



# AMERICAN JOURNAL OF PHARMTECH RESEARCH

Journal home page: <http://www.ajptr.com/>

## In-vitro Screening of Anti-Lice Activity of *Nardostachys Jatamansi* Roots

Suman Mande <sup>1\*</sup>, Nita Fernandez <sup>1</sup>

1.Smt. Kasturbai Walchand College Sangli, Maharashtra, India

### ABSTRACT

In the present study, various extracts of *Nardostachys jatamansi* roots were tested against the head louse *Pediculus humanus capitis*. Chloroform, petroleum ether, methanol, and water extracts of *N. jatamansi* roots were used for determining Potential pediculocidal and ovicidal activity using filter paper diffusion method. It was observed that methanol extracts exhibited excellent anti-lice activity with values ranging between 50.3% and 100% where as peteroleum ether, chloroform and water extracts showed moderate pediculocidal effects. All the results were well comparable with benzoyl benzoate (25% w/v) was used as positive control to compare the activity. Anti-lice activity of *N. jatamansi* extracts proved a potential prospect of introducing it in anti-lice formulations.

**Keywords:** *Nardostachys jatamansi*, roots, anti-lice activity, filter paper bioassay, head louse, paper diffusion method, ovicidal activity

\*Corresponding Author Email: [sumanmande81@gmail.com](mailto:sumanmande81@gmail.com)

Received 28 January 2016, Accepted 31 January 2016

Please cite this article as: Mande S *et al.*, In-vitro Screening of Anti-Lice Activity of *Nardostachys Jatamansi* Roots. American Journal of PharmTech Research 2016.

## INTRODUCTION

Human head louse also known as *Pediculus humanus capitis*, infestation is a major concern in public health-associated *problem*. Studies have reported that age groups between 5-11 years old are more prevalent. The condition is distributed around the world invading various ethnic groups with no restrictions of sex and socioeconomic status (Abdel-Ghaffar F., et al.,2010)<sup>1</sup>. Commercially, people buy costly products in combating head lice and it has been observed it is difficult to get rid of head lice, the primary reason being resistance to synthetic products. These motivated researchers to search new substitutes to synthetic ingredients, such as phytoconstituents obtained from plant sources. Eucalyptus, mint, Green tea, clove, cinnamon are some traditional plants used as anti-lice naturally (Roberts R. J.,2002)<sup>2</sup>.

*Nardostachys jatamansi* member of the family Valerianaceae, is a plant that grows in the Himalayan regions of India, China and Nepal (Dua V., et al.,2008)<sup>3</sup>. The plant is mostly found growing in steep areas with a 25° to 45 ° slope. It grows well on open, stony and grassy slopes, and on the turf of glacial flats. The essential oil extracted from roots of *Nardostachys jatamansi* possesses tremendous useful benefits both for external and internal use. For external use, it is used for improving skin complexion, antioxidant, anti-inflammatory agent (Agnihotri S., et al.,2011)<sup>4</sup>, treating eczema, alopecia, imparts blackness to hair (Parekh A., et al.,2009)<sup>5</sup>. Internally, Jatamansi oil helps in digestion, act as sedative and fight insomnia, reducing hypertension (Bhatt I. D., et al.,2012)<sup>6</sup> (Singh N., et al.,2006)<sup>7</sup>. The essential oil of this root contains sesquiterpenes and valeric acid and hence high potential it might have anti-lice activity. On these grounds of traditional claim, we have decided to screen various extracts, such as chloroform, petroleum ether, methanol, and water of *N. jatamansi* roots on adults, nymphs, and nits for its potential anti-lice and ovicidal activities.

## MATERIALS AND METHOD

### Plant Material

Submit your manuscript electronically for review. Roots of *N. jatamansi* were collected from retail shop in satara. India. The samples were identified and authenticated by department of Botony, Shivaji University, Kolhapur. The dried roots were size reduced to coarse powder in a mill and stored in dried container until used.

### Extraction

Extraction of *N. jatamansi* powder (500gm) was made using various solvent such as petroleum ether, chloroform, methanol, and water by Soxhlet extraction technique (Parekh A. and Jadhav

V.,2009)<sup>5</sup>. All the extracts were concentrated using rotary vacuum evaporator and kept in a dessicator until further studies. The color, consistency, and percentage yield were observed (Snyder J. L., et al.,1992)<sup>8</sup>.

### **Collection of head lice**

*P. humanus capitis* were collected from children between the age group of 8-12 by combing through sections of the scalp using a clean comb. After combing, the lice were carefully removed from the teeth of the comb into plastic boxes. None of the subjects used any anti-lice products for the preceding 3 months.

