IN VITRO ACARICIDAL ACTIVITY OF ETHANOLIC PLANT EXTRACTS AGAINST BROWN DOG TICK

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Recieved: 13-01-2019 Accepted 21-01-2019

ABSTRACT

The current practice of treatment and control of tick vectors mainly depends on the use of synthetic acaricides which has far reaching effects including toxicity and drug resistance. Natural substances of plant origin constitute an important segment of alternative control strategies. Hence, this study was designed to investigate the acaricidal activity of ethanolic extracts of certain plants against *Rhipicephalus sanguineus*. The extracts of *Cassia alata, Lantana camara* and *Calotropis gigantea* exhibited good acaricidal activity at different dilutions. The study throws light into the possibility of developing alternate tick control measures based on ethnobotanicals.

Key words: Ethanolic extracts, Acaricidal activity, *R.sanguineus*

INTRODUCTION

Kerala has ecologically optimum conditions for the propagation of ectoparasites in domestic animals. The gravity of tick infestation in a tropical country like India cannot be neglected (Ghosh *et al.,* 2007). The brown dog tick *R. sanguineus* transmits several rickettsial, protozoan and viral pathogens, besides being associated with tick paralysis in dogs. Synthetic acaricides remain the mainstay of treatment and control which needs to be reviewed owing to their toxicity as well as drug resistance. Considering the economics of ectoparasite infestation, toxicity of synthetic pesticides, emerging resistance problems and growing concern for environment, attention to safe eco-friendly, cheap and yet alternative methods of control is gaining much importance. In this background, a study was designed to evaluate the *in vitro* acaricidal activity of ethanolic extracts of

Cassia alata(Aanathakara), Lantana camara (Aripoochedi), Calotropis gigantea (Erukku) and *Ocimum sanctum (Thulasi)* against *R. sanguineus*.

MATERIALS AND METHODS

The leaves of *Cassia alata (CA), Lantana camara (LC), Calotropis gigantea(CG) and Ocimum sanctum(OS)* were shade dried and finely powdered. Ethanolic extracts were prepared from approximately 200g of the grated material using the cold extraction technique described by Azhahianambi *et al*. (2004). Different concentrations of the extracts *viz*., 5 % and 10 % were prepared using one per cent Tween 80(v/v). The same solvent served as control for comparison of the extract activity. Adult ticks were collected from dogs, morphologically identified and were maintained in humidity chamber (ROTEK) at ambient conditions with temperature of 28^0 C and relative humidity of 80%. They were exposed to the different extracts using tea bag method and later maintained in humidity cabinet. The mortality was assessed by counting the number of live ticks after definite time interval of 2 hours. The percent mortality was recorded for each concentration of the extracts and compared with that of control. Three replicates were tested for each treatment. The results were statistically analysed using Chisquare test for multiple proportion (Snedecor and Cochran,1989) .

RESULTS AND DISCUSSION

There was statistically significant difference ($p<0.05$) between the control and treatment groups in all time-concentration combinations. At 24h incubation CG (5 %) was shown to possess significantly higher acaricidal activity when compared to others. However, after 48h incubation CG, CA and LC at 5 % level were shown to possess significantly high acaricidal activity. The ticks exposed to OS revealed lowest mortality. Even after 72 hour incubation, 5% solution of OS was found to possess significantly low acaricidal activity than others. At 10 % dilution all the preparations except OS had revealed good acaricidal activity at 24, 48 and 72 hour incubation (Table 1).

Table 1: Percent mortality after exposure to different plant extracts

	5%			10%		
Group	24h	48h	72h	24h	48h	72h
Control	0	0	0	0	0	0
CG	100	100	100	100	100	100

CA	0	100	100	100	100	100
LC	0	90	90	80	100	100
OS	0	20	40	0	40	60

Studies of Marimuthu *et al*. (2013) had demonstrated the acaricidal activity of titanium dioxide nanoparticles (TiO2 NPs) synthesized from flower aqueous extract of *Calotropis gigantea* against the larvae of *R. (Boophilus) microplus* and the adult of *Haemaphysalis bispinosa*. The present study also revealed that crude extracts of CG had significantly higher acaricidal activity than other plant extracts at lower doses and at shortest incubation period. Ravindran *et al.* (2012) had reported the adulticidal and antifecundity effect of ethanolic extracts of *Cassia alata* against *R.microplus*. Kumar *et al*. (2011) evaluated *in vitro* and *in vivo* acaricidal activity of some indigenous plants under organized and farmer flock and the results indicated that all these extracts had similar *in vivo* adulticidal activity on tick population. It is also noteworthy that the mortality percentage was higher as the concentration of extract increased and the time interval progressed. The advantages of botanical acaricides are their low toxicity to mammals, rapid degradation in the environment and a low development of resistance against them in insects and ticks.

Future investigations are warranted to explore the *invivo* acaricidal activity of these plant extracts under field conditions.

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