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EXPERIMENTAL PHARMACOLOGY OF *BHARANGI* [*CLERODENDRUMSERRATUM*(LINN.) MOON]- A REVIEW UPDATE

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ABSTRACT

Research in the field of medicinal plants can be broadly classified as Literature research, Fundamental research, Experimental research and Clinical research. Enrichment of Dravyaguna (materiamedica) depends to a great extent on all the above types of researches.*Bharangi*[*Clerodendrumserratum*(Linn.) Moon] a medicinal plant mentioned in Ayurveda classics has proven to possess multiple pharmacological activities. Ethno-pharmacological significance of *Bharangi* is due to its anti-inflammatory, anti-allergic, anti-asthmatic, anti-histaminic, antimicrobial, anticancer, antioxidant, anti-diabetic, anti-tussive, spermicidal and CNS depressant activity. *Bharangi* root, stem, stem-bark and leaves have been used traditionally for various ailments. *Clerodendrumserratum*(Linn.) Moon has been studied for different pharmacological activities, using different parts (root ,stem, leaf) and using various animal models. *Clerodendrumserratum*(Linn.) Moonwith immense pharmacological activities has been reviewed with an aim to provide a reference source to plan further research strategy on the plant for the unexplored Pharmacological uses of *Clerodendrumserratum*(Linn.) Moon.The present review encompasses the recent pre-clinical studies of*Bharangi*[*Clerodendrumserratum*(Linn.) Moon] carried out in the field of Experimental Pharmacology and its further scope in clinical research.

Keywords:*Bharangi*[*Clerodendrumserratum*(Linn.) Moon],pre-clinical study,Experimental Pharmacology

INTRODUCTION: Many of the Ayurvedic medicinal plants are on the verge of extinct and *Bharangi* [*Clerodandrumserratum*(Linn.) Moon], is one of the rare and threatened plants. It has been mentioned in *abhavadravya* list by *Bhavprakash* and substituted by *talishpatra* or *kantakarimoola.*[1]

Botanicalname: *Bharangi* [*Clerodendrumserratum*(Linn.)Moon]

Family: Verbenaceae

Gana: *Pureeshasamgraneeya* (Charaka) *Pippalyadi* (Sushrutha and Vagbhata) *Vatsakadi*(Vagbhata)

Sanskrit name:*Angaravalli, Bharangi, Bhargavi, Bhargi, Bramhani,Padma, Bhrigubhava, Bramhanayashtika, Kharashaka, Phanji, Hanjika*[2]

Parts used :- root, stem, stembark, leaves.

Action and uses : The roots are bitter, acrid, thermogenic, anti-inflammatory, digestive, carminative, stomachic, anthelmintic, depurative, expectorant, sudorific, antispasmodic, stimulant and febrifuge and are useful in inflammations, dyspepsia, anorexia, colic, flatulence, helminthiasis, cough, asthma, bronchitis, hiccough, tumours, tubercular glands , dropsy, consumption, chronic nasal inflammation, skin diseases, leucoderma, leprosy and fever. Leaves are useful as an external application for cephalagia and

opthalmia. The root increases appetite, lessens expectoration. Seeds bruised and boiled in butter milk are used as aperient and in dropsy. [2]

Properties:

Rasa-*Tikta,Katu,Kashaya*

Guna- *Laghu,Ruksha*

Veerya- *Ushna*

Vipaka-*Katu* [2]

Doshaghnata:*Kaphavatashamaka*

Rogaghnata:*Gandamala,Vrana,Visarpa,Aruchi,Agnimandya,Gulma,Raktavikara,Shotha,Shwasa,Kasa,Rajayakshama,Pratishyaya,Nashtartava,Jwara.*

Karma:*Shothahara,Vranapachana,Deepana,Pachana,Anulomana,Raktashodhaka,Kaphaghna,Kasahara,Shwasahara,Jwaraghna,Swedajanana*[3]

Parts used: Root, stem, bark, leaves.

