



Evaluation of Anthelmintic Efficacy of Ethanolic Extract of *Azadirachta indica* in Goats

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Received: 4.02.2019 | Revised: 27.02.2019 | Accepted: 6.03.2019

ABSTRACT

In India, Goat is considered as a 'poor mans cow' and the Population of goats is about 135.17 millions, which is 26.40 % of total livestock population in India out of these Maharashtra share 6.24% involving about 79.71 lakh as per 19th census of India. Helminthic infection of Gastrointestinal (GI) tract is one of the major causes of decreased productivity in goat worldwide, particularly under grazing conditions. GI parasitic infection in goat is characterized clinically by anemia, emaciation, enteritis, dehydration and death in kids. Further helminth infections are treated with chemotherapeutic agents like benzimidazole (albendazole, fenbendazole and oxfendazole), imidazothiazole (levamisole) and avermectins or milbemycins (ivermectin, doramectin and moxidectin). However the cost effectiveness and increased resistance to these drugs putting the huge burden on economics of goat production. Hence in present study the anthelmintic effectiveness of *Azadirachta indica* was investigated in goats. Ethanolic extract of *A. indica* was fed to the goats at the rate of 200mg/kg subsequently for five days and compared anthelmintic efficacy with fenbedazole. After 28th day of study ethanolic extract of plant and standard drug showed significant reduction in eggs per gram of the helminths compared to control group.

Key words: *A. indica*, Benzimidazole, Anthelmintic, Goats.

INTRODUCTION

India occupies second position in terms of goat population, fifth in meat production, with growth rate of meat production of 5.21% and situated at first position in milk production. Chevon (goat meat) is the most preferred and

widely consumed meat in the country contributing 14.25% to total meat production of India. Since ancient times goat milk has been traditionally known for its medicinal properties.

Cite this article: Gadhave, A.M., Karande, V.V., Ghumare, B.C., Kundu, K., Jadhav, S.N. and Mhase, P. P., Evaluation of Anthelmintic Efficacy of Ethanolic Extract of *Azadirachta indica* in Goats, *Int. J. Pure App. Biosci.* 7(2): 568-573 (2019). doi: <http://dx.doi.org/10.18782/2320-7051.7331>

It contributes 3% to total milk production of India. Goat husbandry provides glimpses of future hope for employment generation, nutritional security and prosperity to the millions of small and marginal farmers in the country. Small ruminant farming has a prominent role in the sustainability of rural communities around the world,^[1]. Goats are mainly reared by landless labours because of its economic significance, low input resources, small generation interval and higher proliferation. Goats have earned a special place in the lives of poor and landless farmer and therefore it is also known as "poor man's cow". Population of goats is about 135.17 millions, which is 26.40 % of total livestock population in India out of these Maharashtra share 6.24% involving about 79.71 lakh as per 19th census of India².

Helminthic infection of Gastrointestinal (GI) tract is one of the major causes of decreased productivity in goat worldwide, particularly under grazing conditions. GI parasitic infection in goat is characterized clinically by anaemia, emaciation, enteritis, dehydration and death in kids. Parasitic infection in goats also has an adverse effect on blood enzyme levels, which decreases goat production in different biological ways. Gastrointestinal nematode infections, especially *Trichostrongylus* and other *Strongyloides* species remain the major problem which cause decreasing qualities of small ruminant productions. The factors that negatively affect the livestock production, infections with parasites and in particular with GIN continue to represent a serious challenge to the health, welfare, productivity and reproduction of grazing ruminants throughout the world³.

Medicinal plants are often cheaper and easily available than the commercially produced drugs. In response to the need to discover new anthelmintic drugs of natural origin with possibly low toxicity to host animals and also to raise them free from chemical inputs, there are a growing interests in ethnomedical and ethnoveterinary practices across the world⁴. Indigenous medicinal plants used as

anthelmintics are *Ananas comosus* (Pineapple), *Annona reticulata* Linn. (Custard apple), *Cynodon dactylon* (Couch grass), *Momordica charantia* (Bitter gourd), *Amaranthus spinosus* (Katakthura), *Punica granatum* (Pomogranate), *Eugenia caryophyllus* (Cloves), *Azadirachta indica* (Neem), *Piper betle* (Betel leaf), *Corchorus oleriosus* (Jute) and *Nicotina tabacum* (Tobacco) etc. *Azadirachta indica* (*A. indica*) is a tree of the family Meliaceae, originally from India that can reach up to 30 meter tall and live up to 200 years. The various beneficial properties of *A. indica* have been recognized in the Indian traditional medicine. Each part of the neem tree has some medicinal property and has been recommended for use against gastrointestinal nematode includes the dewormer property⁵.

