ANTHELMINTIC EFFEICACY OF *AZADIRACHTA INDICA* (NEEM) AGAINST STRONGYLES IN GOATS

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ABSTRACT

The present study was carried out to evaluate the efficacy of crude neem (*Azadirachta indica)* leaf powder in goats naturally infected with strongyle infections. Based on faecal sample examination, 24 adult goats positive for strongyle infection with $\geq$ 1000 EPG (egg per gram) were selected and grouped as I, II, III and IV with 6 animals in each group. Group I was treated with Closantel @10mg/kg body weight and Groups II and III were treated with crude neem leaf powder @ 0.5 g and 1.0 g/kg. b.wt. respectively whereas group IV was kept as infected untreated control. Faecal samples from each animal were examined on day 0, 7, 15 and 30 post-treatment and EPG was determined. The result showed significant reduction ($p<0.05$) in EPG in Group I from day 7 and was maintained till day 30 and in Group III on day 15 post-treatment but there was no significant variation in term of EPG in control group. Thus, it can be concluded that crude neem leaf powder has anthelmintic property.

KEY WORDS: Strongyle, Neem leaf, goats, Anthelmintic efficacy

INTRODUCTION

Parasitic gastro-enteritis caused by strongylosis pose a serious health threat and a limitation to the productivity of goats due to the associated morbidity and mortality (Nwosu *et al.*, 2007). Anthelmintics are currently the cornerstones of the control of veterinary helminth infections and, would probably remain so for the foreseeable future. Anthelmintic resistance is a widespread phenomenon and a cause of growing concern in the livestock raising areas of the world (Waller and Prichard, 1985) and presence of chemical residues in animal products made it mandatory to look for some alternative solutions (Hoste *et al*., 2002). The use of bioactive forages like neem as a means to control strongyle infection in goat might offer a whole “new” range of anthelmintics in the form of the plant secondary metabolites (Hoste *et al*., 2008). Hence, interest in screening of medicinal plants for their anthelmintic activity remains of great scientific interest (Akhtar *et al.*, 2000). Keeping in view this fact the present study was designed to determine the efficacy of neem leaves powder against naturally occurring strongyle infections of goats.

MATERIALS AND METHODS

Preparation of neem leaf powder

Fresh mature neem leaves were collected from adult trees within the veterinary college campus, Jabalpur and were air dried at room temperature for 7 days, once dried, leaves were grinded to obtain a light green colour fine powder with a characteristic odour and stored in airtight containers until further use.

Selection and treatment of animals

A total of 24 adult goats of either sex positive for strongyle infection with $\geq$ 1000 EPG (egg per

gram) were selected from Goat Breeding Farm, Amanala, NDVSU, Jabalpur and were divided into four groups as I, II, III and IV with 6 animals in each group. Group I was treated with Closantel @ 10 mg/kg body weight and, Groups II and III were treated with crude neem leaf powder @ 0.5g and 1.0 g/kg. b.wt. respectively whereas group IV was kept as infected untreated control.

Faecal samples examination

Faecal samples were collected directly from the rectum of the goats individually in labelled polythene bags on day 0, 7, 15 and 30 post- treatment. Faecal egg count (FEC) was determined by the modified McMaster technique using saturated Sodium chloride salt solution as flotation medium (Sloss *et al.,* 1994) and the EPG was determined by the following formula:

$$\text{Efficacy (FECR\%)} = \frac{\text{Pre-treatment EPG} - \text{Post-treatment EPG}}{\text{Pre-treatment EPG}} \times 100$$

Data analysis

The experimental data was analyzed using heierchical model of one way ANOVA (Analysis of Variance) by the standard procedures described by Snedecor and Cochran (1994). The anthelmintic efficacy was calculated by the faecal egg count reduction (FECR) test (Coles *et al*. 1992).

