Evaluation of clinical efficacy of Herbal product-*Kannel spray* on dogs as Ectoparasiticidal agents

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Abstract:

The efficacy of herbal ectoparasiticide Kannel spray was evaluated in-vivo and in-vitro against ectoparasites of 40 dogs. The formulated concentration was effective in controlling ectoparasites at 12-16 kennel spray, at twice a week application, and was also effective in killing fleas, ticks and mites at 15min, 72hr, and 8hr of exposure respectively(*in vitro*).

Key words: Kannel spray, ectoparasites, Dogs.

Introduction:

Ectoparasites (ticks, fleas, Lice) and mites are most frequent cause of dermatological problems in dogs (McDonald, 1983).They are also involved in transmission of many diseases from infected one to susceptible ones. At present chemical insecticides have been widely used against ectoparasites, but their toxicity to animals, man & environment, as well as diminishing efficacy due to development of resistance (Nolan, 1987) have led to continuing search for safe, effective and eco-friendly alternative approaches. The ethno-veterinary and medical knowledge offers a range of herbs to be evaluated for their insecticidal and parasiticidal properties. The ingredients of these plants and herbs posses insecticidal, growth inhibiting, antimolting, and repellent activities (Habeeb, 2010). Hence efficacy of Herbal ectoparasiticide Product ***Kannel spray*** was assessed in-vivo & in-vitro against commonly occurring ectoparasites of dogs and results were recorded.

Materials and Method:

A total of 40 dogs infested with ectoparasites (fleas, ticks,) and mites presented to Veterinary college Hospital, Hebbal, Bengaluru with following clinical manifestations viz, alopecia, and pruritus were selected for the study. ***Kannel spray*** (consisting of Cedarwood (*Cedres deodare*) oil-6%, Citronella (*Cymbogon nordus*) oil-6%, Lemongrass (*Cymbogon citratus*) oil-10%, and Neem (*Azadirachta indica*) oil-4%) was used for spraying the surrounding environment/kennels of dogs, and owners were advised not to allow their pet to have access to this area for duration of one hour after spray.

The criteria for the evaluation of efficacy of the product consists of visual examination for apparent reduction in number of ectoparasites in kennels/environment as per owner subjective observational report, and reduction in the clinical manifestation of alopecia, itching, scratching and general improvement in health of animals, with

gradual subduing of nasty odour in their environment. All observations were recorded through phone call to owners and personalized visit.

Effect of *Kannel spray* against adult ticks was studied in-vitro, and percent paralysis and mortality observations are recorded at 0hr, 24hr, 48hr, 72hr, and 96hr, after exposure. Dog fleas collected from infested dogs were exposed by transferring them to vials which were freshly coated with Kannel spray, and percent paralysis and mortality were recorded at 0min, 5min, 10min, 15min and 20min following exposure.

In dogs infested with Mange/ mites, their skin scrapings were collected, and these were exposed to *Kannel spray*, later mites paralysis and mortality were recorded after 0hr, 2hr, 4hr, 6hr and 8hr of exposure under microscope.

Control group with plain water exposure were kept for each batch/group of ectoparasites during study period.

Results and Discussion:

In the present study total of 40 dogs were included. Out of 40, 11 were Labrador Retriever, seven were N/D, seven were GSD, six were Pomeranian, three were Pug breeds, and two were Cocker-spaniel.

Out of 40 dogs 17 were female and 23 were male dogs. Female dogs were applied with 8 to 16 number of kennel application, while male dogs with 10 to 18 number of kennel application.

Age group of Labrador was in range of 42 days to 11yr, and age group of N/D was in range of 2 to 8 yr, Cocker-spaniel were in 2 to 4 yr age group, and German shepherd age group was in range of 10 month to 15 yr. Pomeranian dogs were in 2 to 12 yr age group.

In Labrador breed all dogs were infested with fleas, ticks and mites. German shepherd were infested with fleas, ticks and mites, while N/D were infested with fleas and ticks. Pomeranian dogs were infested with ticks, mites and fleas. And Pug were infested with fleas and ticks.

