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Medical importance of *Gomphrena Globosa* - A Systematic Review

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ABSTRACT

Gomphrena globosa is commonly known as Globe Amaranth, is one of the traditional medicinal plant widely distributed in North America, Bangladesh and India. Traditional system of medicine consists of large number of plants with various medicinal and pharmacological importances and hence considered as a priceless lane of new bioactive molecules. Gomphrena species found all over the world and has been recognized in different traditional system of medicines for the treatment of various diseases of human being. Globe Amaranth is easily found in the gardens as an ornamental plant. It was empirically proven that medicinal plants have the ability to cure certain diseases such as dysentery. All parts of the plant can be used as medicine. It is used in folk medicines for the treatment of different ailments. It is used in the treatment of high blood pressure and used for oliguria, heat and empacho. It is a popular edible plant and used as food colorant. The present review is to focus on the pharmacological activities and potential of phytochemicals of the plant *Gomphrena globosa*. It comprises approximately 120 species. Phytoconstituents present in it are flavanoids, phytosterols, phenolics, Betacyanins and terpinoids. Plant parts are mainly used to treat body sore, malaria, Bacterial infections and Jaundice, urinary problem, high cholesterol, cough, fever, diarrhea, liver disorders, kidney disorders and cooling. Further work is recommended to isolate and characterize the bioactive compounds which are responsible for the activities in the plant.

INTRODUCTION

Medicinal plants have been playing a vital role on the health and healing of man since down of the human civilization. Nature always stands as a everlasting source of novel chemo types and pharmacophores and has been a source of medicinal agents for millennia and a remarkable number of modern drugs find their origin in natural products. Medicinal plants a significant role in the human health care system and have been known to an important potential source of the therapeutic or curative aids[1]. Many secondary metabolites of the plant origin are commercially important and find use in a number of pharmaceutical compounds[2]. Nations with highly developed pharmaceutical industries are mainly interested in plants as a source of biologically active and medicinal importance compounds which might be lead to discovery of new and better drugs with pharmacological potency[3]. The extracts of the medicinal plants can be used directly or indirectly or for the treatment of different ailments[4]. Due to their therapeutics potential and search on medicinal plants have led to the discovery of novel drugs against diverse diseases. Herbal medicines are in great demand because of their safety, efficacy and lesser side effects and these plant derived medicines are based upon the premise that they contain natural substances that can promote health, alleviate illness and provided to be safe, better patient tolerances, relatively less expensive and globally competitive[5].

The plants of Amaranthaceae family contain a wide range of pharmacologically active compounds and various types of traditional uses like oliguria, heat and emphaco. Amaranthaceae is a large family comprising around 10 subfamilies, 17 genera and 2400 species available all over the world. In the present review the ethno botanical information of plant *Gomphrena globosa* has been discussed.

Fig. : *Gomphrena globosa*

TAXONOMY

Scientific classification

Kingdom	- Plantae
Subkingdom	- Tracheobionta
Super division	- Spermatophyta
Division	- Magnoliopsita
Class	- Magnoliopsida
Subclass	- Caryophyllidae
Order	- Caryophyllales
Family	- Amaranthaceae
Genus	- Gomphrena L
Species	- globosa[6]

VERNACULAR NAMES

English	- Globe Amaranth, Bachlor's button
Hindi	- Gulemakhamal
Malayalam	- Vadamalli
Manipuri	- Chengkruk [7]
Bangladesh	- Botamphul [8]

COLLECTION AND AUTHENTICATION OF PLANT MATERIAL.

The plant of *Gomphrena globosa* was collected from local area of Bharathinagara, Mandya District, Karnataka State. The plant were identified and authenticated by Department of Botany, Bharathi College of Pharmacy, Bharathinagar, Maddur Taluk, Mandya District, Karnataka State.

PREPARATION OF CRUDE EXTRACT

Extracts of crude plants were produced using the Soxhlet extraction method. Approximately

20 g of powdered plant material was uniformly packaged in a thimble and extracted separately with 250 ml ethanol. The extraction process continuous for 24 hours or until an extractor's solvent in siphon tube is colorless. The extract was then taken in a beaker and kept hot and heated at 30-40°C until all the solvent was evaporated, for future use in phytochemical analysis[9].

BOTANICAL DESCRIPTION

Gomphrena *globosa* commonly known as globe Amaranth and bachelor's button belongs to the family Amaranthaceae. Globosa is native to North America, South America, Myanmar and India. It also well grows over regions of Brazil panama and Bangladesh[5]. *G.globosa* is an topical annual plant. *G.globosa* blooms continuously throughout summer and early fall. It is very heat tolerant and fairly drought resistant, but grows better best in full such and regular moisture[8].This species is a shrub with single flower that comes from the end of the steam. Rounded shape like a ball, dark red purple, white or pink in color. It grows about 1-2 feet. Leaves are opposite, oblong, sub sessile, 5-10cm long. Heads 2.5-3.7 cm diameter. Pinkish purple, Globose with two leafy bracts terminating the branches. The individual flowers withinthe flower heads are inconspicuous but the stiff papery bracts that from the bulk of the structure are colorful and purple. Fruit a capsule, oblong, ovoid, compressed, seeds are ovoid brown, shining, almost smooth[10].

