International Journal of Research Development and Technology

Vol 1, Issue 1, Year 2023 ISSN: 2584-0290

Web: www.ijrdt.com

Development & Optimization of Anthelmintic Activity of Herbal Formulation

Singh Atul Pratap[1*], Prakash Satya[2], Kumar Raj[3], Aggarwal Mansi[4], Jaiswal Aakash Kumar[5], Komal[6]

[1]School of Pharmaceutical Sciences, IIMT University Meerut, India, atulsingh2206876@gmail.com*

[2]School of Pharmaceutical Sciences, IIMT University Meerut, India, Scopusjornals1997@gmail.com

[3]School of Pharmaceutical Sciences, IIMT University Meerut, India, rajkumar853282@gmail.com

[4]School of Pharmaceutical Sciences, IIMT University Meerut, India, aggarwalmansi502@gmail.com

[5]School of Pharmaceutical Sciences, IIMT University Meerut, India, aakashkumar_sops@iimtindia.net

[6]School of Pharmaceutical Sciences, IIMT University Meerut, India, komalpharm2020@gmail.com

****

ABSTRACT

Various Asian traditional writings refer to Azadirachta indica leaves and Trichosanthes dioica seeds as herbal medication used for anthelmintic purposes ethno pharma-cologically. The goal of current study was to produce a herbal formulation including A. indica leaves & T. dioica seeds and evaluate its anthelmintic activity in order to determine the optimal dose for pronounced efficacy. For the development of the formulation as tablets, pre-formulation investigations were carried out. Experiments were conducted on nematodes & Ascaridia galli in order to assess & improve anthelmintic efficacy of formulations F1, F2 & F3. The medication albendazole was prescribed frequently. For each formulation as well as the standard, amount of time needed for worm paralysis & death (lethal time) was documented. The findings showed that A. galli was significantly paralyzed & killed by treatment with all formulations. By showing quickest paralysis & fatal times, F1 formu-lation (1:1 ratio of both plant extr-acts) proved highest effectiveness as an ant-helmintic.

Keywords: *Trichosanthes dioica, Azadirachta indica, Anthelmintic activity, Ascaridia galli*

****

Introduction:

The most prevalent human infection, helminthes infections impact a significant section of the global population. The usage of anthelmintic recently causes toxicity in people. Therefore, plants, which are thought to best source of bio-active compounds, are being used in the research and identification of novel

chemicals functioning as anthel-mintics. Tropical Asia is home to the annual & perennial herb genus Trichosanthes, which belongs to Cucur-bitaceae family. In India, more than 20 species have been identified, with T. anguina & T. dioica being cultivated as vegetables. Other significant species include T. pal-mata, T. cordata, T. nervi-folia, T. cucu-merina, T. walli-chiana, & T. cus-pida, among others, which are distributed around the world. To kill worms in wounds & fungal infec-tions, use seeds paste [1-2].

Jaundice and leprosy are treated with the bark. Researchers have previously looked at the antioxidant and anti-inflammatory properties of T. dioica leaves [3-4].

Trichosanthes dioica (Parwal) was studied as a potential Alzheimer's disease treatment [5].

Fruits of T. dioica have been linked to a hypoglycemic impact that can help prevent type 2-diabetes [6].

Although there are no scientific studies yet, seeds of T. dioica have been used ethno-pharmacologically (Charaka Samhita & Ayurveda) to treat helminthes [7].

It was advised to research the anthelmintic potential of T. dioica seeds as a result. Helminthes infections, the most common human infection, affect a sizeable portion of world's population. The drugs known as anthelmintics are used without discrimination to treat parasite diseases. Toxicity in persons has lately been linked to use of anthelmintics. Therefore, plants, which are thought to best source of bio-active compounds, are being used in research & identification of novel chemicals functioning as anthelmintics. A deciduous, perennial tree, azadirachta indica. The leaves have vermicidal, expectorant, demulcent, sedative & insecticidal pro-perties [8].

To eliminate fungus infections & destroy worms in wounds, apply leaf paste. Internal use of leaves is used to treat chronic bronchitis, whooping cough & gastritis [9].

Jaundice and leprosy are treated with the bark. A. indica leaves have previously been studied for their antioxidant and anti-inflammatory properties [10-11].

It has been studied as a potential Alzheimer's disease treatment [12].

Azadirachta indica leaves have been linked to a hypoglycemic impact that can prevent type 2 diabetes [13].

As a treatment for degenerative illnesses such hyper-menorrhea & dysmenorrhea, azadirachta indica seeds had positive outcomes [14].