RESULTS AND DISCUSSION

The mean EPG of different groups on day 0 (pre-treatment) and day 7, 15 and 30 post-treatment are presented in Table 1. The efficacy of drugs was calculated on the basis of mean FECR per cent. Efficacy of Closantel @10 mg/kg body weight and crude neem leaf powder at doses of 0.5 g and 1g/kg. body weight are presented in Table 2

Table 1: Pre and post-treatment EPG (Mean±SE)

Group	0 Day	7 Day	15 Day	30 Day
I	1250.00^{bx}±42.82	00.00^{ay}±0.00	33.33^{ay}±21.08	66.67^{ay}±33.33
II	1650.00^{b}±172.72	1483.33^{b}±151.47	1500.00^{b}±187.97	1783.33^{b}±358.16
III	1366.67^{by}±135.81	1066.67^{bxy}±0.67	900.00^{bx}±230.94	1550.00^{by}±91.89
IV	1500.00^{b}±143.76	1433.33^{b}±172.56	1700.00^{b}±44.72	1533.33^{b}±88.19

Values with different superscripts differ significantly (p<0.05)

· Superscripts a and b are used between group and x and y are used within group between intervals

Table 2: Efficacy of Closantel and Neem leaf powder using FECR (%)

Group	7 Day	15 Day	30 Day
I	100.00	97.33	94.67
II	10.10	9.09	-
III	21.90	34.15	-

In group I decrease in EPG was significant ($p<0.05$) on day 7 and maintained till day 30 post-treatment. This result was in accordance to results obtained by Garedaghi *et al.* (2011) who reported 91% efficacy and Swarnkar and Singh (2012) reported > 99% efficacy of closantel against *H. contortus* in sheep. Animals of Gr. II and III were treated with neem leaves powder (*A. Indica*) @ 0.5 and 1.0 g/kg. b.wt. respectively. Efficacy of neem leaves powder @ 1.0 g/kg. b.wt. were 21.9% on day 7 day and 34% on day 15 post-treatment. These result indicate a significant ($p<0.05$) decrease in EPG in Group III at day 15 post-treatment. These results are more or less similar to the previous studies done by Jamra *et al.* (2014) in cattle, Mehmood *et al*. (2013) and Radhakrishnan *et al*. (2007) in goat and Yadav (2013) in horse. Jamra *et al.* (2014) reported significant ($p<0.05$) reduction in EPG of strongyle in cattle when treated with crude neem leaf powder @ 0.5g/kg body weight. Yadav (2013) also reported 21% reduction in FEC of strongyle with crude neem leaf powder @ 0.535g/kg body weight in horse. Further, studies in Philippines and Malaysia by various workers have also reported the efûcacy of *A. indica* against nematodes of ruminants (Baldo, 2001; Chandrawathani *et al.*, 2002). Anthelminthic efûcacy of Closantel is well established and when it was compared with the crude neem leaf powder it has been shown that the leaves of *A. indica* have marked anthelminthic property though in crude form it is slow acting (Mahboob *et al*. 2008).

Azadirachtin, found in neem in 0.0244% concentration, has been reported to inhibit glutathione S-transferase and reduced glutathione and UDP-glucuronyl transferase activity (Radhakrishnan *et al*., 2007). Neem's effectiveness against parasites is due to compounds that mimic hormones. This activity interrupts the life cycle of parasites by inhibiting the ability of the parasites to feed, and preventing parasite eggs from hatching. Moreover, azadirachtin interferes with the central nervous system of parasite via inhibition of excitatory cholinergic transmission and partly blocks the calcium channel resulting in expulsion parasites from host body (Qiao *et al.* 2013; Veerakumari and Priya, 2006).

The leaves of *A. indica* have been used in folk veterinary medicine as an anthelmintic for ruminants (Jabbar *et al*., 2006). While Chagas and Vieira (2007) observed no anthelmintic effect of neem at a dosage of 30 g of dried leaves per goat/day given for 5 days. However, variation in the anthelmintic activity of *A. indica* may be attributed to these factors in different forms (Iqbal *et al*., 2007). Another possible factor for the discrepant results could be the different origin of the plant material.