In Labrador number of application to kennel were ranging from 10 to 18, while in German shepherd number of kennel application were in range of 8 to 16. In N/D breeds number of kennel application were 10 to 14, and in Pomeranian number of application were in range of 8 to 14. In Cocker-spaniel breed kennel application were 14 to 16, and in Pug number of kennel application were in range of 14 to 18. On an average, every breed of dog which were included in study received a range of 10-19 spray application.

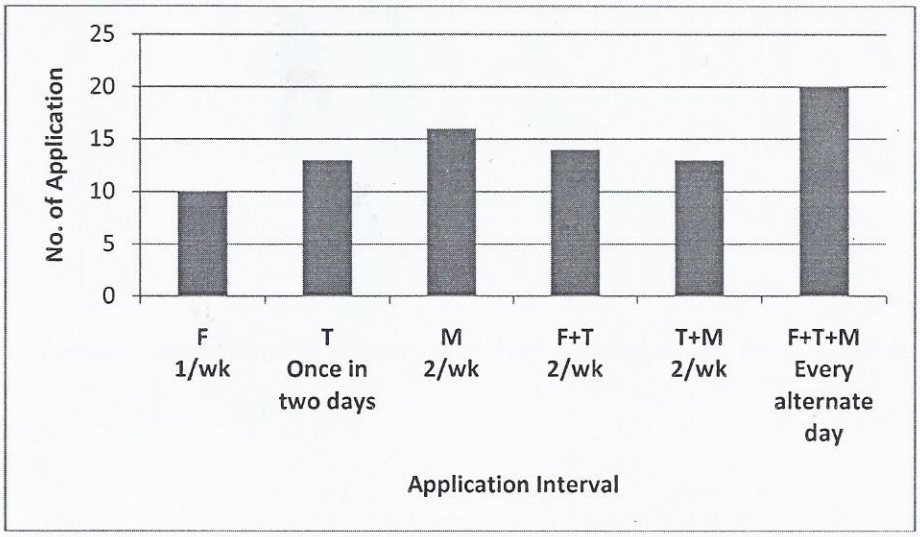
Plant based ectoparasiticides are not contact poisons but act through multiple modes of action, unlike synthetic ectoparasiticides that repel ectoparasites by the " hot foot effect" even after a very short contact,for only a few seconds, a "knock-down effect" occur and insects(ticks/fleas) die soon after the open nerve ends at their feet got into contact with chemical, (Elias, 2013).

Extracts of *Azadirachta indica* are not outright killers of insects. In fact, azadirachtin disrupts the metamorphosis of larvae and thus, insects die without

producing a new generation (Schmutterer, 1990). Azadirachtin is a powerful insect repellent/deterrent and inhibits oviposition (Rice, 1989) . Since effective flea control requires suppression of egg and larval production as well as the elimination of adults, azadirachtin may effectively control fleas (Blakemore, 1967)

Table 1: Profile for usage of Herbal (*Kannel*) spray on ectoparasites.

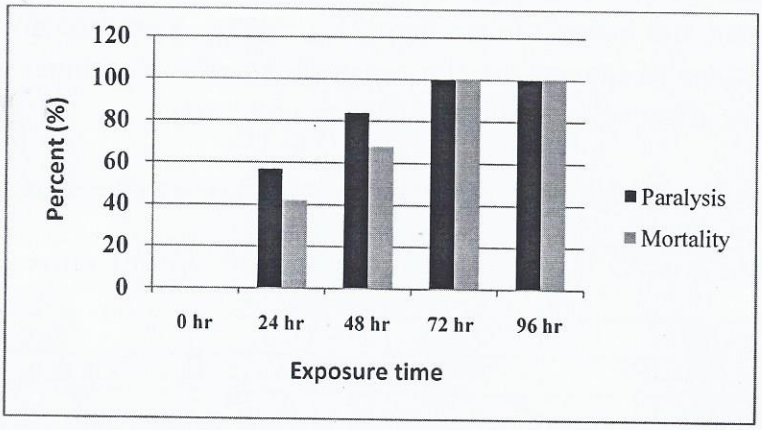
Degree of infestation	Effective number Of application	Effective application interval
Fleas(F)	10	Once a week
Ticks(T)	13	Once in two- days
Mites(M)	16	Twice a week
Fleas + Ticks(F+T)	14	Twice a week
Ticks + Mites(T+M)	13	Twice a week
Fleas + Ticks + Mites(F+T+M)	20	Every alternate Day



