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Anthelmintic activity of AAU/CI herbal formulation incorporated urea molasses block in goats naturally infected with gastrointestinal nematodes

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Anthelmintic value of indigenous medicinal plants was reported by several workers. Chirata *(Andrographis Peniculata)* powder form of leaf is used as anthelmintic in gastrointestinal nematodes (*Trichostrongylus, Haemonchus*) in sheep and goat (Purakayastha and Subhan, 2006 and Anju *et al.* 2012). Ghora neem *(Melia azadarachta)* fruit extract and powder form of leaves had GABA like action on GI nematodes (*Haemonchus)* in cattle (Mali and Mehta 2008 and Arora *et al*. 2012).

Gastrointestinal nematodes cause significant economic losses in animals. Conventional use of the anthelmintics have resulted into resistance. The medicated urea molasses blocks and another dewormer medicated feed pellets (MFP) can alternatively be used in strategic control programme (Sanyal and Singh 1995). The MUMB contain low doses of anthelmintic and are given to the animals to lick on daily basis. MFP is a technology in which divided dose of anthelmintic is more efficacious than a single dose on two consecutive days. The present study was conducted to study the Anthelmintic activity of AAU/CI herbal formulation incorporated urea molasses block in goats naturaly infected with gastrointestinal nematodes.

Crossbred goats (42) of almost similar age and body weights and positive for gastrointestinal nematodes were randomly divided into 8 groups of 6 each. The eggs per gram (EPG) of faeces were counted in each animal by modified Stoll's dilution technique (Soulsby 1982). The EPG was determined prior to the treatment (0-day) and at every fortnight upto 100 days post treatment for each of the animal of each group. All the animals were subjected to detailed clinical examination.

The herbal formulation, medicated urea molasses block (MUMB) consisted of powder of sample AAU/CI prepared by drying and grinding of the plant (leaf and stem) material. This was incorporated into urea molasses block (UMB) @ 15 g/animal/day. The MUMB (AAU/CI) were given to the animal for licking in group 5 (stall feeding) and MUMB (AAU/CI) fed individually to the grazing animals once a day in group 6. To compare the efficacy of herbal formulation with standard anthelmintic, fenbendazole @ 0.5 mg/kg body weight of goat was incorporated into UMB. This MUMB (FBZ) were given to the animals for licking in group 1(stall feeding) and MUMB (FBZ) fed to the animals once a day in group 3 (grazing). The UMB without medication were given to the animal for licking in group 2 (stall feeding) and once a day in group 4 (grazing). The animals of group 7 were kept as infected untreated control. The percentage of efficacy was determined by the following formula as per Zaman *et al.* (2012).

Medicated urea molasses block for 12 goats consisted of deoiled rice bran (576.0g), mineral mixture (14.4g), sodium chloride (7.2g), molasses (252.0 g), gum acacia (15.0g), urea (7.2g), fenbendazole (120mg @ 0.5 mg/kg body weight of goat or AAU/CI 180g @ 15 g/goat).The ingredients were thoroughly mixed and transferred into a suitable container, kept at room temperature to dry up. The EPG data of each group were statistically analyzed by analysis of variance (one-way classification) of Dunnet test (Snedecor and Cochran 1967).

The mean EPG of the goats after treatment was significantly lowered as compared to the pretreatment EPG. The faecal eggs per gram (mean±SE) in different groups are presented in Table 1. In the animals of group 1, the reduction in EPG was 100% on 15th day and onwards post treatment which taken as standard for comparison with MUMB (AAU/CI). There is 100% efficacy observed on 45th days and onwards in group 3. The MUMB (AAU/CI) fed as MFP once a day, the reduction in EPG was 100% on 30th day and onwards post treatment in group 6 in grazing animals, while the reduction in EPG was 100% on 60th days post treatment in group 5 in stall feeding animals. There was 100% efficacy of the MUMB (FBZ) administered in group 1 in stall feeding

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Table 1. Faecal eggs per gram (mean±SE) in helminth infected goats treated with the herbal formulation AAU/CI incorporated in urea molasses block and its efficacy

