ISSN: 2322 - 0902 (P)
ISSN: 2322 - 0910 (O)

International Journal of Ayurveda and Pharma Research

Research Article

AN EXPERIMENTAL EVALUATION OF ANTI-INFLAMMATORY ACTION OF ROOT OF *APARAJITA* (*CLITORIA TERNATEA* LINN.) IN ALBINO RATS

Gangil Darpan[1]*, Patil Sumitra K[2], Chougala S B[3]

*[1]PG Scholar, [2]Reader, [3]Lecturer, Dept. of Dravyaguna Vijnana, Sri JGCHS Ayurvedic Medical College, Ghatprabha, District Belgaum, Karnataka, India.

ABSTRACT

Plants have played a major role in the production of biological compounds for the formation of drugs. Their role may either become a base for the development of medicine, a natural blue print for the development of new drugs or a phytomedicine to be used for the treatment of diseases. Acharya Charaka has quoted that none of the plants found around us are non-medicinal. *Clitoria ternatea* commonly known as *Aparajita* or Butterfly pea is a medicinal plant belonging to the family Fabaceae. In various Ayurvedic classics and Ayurvedic material medica, this plant is reported to be used in insect bites, skin diseases, asthma, burning sensation, inflammation, leucoderma, leprosy and pulmonary tuberculosis.

A good number of anti-inflammatory drugs are available in modern medicine, among them some are expensive and some are having adverse effects in long term uses. Thus a need arises to find a safer and efficient drug from the natural resources, which will be simple, effective and not having any adverse effect. In the present study, preliminary phytochemical study and anti-inflammatory study of *Kashayam* (decoction) of root of *Aparajita* were carried out to confirm the presence of various phytochemical substances and to determine the anti-inflammatory action against diclofenac sodium in carrageenan induced rat paw edema model. The results of experimental study showed significant anti-inflammatory action of *Kashayam* (decoction) of *Aparajita* roots in acute inflammation compared to control and near to the action of diclofenac sodium, which suggests that *Aparajita* is potential natural anti-inflammatory drug.

KEYWORDS: *Aparajita*, Anti-inflammatory, *Clitoria ternatea* Linn, *Shotha-hara*, Digital Vernier caliper.

INTRODUCTION

Out of tetrads of therapeutic management of diseases, *Bheshaja* (Therapeutic Agent) stand next to the *Vaidhya* (physician) for successful management of the disease. Acharya Charaka has quoted that none of the medicinal plants found around us are non-medicinal, it depends on the *Yukti* (skills) of the physician to use it in the appropriate condition in the right dosage form and dose.[1]

Among the various actions explained in Ayurvedic classics, *Shothaghna* (anti-inflammatory) is one. The drug which reduces, diminishes or destroys *Shotha* (inflammation) is called *Shothaghna*, *Shothajeet*, *Shothajihma*, *Shothahrita* etc.[2] *Shotha* can be compared with edema in modern terms which is a sign of inflammation. Inflammation is defined as local response of living mammalian tissue to injury due to any agent. It is a body defense reaction in order to eliminate or limit the spread of injurious agent, followed by removal of necrosed cells and tissues. Rubor (redness), Tumor (swelling), Calor (heat), and Dolor (pain) are the cardinal signs of inflammation.[3]

A good number of anti-inflammatory drugs are available in modern medicine, among them some are expensive and some are having adverse effects such as dyspepsia, nausea, and vomiting and gastro intestinal bleeding etc.[4] in long term uses.

Herbal drugs have been used extensively in medicine for the fact that plants are everywhere at hand, their numbers are very great, their forms are distinct and peculiar and thus they are procured without trouble. The establishment of certain herbal drugs, which are easily available in the vicinity and capable of producing a marked anti-inflammatory effect, will present an opportunity for the physicians to use these drugs in a safe and responsible way and thereby help patients to minimize their reliance upon more dangerous NSAIDs and other synthetic anti-inflammatory drugs. Thus a need arises to find a safer and efficient drug from the natural resources, which will be simple, effective and not having any adverse effects.

Being indicated and designated as *Shothahara dravya* (anti-inflammatory drug), *Aparajita* may be a drug of choice in the management of *Shotha* (inflammation). With this principle in mind, the aim of the present study is to evaluate pharmacologically, the efficacy of *kashayam* (decoction) of root of *Aparajita* (*Clitoria ternatea* Linn.) in the management of *Shotha* (inflammation).

