Volume : 4 | Issue : 10 | Special Issue Oct- 2015 • ISSN No 2277 - 8179

PHYTOCHEMICAL INVESTIGATION AND IN VITRO LICICIDAL ACTIVITY OF SOME INDIGENOUS PLANTS EXTRACT UNDER ORGANIZED AND FARMER FLOCKS OF GOAT



Chemistry

KEYWORDS: Licicidal activity, Thevetica peruviana, Ricinus communis, Mentha piperita

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ABSTRACT

Present investigation is carried out for finding the efficacy of three herbal plants viz. Thevetica peruviana, Ricinus communis, Mentha piperita as licicidal with their phytochemical investigation. The chemical analysis of methanolic crude extract of Thevetia peruviana (leaves) was found positive for alkaloids, flavinoids, glycosides, fixed oils and fats, tannins and phenolic compound, while negative for carbohydrates, proteins and amino acids. The crude extract of Ricinis communis (leaves) was positive for saponin, flavinoids, glycosides, fixed oils and fats, while negative for alkaloids, tannins and phenolic compounds. The chemical analysis of Mentha piperita (leaves) revealed positive for alkaloids, saponins, flavinoids, carbohydrates, fixed oils and fats, tannins and glycosides.

In the sense of licicidal activity, the results of these plants revealed that LC_{50} values were lowest (4.63) in case of Pudina (Mentha piperita) extract as compare to Arand (Ricinus communis) and Yellow Kaner (Thevetia peruviana). It indicates that Pudina (Mentha piperita) crude extract showed highest efficacy against lice in vitro among all the plants.

INTRODUCTION

The present generation is going with herbal preparation. It is due to the herbal preparation is eco-friendly and having no toxicity. Hence emerging trained is the herbal trained. Therefore we can say that the present generation is the herbal generation. A lot of herbal preparations (products) are available in markets. Every plants having a medicinal value which is due to the presence of active constituents like alkaloid, glycosides, saponins, terpins, fatty acids, oils etc. It is the present trend of green chemistry. The plants are used as remedy purpose from ancient times due to the vast availability. The various literatures are available concerning with this area.

On the other hand, Lice are permanent ectoparasites that constitute a very large group of more than three hundred species. The temperature and relative humidity prevailing in India, coupled with a short life cycle enable lice to proliferate quickly, thus leading to high degree of infestation within a short span of time. Louse infestation in all livestock species cause irritation of the skin, scratching, rubbing and licking of affected regions with resultant reduction in milk production and damage to the hide and fleece [1]. There is however little evidence of the effect on weight gains and haematological values except in heavy infestation with *Haematopinus eurysternus* [2, 3]. Sprays containing chlorinated hydrocarbon and organophosphorus insecticides have produced reasonable therapeutic success [4]. However, the toxic effect of organophosphorus compounds on man is a remarkable disadvantage in the use of these compounds [5]. Comparable in efficacy with the organophosphorus are the synthetic pyrethroids [6]; sometimes marketed as pour-ons [7] with the added advantage of ease of administration and low restraint facilities needed on animals. However, while pour-ons are easy to apply, none will kill all lice and are expensive compared to sprays. Injectable formulations produced a higher efficacy than most, as a single subcutaneous injection of 0.2mg/kg ivermectin will remove sucking lice although they are not completely effective on biting lice [8].

Hence considering all these facts present investigation has been carried out. For conducting this experiment *three local plants Mentha piperita* (Pudina), *Ricinus communis* (Arand) and *Thevetia peruviana* (Yellow Kaner) were selected to know the phytochemical as well as licicidal activity under *in vitro* condition under organized and farmer flock of goats.

MATERIALS AND METHODS

Collection and Identification of parasites

Lice population consists of specimens in "active" and "inactive" phase. The specimens which were questing for the host or were attached for feeding on the host were considered in "active" phase. The animals were examined monthly for the presence of lice at various predilection sites of Jamunapari, Barbari breed of organized flock and Non-descript goats maintained and village flocks. These collected lice were put in vials and labeled with all the details of animals. The morphological studies were done as per the standard protocol.

During the present survey, a large collection of lice were made from various predilection sites of Jamunapari, Barbari and Non-descript goats maintained in organized and village flocks. Specific identification of species of lice was done by standard protocol.

Ethano-medecinal plants

Three local plants *Mentha piperita* (Pudina), *Ricinus communis* (Arand) and *Thevetia peruviana* (Yellow Kaner) were selected. These plants were identified and verified with taxonomical studies as reported by Kirtiker [9].

Preparation of crude extract and Chemical investigation

The extract was prepared by soxhlet assembly as per the standard method. The plant material was collected from the semi-arid zone of U.P. It was authenticated by comparing its macro and micro character. The physical characters of the extract were noted and the percentage yield was calculated on such basis. The extracts were preserved in an airtight container to avoid loss of volatile principles for further studies.

The extracts were tested for the presence of some active chemical compounds such as alkaloids, flavonoids, glycosides, fixed oils & fats, proteins, tannins and phenolic compounds, carbohydrate, saponins. The analysis was conducted as per standard methods.

In vitro studies

In vitro effect of adulticidal activity of crude extracts of *Mentha piperita* (Pudina), *Ricinus communis* (Arand) and *Thevetia peruviana* (Yellow Kaner) was evaluated on lice (*Linognathus africanus)* collected from natural infested goats. Lice were randomly divided into four groups containing 20 in each group. The pour-on method was used for *in vitro* studies. The test extracts was dissolved in distilled water and four concentrations were prepared arithmetically viz. 12.5, 25, 50, 100 mg/ml serial dilution. The control group was maintained with each set of experiment where the parasite was treated in a solution which contains distilled water. These petri dishes were kept at 25±2^{0}C and 80±5% relative humidity in the desiccators and transferred into incubator. The mortality of lice in all groups was recorded after 30 min, 1 hr, 2 hr. 4 hr, 6 hr respectively. Probit analysis was done on mortality data to calculate the LC_{50} value [10].