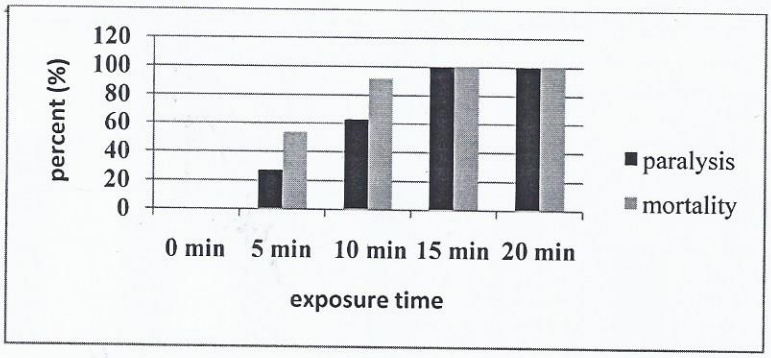
Graph: Profile for usage of Herbal (*Kannel)* spray on ectoparasites.

Table 2: In vitro effect of Kannel spray on Ectoparasites of dog.

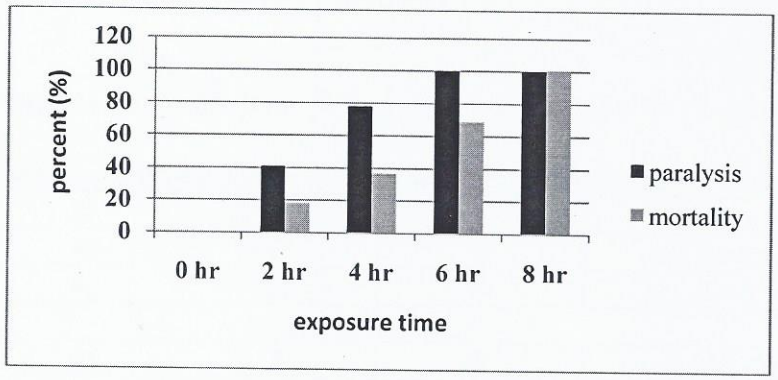
Ticks	**Time (hr)**	**0**	**24**	**48**	**72**	**96**
	Paralysis (%)	0	57	84	100	100
	Mortality (%)	0	42	68	100	100
Fleas	**Time (min)**	**0**	**5**	**10**	**15**	**20**
	Paralysis (%)	0	27	63	100	100
	Mortality (%)	0	54	92	100	100
Mites	**Time (hr)**	**0**	**2**	**4**	**6**	**8**
	Paralysis (%)	0	41	78	100	100
	Mortality (%)	0	18	37	69	100



Graph 1 (a): In vitro **tick** paralysis & mortality at different Time interval.



Graph 2(a): In vitro **fleas** paralysis & mortality at different Time interval.



Graph 3(a): In vitro **mites** paralysis & mortality at different Time interval.

Deterrency and Toxicity are the two main modes of action by which plant compounds may act. Deterrents affect the peripheral nervous system and ultimately prevent arthropod from further feeding. Whereas Toxicants disrupt cellular, biochemical, and physiological process once digested by an insect. (Danielson,2006).

Williams (1993) used extracts of *Azadirachta indica* (Neem) and found that these plants have a severe effect on the reproductive physiology and mortality of female ticks.

Many owners were opined that *Kannel spray* was effective in control of ticks and fleas at 13 to 16 applications at twice a week spraying intervals for spraying kennels. with maintenance spray every month. And also reported that re-infestation of ectoparasites was observed after a month of cessation of *Kannel spray*. The longer sustaining effect reduces the frequency of application, which is desirable and is also a fact in delaying the process of resistance (Bullman *et al.*, 1981). Early re-infestation of ectoparasites is attributable to shorter residual effects of plant/herb extracts.(Muraleedhara, 2000).