Dose: 3 to 6 g powder*churna*(powder)
10-20 ml of *kwatha* (decoction)

Chemical Constituents:

Serratagenic acid, queretaroic acid, some phytosterols, saponins, two iridiod glycosides, ferulic acid, arabinose, scutellarein, baicalein are some important chemical constituents reported. [2]

Taxonomical identification:

Domain:Eukaryota
Kingdom: Plantae
Sub-kingdom:Viridaeplantae
Phylum: Tracheophyta
Sub-phylum: Euphyllophytina
Infraphylum: Radiatopses
Division: Angiospermae
Class: Magnoliopsida
Sub-class: Lamiidae
Order: Lamiales
Family: Lamiaceae/ Verbenaceae
Sub-family: Ajugoideae
Genus: Clerodendrum
Species: Serratum[4]

Botanical Description:

Etymological derivation: Gr. Kleros chance and Dendron, a tree. Dendrum-tree, serrate- leaf serrate,

Habit: Subwoody, erect, annual herb about 2 m tall.

Stem: Almost unbranched, purplish, somewhat quadrangular- triquotrous; almost glabrous.

Leaves: Mostly ternate, exstipulate, petiole about 0.5mm long, stout. Lamina is simple, large, often reaching nearly 20 cm in length, 7-8 cm broad, ovate elliptic, acute, serrate-dentate.

Inflorescence: Terminal panicle of lax dichasia; leafy bract at the point of dichotomy and also at the base of individual flower.

Flowers: Complete, regular, zygomorphic, hypogynous, bracteate; flowers large showy.

Calyx: Sepals are 5, united forming a short cup about 0.4 cm long, lobes triangular, with reddish tinge, persistent.

Corolla: Petals 5, united, whitish pale blue, 2 lipped, upper lip of 2 lobes, lower of three, the middle lobe of the lower lip more conspicuous, dark purple, throat hairy at the point of insertion of stamens.

Androecium: Stamens 4, didynamous, epipetalous, exserted, hairy at the base.

Gynaecium: Carpels 2, ovary superior, syncarpousquadrilocular, each locule one ovulate; style filiform, stigma bifid.

Fruit: Drupe, four lobed with four compartments, somewhat succulent.[6]

Varieties:-*VaidyakaShabdaSindhu* described two types of *Bharangi*i.e*shwetapushpa*(white flowered) and*nilpushpa*(blue flowered). Former is C.indicum while the later variety is C.serratum(Linn) Moon respectively.

Pharmacognostic details-

The root is characterised by stratified cork, secondary phloem, interspersed with

sclereides and ring porous xylem. Starch grains occur in medullary rays and xylem parenchyma and are similar to those found in phloem parenchyma. Acicular crystals of calcium oxalate are scattered in medullary rays and xylem parenchyma cells. Powder is yellowish brown in colour with pungent odour and an acrid taste. Leaf shows a few uniseriate covering trichomes around margin and over large veins and occasional glandular trichomes on both surfaces. Vascular bundles capped with groups of fibres are seen in more or less continuous cylinder at basal region of midrib and are gradually reduced to single strand at apex. The primary root is tetrarch to pentarch and cork cambium arises in second layer of cortex giving rise to stratified cork, 16- 20 cells thick. Xylem fibres are long with pointed, forked or libriform ends. Starch is absent.

Adulterants and Substitutes:-

1) The root is more commonly adulterated with stem pieces.[7]These can be distinguished by their smooth, purplish grey surface and absence of pith.

2) Some said that Quassia bark is used as *Bharangi*.[8]

3) The bark of *Picrasmaquassioides* Benn. is substituted as *Bharangi*in eastern India. [2]

Bharangi[*Clerodendrumserratum*(Linn.) Moon] a medicinal plant mentioned in Ayurveda classics has proven to possess multiple pharmacological activities. Ethno-pharmacological significance of *Bharangi* is due to its anti-inflammatory, anti-allergic, anti-asthmatic, anti-histaminic, antimicrobial, anticancer, antioxidant, antidiabetic, anti-tussive, spermicidal and CNS depressant activity. *Bharangi* root, stem, stem-bark and leaves have been used traditionally for various ailments. Research work is carried out to study the pharmacognostic, physicochemical,antioxidant, anti-inflammatory, anti-asthmatics and various other activities.[5]

Pharmacological activities of Rootand stem:

Toxicity: The aqueous and methanolic extracts of aerial parts of *Clerodendrumserratum*(Linn.) Moonhas taken. This Acute toxicity study reveals that LD_{50} of both the extracts is greater than 2000mg/kg bwt in fasted female rats and classified under category 5. They did not show any mortality amongst the graded dosegroups of rats.[9]