MATERIAL AND METHODS

Source of Drug

The roots of *Aparajita* (*Clitoria ternatea* Linn.) blue variety was collected from the natural source in Karnataka state in the month of June 2014 (Figures 1, 2 & 3). The authentic identification of the drug was made by the Botanist, Sreedhareeyam Ayurvedic Research and

Development Institute (SARDI) and the voucher herbarium specimen was prepared and preserved in herbarium of SARDI (No. H/S-089 & 090).

Phytochemical Tests for Active Compounds:

Physical standards[5] for the drug were determined (results shown in Table 1) and preliminary phytochemical analysis for organic compounds[6] was done (results shown in Table 2) as per standard protocol. The study was carried out in S.D.M. Centre for Research in Ayurveda and Allied Sciences, P.O. Kuthpadi, Udupi, Karnataka.

Acute Toxicity Study of *Kashayam* (decoction) of *Aparajita* roots (*Clitoria ternatea* Linn.):

The acute toxicity study was carried out on albino rats. The animals were divided into one group which consists of five rats. The defined or fixed dose level of the decoction (2000 mg/kg) was given orally to identify a dose producing evident toxicity. The animals were observed continuously for 2 hours for behavioral, neurological and autonomic profiles. The toxicity signs were observed after 24 hours till fourteen days for any lethality or death. (Results shown in Table 3)

Anti-inflammatory activity of *Aparajita* root (*Clitoria ternatea* Linn.)

The animal study was carried out in Pharmacology lab of Smriti College of Pharmaceutical Education, Indore (M.P.). The anti-inflammatory effect of the *Kashayam* (decoction) of roots was evaluated by carrageenan induced rat paw edema model.[7] The albino rats weighing from 150-200 gm. were divided into three groups, each consisting of six rats. They were fasted for 12 hr and deprived of water only during the experiment. As shown in Table 4, Group I (G1, Control) received gum acacia solution (0.5 ml/kg, 0.9% w/v), used as vehicle, Group II (G2, Standard) was treated with 15 mg/kg of Diclofenac sodium used as the reference drug[8], while Group III (G3, Test) was treated orally with the *Kashayam* (decoction) (400 mg/kg). One hour after dosing, edema was induced by injection of carrageenan (0.1 ml, 1% w/v in saline) into sub plantar tissue of right hind paw. The paw thickness (in mm.) was measured by digital Vernier caliper as reported in earlier studies[9,10] (Figures 4, 5, 6 & 7). Measurements were made at 0 minute (immediately before injection of carrageenan) and 30, 60, 90, 120, 150 and 180 minutes after carrageenan injection. Edema was expressed as an increase in the paw thickness in relation to the initial value. The paw edema of the drug-treated groups was compared with the control. (Results shown in Table 5)

RESULTS AND DISCUSSION

Plants have a great potential for producing new drugs for human benefit. The increased interest in plant derived drugs is mainly because of the wide spread belief that 'herbal medicine' is safer than synthetic drugs having no side effects.

As shown in Table 1, the pH value of 5.4 suggested it to be acidic in nature. The ash values and extractive values were determined for identity and purity. Extractive value with water (8.222%) was found to be more than of alcohol (1.907%) which shows that water soluble contents are more than alcohol soluble contents which indicates that *Kashayam* (decoction) will be more effective than any alcoholic preparation of *Aparajita*.

Table 1: Results of Physical Analysis[5]

Parameter	Results n = 3 %w/w *Aparajita*
Total Ash	4.401
Acid Insoluble Ash	0.592
Water soluble Ash	1.584
Alcohol soluble extractive value	1.907
Water soluble extractive value	8.222
pH	5.40

Preliminary phytochemical screening was helpful in prediction of nature of drugs and also useful for the detection of different polarity solvent. As shown in Table 2, preliminary phytochemical analysis revealed the presence of carbohydrate, phenol, steroid, tannin and cumarins. The result of the phytochemical analysis revealed the presence of medicinally active constituents, upon which, the action of any drug depends.

Table 2: Results of Preliminary Phytochemical Screening: Organic Compounds[6]

Test	Results
Alkaloid	–
Carbohydrate	+
Carboxylic Acid	–
Coumarins	+
Flavanoids	–
Phenol	+
Quinone	–
Resins	–
Steroid	+
Saponins	–
Tannin	+

Present (+) Absent (-)

As shown in Table 3, all five rats were survived after 14 days of dosing of decoction during toxicity study which shows that the decoction is safe to be used in human.