MATERIAL AND METHODS

The present investigation was carried out at Punyashlok Ahilyadevi Sheep & Goat Development Farm, Mahud, Tal- Sangola, Dist- Solapur to access in vivo evaluation of anthelmintic activity of *A. indica* in caprines by the egg per gram (EPG) count method before and after treatment.

Collection and Extraction of plant material:

A. indica plant was identified botanically and authenticated from the Department of Botany Shripatarao Kadam Mahavidyalaya, Shirwal. Seeds of *A. indica* were selected for the ethanolic extraction and extraction was done at Department of Pharmacology and Toxicology, Krantisinh Nana Patil College of Veterinary Science Shirwal Dist Satara.

Experimental animals:

Osmanabadi goats (n=30) of 8 to 12 months age were randomly selected and divided in three groups comprising 10 animals in each. The experimental protocol was approved by the Institutional Animal Ethics Committee (IAEC) as per the guidelines of Committee for the Purpose of Control and Supervision of Experiments on Animals (CPCSEA). The helminthic infection was confirmed before beginning of the study by fecal examination of each animal, as per the standard procedure

described by Soulsby⁶. The animals having more than 600 eggs per gram count were included in this experiment. All groups of experimental goats were housed in separate pens at Punyashlok Ahilyadevi Sheep and Goat Development Farm Mahud, Tal-Sangola, Dist- Solapur. The goats were allowed free grazing daily early in the

morning. Then fed with fresh grass and concentrate diet and ad-libitum potable drinking.

Experimental groups and treatments:

Total 30 goats were selected on the basis of EPG count and divided in three groups as A, B and C. The experimental groups and schedule of treatment are detailed in Table 1.

Table: 1 Details of groups and treatment schedules.

Sr. No.	Group	No of Animals	Treatment
1	A	10	Control –untreated
2	B	10	Fenbendazole @ 5 mg/kg b.wt dosed orally once at day '0'.
3	C	10	<i>Azadirachta indica</i> seed extract @ 200 mg/kg b.wt for first five days and on 16 th day

Sample collection and Processing:

The egg per gram (EPG) count of faeces of each fecal sample was determined by modified McMaster Technique⁷ and calculated as follows:

Egg per gram (EPG) = Number of egg in the chamber x 50

Anthelmintic efficacy was calculated by the faecal egg count reduction (FECR) test⁸ according to the following formula:

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

Statistical analysis

All the values in the test groups are presented as Means \pm SE and the data was analysed by using Completely Randomized Design (CRD) by using WASP software 'P' value $p \leq 0.01$ or $p \leq 0.05$.

RESULTS AND DISCUSSION

General observations: The body weights were taken on day '0' (before start of experiment) and day 28th i.e. termination day of the experiment. All the treatment groups found to be apparently healthy without any side effects or behavioural signs throughout the experimental duration

Phytochemical analysis: Phytochemical analysis of ethanolic extract of *A. indica* showed the presence of alkaloids, reducing sugars, tannins, sterols and flavonoids.

Anthelmintic efficacy: Anthelmintic efficacy of *A. indica* compared with control and standard group is depicted in Table 2. Pre-treatment EPG counts (Mean \pm SE) of fecal samples from the groups A, B, C, were recorded as 665 \pm 177.81, 790 \pm 210.79, 685 \pm 174.96 respectively. Pre-treatment EPG count (Mean \pm SE) among the groups did not vary significantly at $p \leq 0.05$. Control group A did not show any significant variation in EPG count on 15th and 21st day of the study.

Pre-treatment EPG count (Mean \pm SE) in group B (standard drug) was 790 \pm 210.79. EPG counts on days 15 and 28 post treatment were 125 \pm 39.612 and 100 \pm 34.155 respectively. Statistically significant decrease ($p \leq 0.01$) in fecal egg counts were recorded on day 15 and day 28 post treatment when compared with pre-treatment EPG count. Post

treatment FEC reduction was 84.2% on day 15 and 87.4% on day 28.

The present findings are further supported by the previous studies of Singh⁹ who reported that fenbendazole @ 10 mg/kg b.wt orally achieved 99.52% reduction in fecal egg count of infected goats on 13th day post-treatment. The animals treated with fenbendazole revealed 83% efficacy by fecal egg count reduction test in goats⁸. Goats treated with fenbendazole at a dosage rate of 5 mg/kg body weight orally achieved 71.08% reduction in FEC on 14th day post treatment^{10,11} reported that fenbendazole exhibited 85 and 100 % efficacy on day 7th and 14th of post treatment.

Pre-treatment EPG count (Mean±SE) in group C was 685±174.96. EPG counts of faeces on days 15 and 28 post treatment were 210±76.666 and 180± 64.637, respectively. Significant reduction in fecal egg counts were recorded on day 15 and day 28 post treatment when compared with pre-treatment count ($p \leq 0.01$). This fecal egg count reduction was 69.4% on day 15 and 73.7% on day 28.