As a result, reports of various activities have come from different areas of Azadirachta indica. Ayurveda & Charaka Samhita both employed leaves of A. indica to treat helminthes; however there is now no evidence to support this. As a result, it was decided to research anthelmintic potential of Azadirachta indica leaves.

Materials & Methods:

Plant Material:

The seeds of Tri-chosanthes dioica (Parwal) & leaves of A. indica were procured in May from a location close to Meerut & verified by botany depart-ment at Meerut College in Meerut, U.P (India).

Experi-mental Worms:

The Nematoda species Ascaridia galli Schrank was procured from Pantnagar, India's department of veterinary science.

Pre-paration of Extracts

The seeds of T. dioica & leaves of A. indica were dried separa-tely in the shade, ground into a 200g powder using an electric blender & then subjected to soxhlet extraction using ethanol as solvent.

Formulation of Tablets

The excipient was combined with plant extracts before being crushed into tablets. Table.1 provided the composition's specifics.

Table 1

Ingredients	**Quantity Per Tablet (mg)**		
	F1 (1:1 ratio)	**F2 (1:2 ratio)**	**F3(2:1 ratio)**
Trichosanthes dioica aqueous extract	200	100	200
Azadirachta indica aqueous extract	200	200	100
Agar	30	30	30
M.C	30	30	30
Dibasic calcium phosphate	30	30	30
Peg 8000	10	10	10
Methyl Paraben	0.1%	0.1%	0.1%
Wt. Per Tablet	500	500	500

Anthelmintic activity:

Experimental Design:

The experiment used worms of comparable sizes. The worms were housed in 14 groups of six each. The first group received 20ml of albendazole (15mg/kg) in 2% DMSO in phos-phate buffe-red saline (PBS, pH-7.2, 0.15M) & was housed on 10cm Petri plates as a control. Al-bendazol (10mg/ml) served as reference vermin-cide in control group. The 2nd group acted as -ve control & was maintained in 20ml of 2% DMSO in PBS (pH-7.2, 0.15-M). 12-groups were kept alive in Petri-dishes using 20ml of 2% DMSO (di-methyl sulpho-xide) in phosphate buffered saline sol., mixed separately with each of 3-tablet formulations, F1, F2 & F3. When there was no movement of any kind other than when worms were violently disturbed, this is known as paralysis. After determining that no worms moved when shaken violently & submerged in warm H2O (500°C), time for death (i.e. lethal

time) of all worms was recorded. When worms lost their body color & ability to move, it was determined that they had died [15-16].

Results & Discussion:

Preformulation Studies:

Evaluation of powder blend

The trial batches' (F1-F3) obtained granules passed evaluation with flying colors. During the passage of grains from hopper, no rat holing was seen. In tablets, there was no evidence of capping or sticking. The outcomes are shown in Table.2 below. Based on the figures for compressi-bility index & Haus-ner's ratio determined for granules of bat-ches F1-F3, it was discovered that granules had good flow characteristics with all parameters within range.

Table 2

Batch	Bulk density (gm/ml)	Tapped density (gm/ml)	Carr's index (%)	Hauss-ner's ratio	Angle of repose (°)
F1	0.45	0.51	13.41	1.12	28
F2	0.41	0.53	17	1.17	30
F3	0.43	0.53	17	1.14	31

Tablets Evaluation:

The observed tablet characteristics are listed in Table.3. The 500mg wt. for the pill compression was set. All batches of pills passed the wt. variation test since largest weight variation was 2.8%, which is within permitted wt. variation range of 5%. All batches of tablets had hardness values b/w 4.1 & 4.2kg/cm2, which is greater than threshold of 3.0kg/cm2. None of batch's tablets had a friability value greater than 0.74%. All of batches' tablets' thick-nesses were found to be between 3.2 & 3.6mm2, which indicates that they were generally acceptable tablets. An essential tablet parameter is disintegration time. Within 15minutes, perfect tablet should dissolve. The tablets of all batches fell apart after 12minutes & 10seconds.

Table 3

Batch	Hard-ness (kg/cm2)	Thick-ness (mm2)	% Wt. Variation	% Friability	Disinte-gration Time
F1	4.2	3.6	1.98	0.72	12min, 15sec
F2	4.1	3.5	2.8	0.71	10 min,25 sec
F3	4.1	3.2	2.2	0.74	12min, 10sec

Table 4

Treatment	Mean Para-lysis time (min)±SEM	Mean Lethal Time (min)±SEM
+ve control (Albendazole)	12.14 ± 0.20	20.00± 0.26
Negative control (Vehicle only)	NIL	NIL
F1	12.00 ± 0.24**	22.00 ± 0.58**
F2	12.16 ± 0.51**	23.00 ± 0.31 **
F3	37.16 ± 0.52	75.17 ± 0.21

Six worms per group (n), St.d Error of Mean (SEM), & * (P0.05) & ** (P0.01) Vehicle: 0.15 M of pH 7.2 2% DMSO in PBS

All test formulations were found to immobilize & ultimately kill Ascaridia galli worms. As indicated in Table.4, the F1 formulation, which contained both plant extracts in a 1:1 ratio, had greatest potency & quickest paralysis & fatal periods. The potency was comparable to, not greater than, reference medication albendazole.