Table 3: Results of Effect of *Aparajita* (*Clitoria ternatea* Linn.) root decoction on acute toxicity study

S. No.	Treatment	Dose (mg/kg/bw)	No. of animals survived after		
			24 hrs	72 hrs	14 days
1	decoction	2000	5	5	5

Table 4: Showing the Rat dose of Control, Standard and Trial drug

SL.	Group	Number of Rats	Drug	Doses
1	G1 (Control Group)	6	Gum acacia solution (orally)	0.5 ml/kg, 0.9% w/v
2	G2 (Standard Group)	6	Diclofenac sodium (orally)	15 mg/kg (3 mg/200 gm)
3	G3 (Test Group)	6	Decoction of *Aparajita* root (orally)	9 ml/kg (1.8 ml/200 gm)

As shown in Table 5, after injecting the irritant, mean edema level started increasing in each group. In standard group, edema started reducing from 60 minutes, in Test group, it started reducing from 90 min. but in control group, edema started reducing from 150 min.

Statistical evaluation was done based on the observations made. Comparison was made between control and standard and control with test at different time intervals. The results showed that at every point of time (30 min., 60 min., 90 min., 120 min., 150 min. and 180 min.) were significant for both Standard and Test drug in comparison with control. The results of the comparison between Standard and Test were statistically not significant and Standard was found to be better than the Test.

Table 5: Results of Effect of *Aparajita* (*Clitoria ternatea* Linn.) root decoction on rat paw edema

Treatment	Dose (mg/kg/bw)	Mean paw diameter (mm) at time T (min.)					
		T(30)	T(60)	T(90)	T(120)	T(150)	T(180)
G1 (Control)	–	4.11 ± 0.05	5.10 ± 0.08	5.69 ± 0.05	5.77 ± 0.03	5.81 ± 0.07	5.76 ± 0.03
G2 (Standard)	15	3.38 ± 0.06	3.42 ± 0.05	3.37 ± 0.07	3.28 ± 0.09	3.23 ± 0.06	3.21 ± 0.02
G3 (Test drug)	400	3.23± 0.07	3.55± 0.08	3.67± 0.11	3.42± 0.10	3.29± 0.05	3.24± 0.02

As per classical Ayurvedic texts, the action of any drug is may be explained on the basis of *Rasa* (taste), *Guna* (properties), *Virya* (potency), *Vipaka* (post digestive taste) and *Prabhava* (specific effect). While some of the actions are attributed to *Rasa* (taste), some to *Guna* (properties), some to *Virya* (potency), some to *Vipaka* (post digestive taste) and some to *Prabhava* (specific effect).[11]

The *Shotha samprapti* (etio-pathogenesis of inflammation) shows that the *Shotha* (inflammation) is mainly caused by vitiated *Vata* and *Kapha Dosha* with the association of *Pitta* and *Rakta*. Those drugs that reduce the *shotha* (inflammation) are called as *Shothahara* (anti-inflammatory).[12]

Aparajita is said to be *Katu* (pungent), *Tikta* (bitter) and *Kashaya* (astringent) in *Rasa* (taste), *Sheeta* (cold) in *Virya* (potency) and *Katu* (pungent) in *Vipaka* (post digestive taste).[13] By its cold potency, *Aparajita* acts as *Pitta* and *Rakta* pacifier.[14] By pungent, bitter taste and pungent post digestive taste, it pacifies *Kapha*,[15] while *Vata* is pacified by the *Prabhava* (specific effect) of *Aparajita*. Thus all these properties combined help in the inhibition of *Shotha* (inflammation).

The magnitude of inhibition onset and the period of action suggest that anti-inflammatory mechanism of *Aparajita* root decoction may be through inhibition of prostaglandin synthesis by reduced action of cyclo-oxigenase.

CONCLUSION

The results of the preliminary phytochemical study revealed the presence of medicinally active constituents i.e. carbohydrate, phenol, steroid, tannin and cumarins. The results of experimental study showed significant anti-inflammatory action in acute inflammation compared to control. Thus the present study supports the drug *Aparajita* (*Clitoria ternatea* Linn.) is safe, cost effective, easily available anti-inflammatory natural source. So it can be concluded that decoction of roots of *Aparajita* has anti-inflammatory potential and roots may be used as potential anti-inflammatory agent in future.

Further studies in in-vivo models and to isolate active constituents from root are required to carried out and establish the effectiveness and pharmacological rationale for use of *Aparajita* root as an anti-inflammatory drug. Clinical studies also need to be carried out on *Aparajita* in order to use and formulation of the plant in clinical applications such as analgesic, anti-pyretic, anti-microbial etc. which can be used for the welfare of mankind.