Days of observation	Group 1 (Stall feeding) MUMB (FBZ)	Group 2 (Stall feeding) UMB	Group 3 (Grazing) MUMB (FBZ)	Group 4 (Grazing) UMB	Group 5 (Stall feeding) MUMB (Herbal)	Group 6 (Grazing) MUMB (Herbal)	Group 7 (Grazing) InfectedUntreated control
			Pre treatment mean EPG				
0 day	150.00 ±22.36[a]	150.00 ±22.36[b]	200.00 ±42.81 [b]	183.33 ±30.73 [c]	166.66 ±16.66[d]	233.33 ±55.77 [c]	133.33 ±1.08 [c]
			Post treatment mean EPG				
15	0.000 ±.00 [a] (100)	133.33 ±21.0 [b] ((11.11)	133.33 ±21.08[b] (46.67)	183.33 ±30.73[c] (0.00)	116.66 ±16.66 [d] (30.00)	66.66 ±33.33 [c] (71.43)	133.33 ±21.08 [c] (0.00)
30	0.000 ±.00 [a] (100)	133.33 ±21.0 [b] (11.11)	100.00 ±0.00 [b] (60.00)	166.66 ±33.33[c] (9.09)	50.00 ±22.36 [d] (70.00)	0.000 ±.00 [a] (100)	133.33 ±21.08 [c] (0.00)
45	0.000 ±.00 [a] (100)	100.00 ±.00 [b] ((33.33)	0.000 ±0.00 [a] (100)	183.33 ±30.73[c] (0.00)	50.00 ±22.36 [d] (70.00)	0.000 ±.00 [a] (100)	133.33 ±21.08 [c] (0.00)
60	0.000 ±.00 [a] (100)	116.66 ±16.6 [b] ((22.23)	0.000 ±0.00 [a] (100)	183.33 ±30.73[c] (0.00)	0.000 ±.00 [a] (100)	0.000 ±.00 [a] (100)	133.33 ±21.08[c] (0.00)
85	0.000 ±.00 [a] (100)	116.66 ±16.6[b] ((22.23)	0.000 ±0.00 [a] (100)	183.33 ±30.73[c] (0.00)	0.000 ±.00 [a] (100)	0.000 ±.00 [a] (100)	133.33 ±21.08[c] (0.00)
100	0.000 ±.00 [a] (100)	116.66 ±16.6 [b] ((22.23)	0.000 ±0.00 [a] (100)	183.33 ±30.73 [c] (0.00)	0.000 ±.00 [e]a (100)	0.000 ±.00 [a] (100)	133.33 ±1.08 [c] (0.00)
Overall efficacy (%)	100±0.00	20.37±3.42	84.45±9.99	1.52±1.52	78.33±11.38	90.48±6.02	0.00±0.00

Mean having same superscript do not differ significantly (P<0.05) between column. Figure in parenthesis refer to percent reduction in EPG.

animal and 84.45±9.99% in group 3 grazing animal respectively. The overall efficacy of MUMB (AAU/CI) in stall feeding and grazing animal was 78.33±11.33 and 90.48±6.02, respectively. The overall efficacy of UMB administered in stall feeding and grazing animal showed 20.37±3.42 and 1.52±1.52% respectively. From the above observation it is evident that the faecal egg count of helminth infected goats were significantly reduced after the treatment with the herbal formulation. Again there was significant difference between the different groups at different ages as observed in Table 1. The herbal formulation MUMB (AAU/CI) fed orally as MFP to the grazing animal was found to be more effective in controlling the worm burden of goat.

In the recent years, the importance of herbal drugs in medicine has tremendously increased because of their fewer side effects. The results of this study are in complete agreement with findings of similar studies carried out by other workers in different countries of the world (Patter *et al.* 2012 and Zaman *et al.* 2012). Several experimental investigations, including *in vitro* and *in vivo* studies, using different part of these plants also indicated vermicidal activity which kills intestinal worms (Bhale *et al*. 2011). The anthelmintic efficacy of the herbal formulation might be due to the lactone function of andrographolide a phytochemical (Mishra *et al.* 2007) present in the leaves and stem of the plant. Increase in palatability because of the molasses and additive effect of mixed formulation of other ingredients resulted in significant anthelmintic action in the present investigation.

Zaman *et al.* (2012) suggested that the herbal plants may contain tannins, alkaloids and phenolics that maybe responsible for the anthelmintic activity and causes activation of the neuromuscular junctions leading to spastic paralysis, death and expulsion of worms from the body. Athanasiadou *et al.* (2001) suggested that anthelmintic activity of herbal plants on larvae may be attributed to condensed tannins which has the ability to blind the cuticle of larvae of nematodes, which is highly in glycoprotein, thus causing starvation of larvae and death.

From the study it can be concluded that the faecal egg count of helminth infected goats were significantly reduced following the treatment with the herbal formulation. Thus the herbal formulation had an anthelminthic activity and has the potential to develop as useful anthelminthic alternative,

but it demands more thorough study to find out the exact chemical responsible for anthelminthic activity of the plant so as to extract it separately to improve the potency.

SUMMARY

Crossbred goats (48) of almost similar age group and body weight, positive for gastrointestinal nematodosis were randomly divided into 8 groups of 6 each. The egg per gram of faeces was determined prior to the treatment (0 day) and at every 15 days interval up to 100 days post treatment. The herbal formulation consisted of sample AAU/CI incorporated into urea molasses block (UMB) and was fed @ 15g/animal/day. There was 100% efficacy of the MUMB (FBZ) administered in group 1 in stall feeding animal and 84.45±9.99% in group 3 MUMB (FBZ) grazing animal respectively. The overall efficacy of MUMB (AAU/CI) in stall feeding and grazing animals (group 5 and 6) were 78.33±11.33 and 90.48±6.02 respectively. The overall efficacy of UMB administered in stall feeding and grazing animal (group 2 and 4) was 20.37±3.42 and 1.52±1.52% respectively. There was significant ($P<0.05$) difference between the different groups at different ages. From the observations it is evident that the faecal egg count of helminth infected goats reduced significantly following the treatment with the herbal formulation.

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