It can be concluded that the anthelminthic activity of neem was associated with the alkaloids present in it; hence, there is need for further studies based upon determination of active principles, their lethal and effective dose, appropriate route of administration and susceptibility of specific species of parasites may prove helpful for establishing neem as herbal anthelmintic for use in rural India.

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REFERENCES :

Akhtar, M.S., Iqbal, Z., Khan, M.N. and Lateef, M. (2000). Small Rumin. Res, **38**: 99–107.

Baldo, R.C. (2001). Comparative efûcacy of pineapple (*Ananas comosus*) leaves bolus and albendazole against gastrointestinal nematodes of sheep. DVM. University of the Philippines, Department of Vet. Parasitol., p 38

Chandrawathani, P., Brelin, D., Nor, F.A.S., Adnan, M., Jamnah, O., Rehana, A.S., Hoglund, J. and Waller, P.J. (2002). Trop. Biomed., **19**:41–48

Chagas, A.C.S. and Vieira, L.S. (2007). Brazilian J. Vet. Res. Anim. Sci., **44**: 49–55.

Coles, G.C., Bauer, C., Borgsteede, F.H.M., Geerts, S. And Walker, P.J. (1992) Vet. Parasitol., **44**:35–44

Garedaghi, Y., Rezaii-Saber, A.P., Naghizadeh, A. and Nazeri, M. (2011Adv. Env. Biol., **5**: 73-775.

Hoste, H., Chartier, C. and Le Frileux, Y. (2008). Vet. Res., **33**: 531-545.

Hoste, H., Le Frileux, Y. and Pommaret, A. (2002). Vet. Parasitol., **106**: 345–355.

Iqbal, Z., Lateef, M., Jabbar, A. and Gilani. A.H. (2007). Vet. Parasitol., **168**: 342–345.

Jabbar, A., Raza, M.A., Iqbal, Z. and Khan, M.N. (2006). J. Ethnopharmacol., **108**: 152–154.

Jamra, N., Das, G., Singh, P. and Haque, M. (2014). J. Parasit. Dis., doi: 10.1007/s12639-014-0423-9

Mahboob, K., Khan, J.A. and Khan, M.S. (2008) J. Anim. Plant. Sci., **18**:117–119

Mehmood, K., Ijaz, M., Durrani, A.Z., Khan, M.A., Ahmad, J.S. and Saleem, M.H. (2013). Pak. J. Zool., **45**: 489-494.

Nwosu, C.O., Madu, P.P. and Richards, W.S. (2007 Vet. Parasitol., **144**: 118-124.

Qiao, J., Zou, X., Lai, D., Yan, Y., Wang, Q., Li, W., Deng, S., Xu, H. and Gu, H. (2013). Pest. Manag. Sci. doi:10.1002/ps.3644

Radhakrishnan, L., Gomathinayagam, S. and Balakrishnan, W. (2007). *Res. J. Parasitol.*, **2**: 57-62.

Sloss, M.W., Kemp, R.L. and Zajac, A.M. (1994). Veterinary Clinical Parasitology. 6th Edn., International Book Distributing Co., Lucknow, India.

Snedecor, G.W. and Cochran, W.G. (1994). Statistical Methods. 7th Edn., The Iowa State University Press., Ames, Iowa. USA.

Swarnakar, C.P. and Singh, D. (2012). Indian J. Anim. Sci., **82:** 451-456.

Veerakumari, L. and Priya, P. (2006). J Vet Parasitol, **20**:1–5.

Waller, P.J. and Prichard, R.K. (1985) Phenum, New York, pp 339–362.

Yadav, K. (2013). Efficacy of different doses of Neem (*Azadirachta indica*) against gastroinstestinal nematodes in horses. M.V.Sc. & A.H. thesis (Department of Veterinary Medicine), Nanaji Deshmukh Veterinary Science University, Jabalpur.

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