The present findings are further supported by the previous studies of Ahmed *et al.*¹² who reported 35% and 40 % efficacy of *A. indica* seed at 75 mg/kg b.wt and 100 mg/kg b.wt respectively against gastrointestinal nematodes in sheep. Similarly Jamara *et al.* reported that crude neem leaf powder exhibited 78, 98 and 100 % efficacy on day 7, day 14 and day 28 respectively in cattle¹¹. The anthelmintic efficacy of *A. indica* crude powder was 27% in sheep although lower than the reference drug reported earlier by (Dongar *et al.*¹³. Nawaz *et al.* reported that aqueous extract of neem leaves achieved 89% reduction in EPG count of GI parasitic infected sheep¹⁴. Chandrawathani *et al.* reported that neem products especially neem juice, neem decoction and neem capsule were 40-60% effective for worm control¹⁵. Dongre *et al.* also evaluated the efficacy of crude neem leaf powder and showed significant reduction ($p < 0.05$) in EPG count of goats treated with neem leaves powder @ 1.0 g/kg b.wt were 21.9% on day 7 day and 34% on day 15 post-treatment¹⁶.

Table 2: EPG count of different groups on Pre-treatment Day (-7th) and post treatment 15th and 28th day

Group	Treatment	Mean EPG count ± (Mean SE)				
		Pre-treatment Day (-7 th)	Day 15 th		Day 28 th	
		EPG count	EPG count	FECR %	EPG count	FECR %
A	Control	665± 177.81 ^{ap}	745±186.26 ^{ap}	-	850± 184.4 ^{ap}	-
B	Fenbendazole	790± 210.79 ^{ap}	125± 39.61 ^{bq}	84.2	100± 34.15 ^{bq}	87.4
C	Ethanollic extract of <i>Azadirachta indica</i>	685± 174.96 ^{ap}	210± 76.66 ^{bq}	69.4	180± 64.63 ^{bq}	73.7

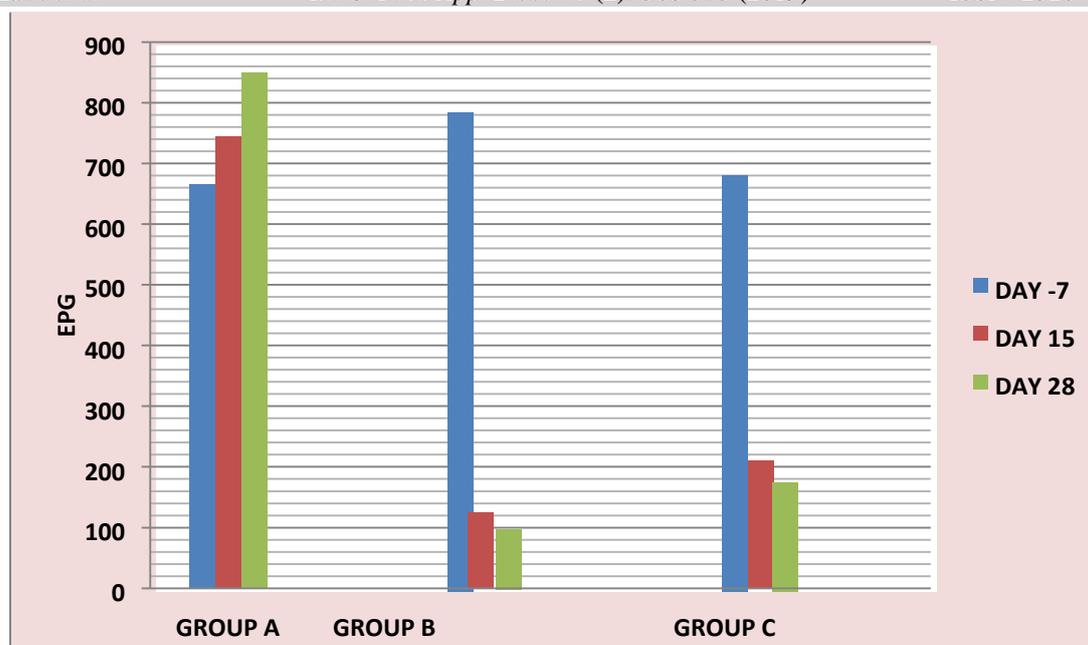


Fig. 1: Groupwise EPG count on Day 7, 15 and 28th of study

CONCLUSION

A. indica (neem) is proved to be a good anthelmintic activity and further studies should be conducted in order to make a feasible pharmaceutical formulation.

Acknowledgement

Authors are thankful to the Manager of Punyshlok Ahilyadevi Sheep and Goat Development corporation Mahud, Dist Solapur and Associate Dean, KNPCVS, Shirwal for availing the research facilities.

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