### **Anti-lice activity**

Petroleum ether, chloroform, methanol, and water of *N. jatamansi* were tested for pediculocidal activity by filter paper diffusion method. To obtain various concentrations all the extracts were dissolved in distilled water. The concentrations prepared out of these extracts were 5%, 10%, and 20% in water. The adults and nymphs were identified and separated using dissecting microscope. All the test organisms in a ratio of 3/2 (adult/nymph) were divided into 16 groups (5 lice each) and were placed on a filter paper at the bottom of petri dish and kept open. Group 1 served as negative control with only water in it. Group 2 to group 13 were treated with various extracts of *N. Jatamansi* and at different concentrations (5%, 10% and 20%). Group 14 to Group 16 were treated with 0.5 ml of 5%, 10%, and 20% of benzyl benzoate 25% (w/v) (RidPed) and were treated as positive control. For all the experiment, test samples with 0.5 ml quantity were poured on the test organisms and allowed to spread as a thin layer of 3-5 cm<sup>2</sup>. Before the start of experiment, all the Petri dishes were set aside and incubated for 1 hr in a dark chamber at 26 ±0.5°C and 70 ±1% humidity. At the end of 1 hr, the dishes were taken out and applied 0.5 ml of test samples and further placed in the chamber under the condition mentioned above. After 18 hr, the dishes were carefully inspected for any motility of lice under a dissecting microscope. All the experiments were performed in triplicate.

### **Ovicidal effects**

The test was performed using 6 brownish oval eggs with an unbroken operculum on the filter paper (Whatmann No. 1; 6 cm diameter) placed on petric dish. Later, 0.5 ml of each test solution and control were applied on the nits. The dishes were then incubated in a dark chamber at 26 ± 0.5°C for 14 days. To maintain the moisture, 0.1 ml of distilled water was added at 48 hr interval. Hatching of eggs was monitored under a microscope and the percentage of emergence, i.e., partially hatched nits, was observed, and the findings were recorded. All the experiments were performed in triplicate.

## RESULTS AND DISCUSSION

Physical characteristic of the extracted *N. Jatamansi* were recorded in Table 1. All the extracts displayed concentration (5%, 10%, and 20%) dependent activity among which methanol extract showed higher mortality followed by petroleum ether, chloroform and water extracts, respectively. The activity was well comparable with the standard. Water extract in various concentrations showed minimal anti-lice activity (Table 2).

**Table 1. The color, consistency and percentage yield of extracts of *N. jatamansi***

Extracts	Color	Consistency	%yield
Methanol	Greenish	Viscous paste	14.0
Chloroform	Pale Green	Viscous paste	9.5%
Petroleum ether	Greenish yellow	Viscous paste	8.8%
Water	Greenish yellow	Viscous liquid	4.5%

The use of *N. jatamansi* extracts for controlling lice infestations has been authenticated from the excellent results obtained after screening various extracts for potential anti-lice and ovicidal activity. Extracts of natural sources, such as eucalyptus, green tea, vinegar, peppermint, sage, rosewood, clove bud, and cinnamon bark have exhibited significant pediculocidal activity in filter paper bioassays. Another study

**Table 2. Effects of *Nardostachys jatamansi* root extracts against *Pediculus humanus capitis* adults and nymphs**

Test sample (0.5ml)	Concentration (%)	Average Mortality (%)
Distilled water	-	8.3
Methanol extract	5	34.5
	10	64.2
	20	92.5
Chloroform extract	5	18.4
	10	30.2
	20	40.5
Petroleum ether extract	5	14.5
	10	32.5
	20	60.2
Water extract	5	8.4
	10	11.5
	20	18.7

**Table 3. Ovicidal effects of *Nardostachys jatamansi* root extracts against *Pediculus humanus capitis* adults and nymphs**

Test sample (0.5ml)	Concentration (%)	Emergence (%)	
		Day 6	Day 14

Distilled water	-	86.3	91.6
Methanol extract	5	48.5	31.3
	10	30.5	18.7
	20	14.5	9.4
	5	56.2	51.9
Chloroform extract	10	52.1	24.4
	20	21.4	19.3
	5	78.5	54.5
Petroleum ether extract	10	64.5	34.8
	20	58.4	29.4
	5	62.2	52.5
Water extract	10	54.8	40.4
	20	50.5	32.6
	5	7.5	0
Benzyl benzoate (25% w/v)	10	0	0
	20	0	0
	5	0	0

carried out on school children revealed that 20% petroleum ether extract of custard apple seeds killed 95.3% of head lice. Previous literatures on phytochemistry of *N. jatamansi* seeds reported the presence of sesquiterpenes and its derivatives together with saturated and unsaturated fatty acids (monoenoic, dienoic, and trienoic acids) establishing its lipophilic nature.

