-significant on the day 0,3rd and 7th post treatment. On the 10th and 14th day post treatment there was significant ($P< 0.05$) increase in Hb concentration in all treated groups compared with untreated group (control). The findings of the study are in agreement with results of other researchers (Chaudary *et al.,* 2007; Walkden-Brown *et al.,* 2008; Qamar, 2009; Marshall *et al.,* 2012; Qamar and Maqbool, 2012; Njidda *et al.* 2013). The increases in PCV % and Hb concentration of treated goats may be due to the elimination of worms, particularly, *H. Contortus* nourishing on the red blood cells of the goats. In heavy infections, an infected goat can bleed to death within hours.

Table 2. Mean and ±SD of PCV (%) of goats before and post- treatment with Valbazen

Group	No.of goats	Nematode species	Pre-treatment	Post-treatment (days)			
			0 days	3rd	7th	10th `	14th
A-I	8	*H. contortus* (pure)	23 ± 1.7	23 ±1.7	25 ±1.7	27± 1.5**	29.19±.5***
B-I	8	Control	22 ± 2.8	21 ±2.2	20.3±2-1	19.6±1.5	19.6 ± 1.5
A-II	8	Mixed infection (with *H. contortus*)	22 ± 2.8	22.1±2.5	23.6±2.3	25.6±2.6*	28.6±2.4***
B-II	8	Control	23 ± 1.7	23 ±1.7	23±1.5	23 ±1.3	22.5±1.3
A-III	8	Mixed infection (without *H. contortus*)	22 ± 2.7	22.2±2.0	23.2±2.1	24.9±2.1*	27.1±2.5***
B-III	8	Control	22 ± 2.7	21.6±2.4	20.8±2.4	20.1±2.2	19.8±1.8^{ns}

* = *P*< 0.05 , ** = *P*< 0.01, ***= *P*< 0.001

Table 3. Mean and ±SD of Hb concentration (g/dl) of goats before and post- treatment with Valbazen

Group	No.of goats	Nematode species	Pre-treatment	Post-treatment (days			
			0 days	3rd	7th	10th `	14th
A-I	8	*H.contortus* (pure)	9.0 ± 0.8	9.2 ± 0.8	9.4 ± 0.8	9.9 ± 0.8	10.4 ± 0.9*
B-I	8	Control	8.8± 0.6	8.8 ± 0.6	8.7 ± 0.5	8.7 ± 0.5	8.5 ± 0.5
A-II	8	Mixed infection (with *H. contortus*)	8.8 ± 0.6	9.0 ±0.7	9.4 ± 0.7	9.7 ± 0.7	10. ± 0.7**
B-II	8	Control	8.7± 0.8	8.6± 0.7	8.4± 0.6	8.2± 0.6	8± 0.5
A-III	8	Mixed infection (without *H. contortus*)	8.5 ± 0.9	8.9 ± 0.8	9.1 ± 0.8	9.6 ± 0.9	10.2 ± 0.9**
B-III	8	Control	8.8 ± 0.6	8.8 ± 0.6	8.7 ± 0.5	8.6 ± 0.5	8.4 ± 0.4

* = *P*< 0.05 , ** = *P*< 0.01,

CONCLUSION

The results of the present study show that Valbazen is less efficacious against gastro-intestinal nematodes in goats and the efficacy percentages observed are lower than 95%, of WAAVP's recommendation for suspicion of resistance. Hence, farmers and veterinary professionals should consider the poor efficacy of anthelmintics as a serious problem and the routine diagnosis of infections by GIT nematodes should be complemented by standardized efficacy evaluation techniques. Further studies, however, are needed to assess the efficacy status of Valbazen in different, animal species, and management systems.

REFERENCES

Amarante, A. F. T., P. A. Bricarello, R. A. Rocha and S. M. Gennari. 2004. Resistance of Santa Inês, Suffolk and Ile de France sheep to naturally acquired gastro-intestinal nematode infections. Vet. Parasitol., 120: 91-106.

Ancheta, P. B., R. A. Dumilon, V. M. Venturina, W. A. Cerbito, R. J. Dobson, L. F. LeJambre, E. C. Viollar and G. D. Gray. 2004. Efficacy of benizmidazole anthelmintics in goats and sheep in the Philippines using a larval development assay. Vet. Parasitol., 102: 107-21.

Baermann, G. 1917. Eineeifache Methode ZurAuffindung Von Anklyosto- mum larven in Erdproben. Geneesk. Tijdschr. Ned.-Indie., 57: 131-137.

Chaudary, F. R., F. U. Khan and M. Qayyum. 2007. Prevalence of *Haemonchus contortus* in naturally infected small ruminants grazing in the Potohar area of Pakistan. Pak. Vet. J., 27: 73-79.

Coles, G. C. 2002. Sustainable use of anthelmintics in grazing animals. Vet. Rec., 15: 165-69.

Coles, G. C., F. H. M. Borgsteede, S. T. R. Geerts and M. A. Tylor. 1992. World Association for the Advancement of Veterinary Parasitology methods for the detection of anthelmintic resistance in nematodes of veterinary importance, Vet. Parasitol., 44: 35-44.

Coles, G. C., F. Jackson, W. E. Pomro and R. K. Prichard. 2006. The detection of anthelmintic resistance in nematodes of veterinary importance, Vet. Parasitol., 11-19.