Kennel spray has resulted in 84% paralysis, 68% mortality at 48hr of in-vitro exposure, and 100% paralysis, 100% mortality of ticks after 72hr of exposure.

At earlier studies Vihan *et al.*, (2007) reported acaricidal property of *Azadirachta indica* extract against ticks *in vitro* as well as *in vivo* experiment. Further, Pathak *et al.,* (2004) studied acaricidal effect of plant extracts of neem (*Azardiachta indica*) leaves and bark, nochi (*Vitex nugundo*) leaves, vashambu (*Acorus calamus*) rhizome and Pungu (*Pongamia pinnata*) leaves against ticks of small ruminants. Bisen *et al.,* (2009) conducted *in vitro* efficacy trial against *Boophilus microplus* using neem seed oil, karanj seed oil and found that neem seed oil exhibit highest efficacy (70%). Meshram *et al.,* (2009), Khudrathulla and Jagannath (2002), Kumar *et al.,* (2000). evaluated various extract *in vitro* against ectoparasites. Vatsya *et al.*, (2004). reported *in vitro* tickicidal action of few herbal plants against *Boophilus microplus* ticks. These results were in concurrence with our results that formulated concentration of *Kannel spray* (4% neem oil) having Acaricidal property against ticks both *in vivo* and *in vitro* studies.

63% of fleas were paralyzed with 92% death at 10 min of exposure, and 100% paralyzed and died at 15 min after exposure to *Kannel spray* in-vitro. The results were in concurrence with findings of Guerrini, *et al.*, (1998) that citronella, and neem oil reduced fleas 95–62% for 20 days. The combination killed most fleas within 24 h, providing effective flea control for 7 days. On petri dishes, the combination achieved 100% mortality at 17min(*in vitro*). The results suggest that citronella potentiated the effect of azadirachtin(neem oil) on fleas.

At 4 hr of exposure of mites to *Kannel spray* in-vitro, 78% of mites were paralyzed and 37% died. After 6 hr of exposure 100% paralysis and 69% mortality was observed, with 8 hr of exposure 100% paralysis, mortality was noticed. Neem oil has been reported as effective against Demodectic mange in dogs(Singh, 1980) in

combination with others, similarly a combination aerosol spray having extracts of *Cedrus deodare*, *Azardirechta indica*, and *Embelia ribes* was reported as effective against Demodectic mange in dogs (Das, 1993) which supports our findings that *Kannel spray* (6% cedarwood oil and 4%-neem oil) was effective in controlling mange/mite infestation in treated dogs.

Maske (1996) reported that amongst various dilutions of combination, a herbal ectoparasiticide having *Cedrus deodare*, *Azadirachta indica*,and *Embelia ribes*,(1:5,1:10,1:20.) 1:10 dilution was found to be 100, 80, and 70% effective against larvae, nymphes and adult ticks respectively, treated animals were found to be free from tick infestation upto 7 days after treatment. Fernanda, *et al*., (2013) found that the treatments with citronella in concentration equal or superior to 5% showed better results and the concentration of 10% showed maximum efficiency, in *in vitro* tests, presenting a tickicide action. Our results were in correlation with these findings that formulated concentration of *Kannel spray* having *Cedrus deodare*-6% and *Azadirachta indica*-4% and Citronella oil-6% was 68% effective against adult ticks *in vitro* study.

Over all mortality of ectoparasites was significantly influenced by species, age of plant/herb used for extraction, and the period of exposure (Khudarathulla *et al*., 2000).

Conclusion:

In present study 40 dogs of different age, sex and breed were selected. Upon usage of formulated concentration of herbal ectoparasiticide Kannel spray, it was found to be effective in control of ticks, fleas, and mites at an average of 13 to 16 kennel spray, with twice-a-week application interval. The results were supported by in-vitro study of Kannel spray, that formulated concentration of product was effective in killing Fleas, ticks and mites at 15min, 72hr and 8hr of exposure respectively.

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