Anti-asthmatic activity: This study revealed that ethanolic extract of roots of *Clerodendrumserratum*(Linn.) Moon produced significant anti-asthmatic activity at 50,100 and 200 mg/kg p.o, by employing isolated goat tracheal chain preparation (in-vitro), Clonidine induced catalepsy, milk induced leucocytosis and eosinophilia studies (in-vivo) in mice.[10]

Anti-inflammatory activity:

Clerodendrumserratum(Linn.) Moon root shows significant anti-inflammatory activity in comparison with dexamethasone.[11]

Anti-allergic activity:

Clerodendrumserratum(Linn.) Moon root shows significant anti allergic activity in comparison with dexamethasone.Anti-allergic activity was evaluated by milk induced Leucocytosis in mice and Bronchial Hyperactivity in Guinea pigs sensitized with egg albumin. HD root 35%.Anti-inflammatory activity for LD-23% (44%) of ClerodendrumSerratum root in rats was assessed by Granuloma Pouch method.[11]

Anti-bacterial activity: The ethanol extract of roots (7.5 mg/disc) showed broad spectrum anti-bacterial activity

against gram positive and gram negative bacteria. The results were compared with the standard drug Streptomycin (10µg/disc).[12]

Anti-oxidant study: The result of the present study shows that the ethanolic extract of the roots of *Clerodendrumserratum*(Linn.) Moon possesses antioxidant activity through the DPPH free radical scavenging activity, reducing power assay and scavenging of hydrogen peroxide.[13]

Leaves

Anti-diabetic activity:

These experimental results conclude that the extract of *Clerodendrumserratum*(Linn.) Moonis endowed with anti-diabetic potential.[14]

Anti-cancer activity:

The study reveals the efficacy of *Clerodendrumserratum*(Linn.) Moonagainst Dalton's Ascitic Lymphoma described in this investigation offers the potential for reaching on understanding of anti-cancer potency.[15]

Anti-bacterial activity:

This study reveals that the inhibitory activity of n-Hexane leaf extract of *Clerodendrumserratum*(Linn.) Moonwas concentration dependent.[16]

Neuroprotectiveactivity:

This study concluded that ethanolic extract of *Clerodendrumserratum*(Linn.) Moondemonstrated significant anti-depressant and neuro-protective effect, thereby preventing or slowing the progression of various oxidative stress induced disorders.[17]

CONCLUSION:

The published researches in this paper are stated according the sequence mentioned in table no :1. After reviewing all these articles it is observed that this plant have the anti-asthmatic activity, anti-inflammatory activity,anti-allergic activity,anti-bacterial activity,anti-oxidant activity ,anti-diabetic activity,anti-cancer activity and neuro-protective effect.*Clerodendrumserratum*(Linn.) Moon has been studied for different pharmacological activities, using different parts (root ,stem, leaf) and using various animal models.*Clerodendrumserratum*(Linn.) Moonwith immense pharmacological activities has been reviewed with an aim to provide a reference source to plan further research strategy on the plant for the unexplored Pharmacological uses of *Clerodendrumserratum*(Linn.) Moon.

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Table 1 : Researches on *Bharangi*

Plant/ Bharangi	Research	Reference
1) Root and Stem	Toxicity study	Sarathchandiran I et al. 2014
2) Root and Stem	Anti-asthmatic activity	S.S.Bhujbalet al. 2009
3) Root and Stem	Anti-inflammatory activity	N.K.Bhangare et al. 2012
4) Root and Stem	Anti- allergic activity	N.K.Bhangare et al. 2012
5) Root and Stem	Anti- bacterial activity	Singh Mukesh K et al. 2012
6) Root and Stem	Anti-oxidant study	S.S.Bhujbal et al. 2009
7) Leaf	Anti-diabetic activity	Mihir. K. Kar et al. 2014
8) Leaf	Anti-cancer activity	Nagdeva. et. al. 2012
9) Leaf	Anti- bacterial activity	Malik Tafazul Rashid et al. 2018
10) Leaf	Neuro-protective activity	Babitha K. Vazhzyil. Et al. 2017