FAO, 2015. Statistics Division, Live animal production and population, http:// faostat.fao.org/site/573/Access on 18, July, 2016].

Gauly, M. and G. Erhardt. 2002. Genetic resistance to gastro-intestinal nematode parasites in Rhon sheep, following natural infection. Vet. Parasit., 102: 253-259.

Grimshaw, W. T. R., C. Hong and K. R. Hunt. 1996. Potential of misinterpretation of faecal egg count reduction test for levamisole resistance in gastro-intestinal nematodes of sheep. Vet. Parasit., 62: 267-273.

Hafeez, M.1996. A study of gastro-intestinal parasitism and haematological differences associated with single or multiple infection in sheep.M.Sc. Thesis, College of Veterinary Sciences Lahore.

Ijaz, M., M. S. Khan, M. Avais, K. Ashraf, M. M. Ali and Saima. 2008. Infection rate and chemotherapy of various helminths in goats around Lahore. Pak. Vet. J., 28 (4): 167-170.

Iqbal, Z., M. Akhtar, M. N. Khan and M. Riaz. 1993. Prevalence and economic significance of Haemonchosis in sheep and goats slaughtered at Faisalabad abattoir. Pak. J. Agric. Sci., 30: 51-53.

Islam. M. S., F. Begum and M. S. Alam. 2003. Comparative efficacy of Albendazole, Fenvet and Ivomac injection against natural infection of gastro-intestinal nematodes in goats. J. Anim. Vet. Adv., 2 (7): 382-384.

Keyyu, J. D., H. M. Mahingika, H. B. Mawkish and A. A. Kassuku. 2002. Efficacy of albendazole and levamisole against gastro-intestinal nematodes of sheep and goats. Tropical Anim. Health Prod., 34 (2): 115-120.

MAFF (Ministry of Agriculture, Fisheries and Food). 1986. Manual of Veterinary Parasitological Laboratory Techniques, London, U.K.

Marshall, R., S. Gebrelul, L. Gray and Y. Ghebreiyessus. 2012. Mixed species grazing of cattle and goats on gastro-intestinal infections of *Haemonchus contortus.* Am. J. Anim. Vet. Sci., 17: 61-66.

Munyua, W. K., R. M. Waruiru and J. W. Ngotho. 2004. Comparative efficacy of albendazole, levamisolerafoxanide and ivermectin against naturally acquired gastro-intestinal nematodes in goats. Kenya. Vet., 27: 5-9.

Njidda, A. A., I. T. Hassan and E. A. Olatunji. 2013. Haematological and biochemical parameters of goats of semi-arid environment fed on natural rangeland of Northern Nigeria. J. Agric. Vet. Sci, 3 (2): 1-8.

Pandit, S., J. D. Ghosh, A. Chinya, M. Mandal, R. Jas and S. Moi. 2009. Evaluation of anthelmintic efficacy of ivermectin, levamisole and albendazole against naturally occurring gastro-intestinal nematodosis in Garole sheep. J. Vet. Parasit., 23: 121-125

Qamar, M. F. 2009. Epidemiology, sero-diagnosis, economic losses and control of haemonchosis in sheep and goats. Ph.D. thesis, Dept. of Parasitology, Univ. Vet. Anim. Sc., Lahore, Pakistan, 63-113.

Qamar, M. F. and A. Maqbool. 2012. Biochemical studies and serodiagnosis of haemonchosis in sheep and goats. J. Anim. Plant Sci., 22 (1): 32-38.

Raza, M. A., Z. Iqbal, A. Jabbar and C. Yaseen. 2007. Point prevalence of gastro-intestinal helminthiasis in ruminants in southern Punjab, Pak. J. Helminth., 81: 323-328.

Taylor, M. A., K. R. Hunt and K. L. Goodyear. 2002. Anthelmintic resistance detection methods, Vet. Parasit., 103: 183-194.

Terrill, T. H., R. M. Kaplan, M. Larsen, O. M. Samples, J. E. Miller and S. Gelaye. 2001. Anthelmintic resistance on goat farms in Georgia: efficacy of anthelmintics against gastro-intestinal nematodes in two selected goat herds. Vet. Parasit., 97: 261-268.

Urquhart, G. M., J. Armour, J. L. Dunncan and F. W. Jennings. 1996. Veterinary Parasitology. 1st Ed., ELBS, Longman, London, U.K.

Walkden-Brown, S., B. Sunduimijid, M. Olayemi, J. Van Der Werfand and A. Ruvinski. 2008. Breeding fiber goats for resistance to worm infections-gastro-intestinal nematode or helminth. Australian, Govt. Rural Indust. Res. Develop. Corporation.

Waruiru, R. M. 2002. Efficacy of closantel plus albendazole combination against naturally acquired and experimentally induced nematode infections in goats. Israel J. Vet. Med., 57: 113-117.

Waruiru, R. M., J. W. Ngotho, M. N. Mutune and W. K. Munyua. 2003. Comparative efficacy of ivermactin, albendazole, levamisole and rafoxanide against gastro-intestinal nematode infection in goats. Indian J. Anim. Sci., 73 (2): 147-150.

Yacob, H. T., B. K. Baseline and A. K. Basu. 2008. Experimental concurrent infection of Afar breed goats with Oestrus ovis (L1) and Haemonchus contortus (L3): Interaction between parasite populations. Exp. Parasit., 120: 180-184.

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