Conclusion:

This endeavor demonstrates the scientific basis for the conventional adaptation. The best therapeutic potential, good compliance, cost effectiveness with economic significance, and less toxicity due to the herbal formulation are reasons to choose drugs with natural origins.

Acknowledgment:

The entire authors are thankful to Dhanvantri group at Ghaziabad to register the clinical trials for the above research product F1.

References:

1. Nadkarni A.K., Indian Materia Medica. 3rd ed. Mumbai Popular prakashan;1996. p.236.
2. Elshamy, A.I., Abdallah, H.M.I., El Gendy, A.E.N.G., El-Kashak, W., Muscatello, B., De Leo, M. and Pistelli, L., 2019. Evaluation of anti-inflammatory, antinociceptive, and antipyretic activities of Prunus persica var. nucipersica (nectarine) kernel. *Planta medica*, *85*(11/12), pp.1016-1023.
3. Deb L, Gupta R, Dutta AS, Yadav A, Bhowmik D & Kumar KPS, Evaluation of antioxidant activity of *Azadirachta indica*L. aqueous extract, Pharm. Sin.,2010; Vol. 1(3), pp.157-164.
4. Shin TY, Park SB, Yoo JS, Kim IK, Lee HS, Kwon TK, Kim MK, Kim JC, Kim SH, Anti-allergic inflammatory activity of the fruit of *Azadirachta indica*: Role of calcium and NF- kappa. *J. Food Chem. Toxicol*., 2010, vol. 48(10), pp. 2797-2807.
5. Suh SJ, Koo BS, Jin UH, Hwang MJ, Lee IS, Kim CH, Pharmacological characterization of orally active cholinesterase inhibitory activity of *Azadirachta indica* L. Batsch in rats. J Mol Neurosci. 2006; vol. 29(2) pp.101-107.

6. Park S. W., Survay N.S., Ko E. Y., Upadhyay C.P., Mi1 J., Hypoglycemic Effects of Fruits and Vegetables in Hyperglycemic Rats for Prevention of Type-2 Diabetes, Kor. J. Hort. Sci. Technol. 28(5), 2010.
7. Kim Y, Koo B, Gong D, Lee Y, Ko J, Kim C: Comparative effect of Azadirachta indicaL. BATSCH water extract and tacrine (9-amino-1,2,3,4-tetrahydroacridine hydrochloride) on concentration of extracellular acetylcholine in the rat hippo-campus. J Ethnopharmacol 2003, vol. 87 pp.149–154.
8. Thorn GW, Adams RD, Brundwald E, Isselbacher KJ, Petersdorf RG. Harrison's Principles of Internal Medicine. New York: McGraw Hill Co., 1977: 1088.
9. Vigar Z. Atlas of Medical Parasitology. 2nd Ed. Singapore: P. G. Publishing House, 1984:216.
10. Vidyarthi RD. A Text Book of Zoology. New Delhi: S. Chand & Co., 1967: 329-370.
11. Chatterjee KD. Parasitology, Protozoology and Helminthology. Calcutta: Guha Ray Sree Saraswati Press Ltd., 1967: 168-169.
12. Ghosh T, Maity TK, Bose A, Dash GK. Anthelmintic activity of *Bracopa monnieri*. Indian J Nat Prod 2005; 21 (2): 16-19.
13. Lalchhandama K. Nematocidal effects of piperazine and the extract of *Acacia oxyphylla* stem bark on the poultry nematode, *Ascaridia galli*. Pharmacologyonline 2008; 3: 864-869.
14. Singh K, Nagaich S. Anthelmintic efficacy of the alcoholic extract of *Ocimum sanctum* against common poultry worms *Ascaridia galli* and *Heterakis gallinae.* J Parasit Dis 2002; 26: 42-45.
15. Singh K, Nagaich S. Efficacy of aqueous seed extract of *Carica papaya* against common poultry worms *Ascaridia galli* and *Heterakis gallinae*. J Parasit Dis 1999; 23:113-116.
16. Kaushik RK, Katiyar JC, Sen AB. Studies on the mode of action of anthelmintics with *Ascardia galli* as test parasite. Ind J Med Res 1974; 62 (9): 1367-1375.