ACKNOWLEDGEMENTS

The author would like to express his gratitude to Mr. D.G. Namboothiri; General Manager (R&D) and Mr. Bijeshmon P.P.; Botanist, Sreedhareeyam Ayurvedic R&D Institute, Koothattukulam, Kerala for confirming the genuinity and purity of crude drug, Dr. K.N. Sunil Kumar;

Senior Research Officer – Pharmacognosy, SDM Center for Research in Ayurveda & Allied Sciences, Udupi, Karnataka for providing the necessary laboratory facilities for phytochemical analysis and Mr. Rakesh Barik, Associate Professor, Dept. of pharmacognosy, Smriti College of Pharmaceutical Education, Indore (M.P.) for his guidance, help and support in carrying out the experimental study.

REFERENCES

1. Acharya Agnivesha, edited by Vaidya Jadavji Trikamji Acharya, Charaka Samhita, with the Ayurveda Deepika Commentry by Chakrapanidatta, [Varanasi, Chaukhamba Samskrit Samsthan, Reprint 2004] Sutrasthana 26/12, Page no: 138.
2. Raja Radhakantha Deva, Sabdakalpadruma, [New Delhi, Naga Publishers Jawaharnagar, 2nd Edition-2003], Page no: 140.
3. Harshmohan, Text book of Pathology, [Jaypee Brothers Medical Publishers Pvt. Ltd, Sixth Edition 2010], Chapter 6, Page no: 130.
4. Harrision, Principles of Internal Medicine, [USA, M C Grawhill Companies, 12th Edition 1992], Vol-II, Page no: 1734.
5. C.K. Kokatte, A.P. Purohit, S.B. Gokhale, Pharmacognosy, Vol I & II [Mumbai, Nirali Prakashan, 46th Edition Dec 2010].
6. Dr. Khandelwal K.R., Practical Pharmacognosy [Pune, Nirali Prakashan, 16th Edition, July 2006].
7. Da MZ, Jing L, Qiong Z, Ting X., Chemical constituents from the Stems of Caesalpinia decapetala, Chinese journal of natural medicines. 2008. 6:168-172.
8. Loggia RD, Sosa S, Altinier G, Braca A, Morelli I., Extracts and constituents of Lavandula multifida with topical Anti-inflammatory activity, Phytomedicine. 2005. 12:271-277.
9. Kaneria MS, Naik SR, Kohli RK., Anti-inflammatory, antiarthritic and analgesic activity of a herbal formulation (DRF/AY/4012), Indian J. Exp. Biol. 2007. 45:278-284.
10. Mule SN, Patil SB, Naikwade NS, Magdum CS., Evaluation of antinociceptive and anti-inflammatory activity of stems of Gyanandropis pentaphylla Linn., Int. J. Green Pharmacy 2008. 2:87-90.
11. Acharya Vagbhata, Edited by Kaviraj Atrideva Gupta, Astanga Hrudayam with Vidyotini Hindi Commentary, [Chaukhambha Prakashan, Reprint 2011], Sutra Sthana 9/22, Page no: 108.
12. Vaidya Yadavji Trikamji Acharya, Dravyaguna Vijnana- Purvardha, [Sri Baidyanath Ayurveda Bhavan Ltd, 7th edition, December 1998], Page no: 53.
13. Acharya Bhavmishra, commentary by Dr. K.C. Chunekar, Bhavprakash Nighantu, [Varanasi, Chaukhamba Bharti Academy, Reprint 1999], Guduchyadi Varga 111-112, Page no: 342-343.
14. Acharya Vagbhata, Edited by Kaviraj Atrideva Gupta, Astanga Hrudayam with Vidyotini Hindi Commentary, [Chaukhambha Prakashan, Reprint 2011], Sutra Sthana 9/19, Page no: 107.
15. Acharya Vagbhata, Edited by Kaviraj Atrideva Gupta, Astanga Hrudayam with Vidyotini Hindi Commentary, [Chaukhambha Prakashan, Reprint 2011], Sutra Sthana 10/15 & 10/18, Page no: 110-111.

Cite this article as:
Gangil Darpan, Patil Sumitra K, Chougala S B. An Experimental Evaluation of Anti-Inflammatory Action of Root of Aparajita (Clitoria Ternatea Linn) in Albino Rats. International Journal of Ayurveda and Pharma Research. 2016;4(4):60-63.
Source of support: Nil, Conflict of interest: None Declared

***Address for correspondence**
Dr. Gangil Darpan
PG Scholar
Dept. of Dravyaguna Vijnana,
Sri JGCHS Ayurvedic Medical College, Ghatprabha, District Belgaum, Karnataka, India.
Mobile: +91 7665588795
Email: darpan.gangil@gmail.com