Present study showed excellent anti-lice and ovi-cidal activities of methanolic extract of *N. jatamansi* which may be due to the presence of these sesquiterpenes (Rekha K., et al.,2013)<sup>9</sup> and its derivatives. Penetration of extracts into the alimentary tract of lice could be ignored since all the extracts was applied on lice placed on the filter paper which also subse-quentlly avoided immense dissemination of active constituents into the cuticle when the compound is directly applied to the insect skin. Additionally, the lice was not exposed in an enclosed environment with the petri dish kept open which limits the possibility of volatile agents getting absorbed through the spiracles. For synthetic pediculocidal agents, the residue which remains in the head even after rinsing with water gives an enhanced control against lice but also noted for the development of resistance for lice. Natural extracts from medicinal plants has been noticed for its safe and effective use, and appearance of resistance patterns were minimal due to its different mode of action which greatly supports the safe use of *N. jatamansi* extracts as a potent anti-lice agent.

Eradication of lice would be complete if the products used for pediculocidal activity also delays nymph emergence and potentially kill the nymph. Extracts of *N. jatamansi* succeeded in delaying the emergence of nymphs, and its oily nature may help to detach nits from the hair before hatching. Among all the extracts, methanol exhibited the maximum pediculocidal effects and inhibited nymph emergence to maximum extent. Hence, the results obtained from this research present a

promising scenario for using *N. jatamansi* root extract as an effective alternative for treating human head lice.

## CONCLUSION

Extracts of *N. Jatamansi* offers potential to be used as Anti-lice agent. The extract can be used as key ingredient in commercially available formulations. However, in future it will be interesting to notice synergistic effect it might possess when combined with other promising natural plants with ovicidal effects.

## ACKNOWLEDGEMENTS

Authors are grateful to University of Texas for continuous scientific support and funding for the project.

## REFERENCES

1. F. Abdel-Ghaffar, M. Semmler, K. Al-Rasheid, S. Klimpel and H. Mehlhorn, Comparative in vitro tests on the efficacy and safety of 13 anti-head-lice products. *Parasitology research*; 2010; 106 (2) 423-429
2. R.J. Roberts, Head lice. *New England Journal of Medicine*; 2002; 346 (21) 1645-1650
3. V. Dua, M. Alam, A. Pandey, S. Rai, A. Chopra, V. Kaul and A. Dash, Insecticidal activity of *Valeriana jatamansi* (Valerianaceae) against mosquitoes. *Journal of the American Mosquito Control Association*; 2008; 24 (2) 315-318
4. S. Agnihotri, S. Wakode and M. Ali, Chemical composition, antimicrobial and topical anti-inflammatory activity of *Valeriana jatamansi* Jones. essential oil. *Journal of Essential Oil Bearing Plants*; 2011; 14 (4) 417-422
5. Parekh and V. Jadhav, Development of validated HPTLC method for quantification of jatamansone in jatamansi oil. *Journal of Pharmacy Research Vol*; 2009; 2 (5)
6. I.D. Bhatt, P. Dauthal, S. Rawat, K.S. Gaira, A. Jugran, R.S. Rawal and U. Dhar, Characterization of essential oil composition, phenolic content, and antioxidant properties in wild and planted individuals of *Valeriana jatamansi* Jones. *Scientia Horticulturae*; 2012; 136 61-68
7. N. Singh, A. Gupta, B. Singh and V. Kaul, Quantification of valerenic acid in *Valeriana jatamansi* and *Valeriana officinalis* by HPTLC. *Chromatographia*; 2006; 63 (3-4) 209-213
8. J.L. Snyder, R.L. Grob, M.E. McNally and T.S. Oostdyk, Comparison of supercritical fluid extraction with classical sonication and Soxhlet extractions for selected pesticides.

Analytical Chemistry; 1992; 64 (17) 1940-1946

9. K. Rekha, R.R. Rao, R. Pandey, K.R. Prasad, K.S. Babu, J.R. Vangala, S.V. Kalivendi and J.M. Rao, Two new sesquiterpenoids from the rhizomes of *Nardostachys jatamansi*. *J Asian Nat Prod Res*; 2013; 15 (2) 111-6

***AJPTR is***

- Peer-reviewed
- bimonthly
- Rapid publication

Submit your manuscript at: [editor@ajptr.com](mailto:editor@ajptr.com)