RESULTS

In present study hot methanolic crude extract of *Thevetia peruviana* (leaves), *Ricinis communis* (leaves) and *Mentha piperita* (leaves) were extracted in soxhlet apparatus. In case of *Thevetia peruviana*, methanolic crude extract was positive for glycosides, saponins, flavinoids, fixed oils and fats, tannins and phenoilc compounds, whereas *Ricinis communis* was found to contain saponins, flavinoids, glycosides, fixed oils and fats and *Mentha piperita* was positive for alkaloids, saponins, flavinoids, carbohydrates, fixed oils and fats, tannins and phenolic compound. Saponins, flavinoids, fixed oils and fats were found in all three plants (Table 1-3).

Results of *in vitro* effect of crude extracts have been depicted in (Table 4). Significant difference in lice mortality was observed between 25 and 12.5 concentration and control, but difference in mortality was not significant at 100 and 50% concentrations. The results of these plants revealed that LC_{50} values were lowest (4.63) in case of Pudina (*Mentha piperita)* extract as compare to Arand (*Ricinus communis) and* Yellow Kaner (*Thevetia peruviana*). It indicates that Pudina (*Mentha piperita)* crude extract showed highest adulticidal activity against lice *in vitro* among all the plants.

DISCUSSION

Among all three plants *Ricinis communis* yielded high (22.77), while *Thevetia peruviana* was lowest (14.46%) as similar earlier report [9, 11]. Difference of percentage yield of extract products among different extraction might be due to different solvents used and the solubility of various ingredients, methods and types of extraction used [12].

Chemical extraction (qualitative) of different extracts of all three plants were conducted by using chemical tests to known the active principle present in crude extract of various plants. The presence of alkaloids, glycosides and phenol are important chemicals to initiate the mechanism of action *in vitro* activity causing mortality against lice.

Control of lice with chemical licicidal has become difficult due to resistance development [13]. The chemicals also cause environmental pollution due to prolonged time for biodegradability and health hazards owing to residues in milk and meat [14].

The results revealed that the mortality in lice was highest in crude extract of *Menthe piperita* at 50% concentration than the other two plants Arand (*Ricinus communis)* and Kaner (*Thevetia peruviana*). It was also observed that there was significant increase in the mortality of lice with time. At earlier studies reported highest acaricidal property of *Annona squmosa* extract against ectoparasite *in vitro* as well as *in vivo* [15]. Further, other worker evaluated *in vitro* effect of *Nicotiana tabacum* aqueous extract on *Rhipicephalus* and *haemaphysaloides* [16]. Similar studied with plant extracts of *neem* leaves and bark (*Azadirachta indica*), *nochi (Vitex negundo*) leaves, *vashambu (Acorus calamus)* rhizome and *pungu* (*Pongamia pinnata*) leaves against *ixodid* [17]. Lousicidal properties of *Xanthoxylum alatum* and *Mentha oil* have been also tested [18- 20]. Moreover, various plants extract tested as *in vitro* against ectoparasites (ticks, lice) [21-24]. The active principle particularly glycosides and alkaloids present in the extracts of these plants were responsible for causing mortality in adult lice [25-27]. Considering the results obtained in this study, it can be concluded that these plant extracts might be useful in controlling the ectoparasites (lice) infestation in goats.

CONCLUSION

In vitro effect of crude extract of all the three plants were carried out in natural infestation of village flocks of goats. Arand crude extract was found more efficacious *in vivo* on lice as compared to other two plants. The next most effective crude extract was yellow Kaner and the least activity was found in Arand extract against adult lice. *In vitro* effect of crude extract of all the three plants was effective against lice at 4 hrs and was effective in killing the lice and showed knock-down effect.

Table 1. Physical characteristics of different crude extract of plants

Plant extracts	Consistency	Colour	Odour
Thevetia peruviana (Leaves)	Sticky solid	Dark greenish	Agreeable
Ricinis communis (Leaves)	Semi solid	Dark greenish	Agreeable
Mentha piperita (Leaves)	Sticky semi solid	Dark greenish	Characteristi cs organic

Table 2. Percent yield of different plants extract

Plants	Weight of dry powder (gm)	Weight of dry extract (gm)	Yield (%)
Thevetica peruviana (Leaves)	242.20	24.80	10.23
Ricinis communis (Leaves)	217.60	49.60	22.79
Mentha piperata (Leaves)	300.00	43.40	14.46

Table 3. Qualitative determination of active ingredients in crude extract of different Plants

Plant extracts	Plant constituents							
	Alkaloids	Saponins	Flavonoids	Glycosides	Carbohydrate	Fixed oils and fats	Tannins and phenolic compound	Proteins and amino acids
Thevetica peruviana (Leaves)	+	+	+	+	-	+	+	-
Ricinis communis (Leaves)	-	+	+	+	-	+	-	-
Mentha piperata (Leaves)	+	+	+	-	+	+	+	-

Table 4. In vitro licidical activity of crude extracts on lice collected from natural infested village flock of non-descript breed goats

Botanical name of Plants	Hindi name	Part used	LC 50	Mortality % (2 hrs)				
				Control	Concentration of extracts (mg/ml)			
					12.5	25	50	100
Mentha Piperita	Pudina	Leaves	4.63	0	80	90	100	100
Ricinis communis	Arand	Leaves	5.36	0	75	85	95	100
Thevetia peruviana	Yellow Kaner	Leaves	8.65	0	65	80	95	100

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