PHYTOCONSTITUENTS.

Twenty four chemicals have been detected in *Gomphrena globosa* including six phenolic acid derivatives and fifteen specific flavanoids. A major phenol was found to be kaempferol - 3-0- sulinoside flavanoids include quercetin. Kaempferol and Isorhamnetin derivatives[11].Phytochemical screening of Gomphrena *globosa* ethanol extract detected the presence of saponins, alkaloids, reducing sugars, coumarins, catecholamines, tannins, lactones, and quinalones, steroids, triterpinoids and essential oil obtained by phytochemical screening test of ethanol, ethyl acetate and n-butanol extract. Steroids such as campesterol, β- sitosterol and sigmasterol were identified from the benzene fraction of aerial parts on column chromatography. Four volatile compounds nonanal, decanal, geranyl, acetone and 4, 8, 12- tetra decaqrtrienal and 5, 9, 13-trimethyl were commonly detected in the floral emits of globe Amaranth[12]. Chrysoerol-7-β-D-glucoside.Betacyanins such as Isogomphrenin II and

Isogomphrenin III other 4 structural types of betacyanins have been reported. Betanin, gomphrenin, amaranthin, and bougainvellein[13]. Friedelin and epifriedeninol were produced in the $CHCl_3$ fraction of aerial parts on the column chromatograph. Stigma sterol-β-D-glycoside and gomphsterol were found in the n-butanol fraction of the aerial parts on the column chromatograph. C_6H_6 and $CHCl_3$ soluble fraction of aerial parts on the column chromatograph. Stigmasterol-β-D-glucoside and gompsterol were found in the n-butanol fraction of the aerial parts on the column chromatograph. C_6H_6 and $CHCl_3$ soluble fractions of the flowers on the column chromatograph gave friendlin. Allatoin and chryosoeriol-7-0-β- D-glucoside found in n-butanol fraction of flowers.

FOLK USE

The plant is used as coagulant. Other uses are Antioxidant, Antimicrobial, Cytotoxic, Cancer, Antinflammatory, Reproductive problems used for reducing higher Cholesterol level, Kidney problems etc.

Pharmacological activities

Antinflammatory activity: Andrade *et al*[14]., determined the 24 phenolic compounds and eight betacyanins by HPLC-DAD in three different extracts of Gomphrena globosa inflorescences-globosa inflorescences has the potential as a source of antinflammatory compounds. Roots are used as Analgesic for tooth acne.

Antimicrobial, Antioxidant and Cytotoxic activities: Hamidazzaman and Azam *et al*[15]., Subjected the crude methanol extract and its hexane, Carbintetrachloride chloroform and aqueous soluble fractions of Gomphrena *globosa* to antimicrobial, antioxidant and brine shrimp lethalitics bioassays.

Antimicrobial activity: Dias *et al*[16]., screened the methanol extract and pure compounds of *Gomphrena celosiodes* for anti microbial activity by Kirby-Bver-Method.

Anticancer agent: Babuet *et al*[17]., reported that the phytochemical analysis of chloroform extract at *Gomphrena serata* and reported the presence of carbohydrate glycosides, amino acids, terpinoids, flavanoids, phenolic and phytosterols. Letha *et al*[18]., performed a safety to investigate Anticancer activity of chloroform extract of serial parts of Gomphrena *globosa* against Ehrlich Ascites Carcinoma[EAC] induced solid tumour.This study showed that the extract was non toxic up to 2000 mg/kg body weight.

Organic sulfur fertilizer: Wanget *et al*[19]., explored that *G.globosa* absorb atmospheric sulfides. When may be of agent importance of ameliorating the environment and for forming a green organic sulfur fertilizer used to balance insufficient soil sulfur content for intensive cultivations of China.

Urinary problems: Lans *et al*[20]., reported a non experimental validations was on the plant used for urinary problems and diabetes mellitus. The study revealed that is plant species belonging to thirteen families of are used as anti-urolithiactic agents in local remedies.

Analgesic activities: Hamiduzzaman *et al.,*[21] investigated the central and peripheral analgesic activity of *G.globosa* the wound healing activity to the tribal people of Bangladesh.Oladele[22] *et al.,* were reported that Anti-inflammatory and *Memordica charantia* in rats and mice.

Cooling and cough: In Trinidal, The flowers of Gomphrena are boiled to make a tea which is used for baby gripe, oliguria, cough, and diabetes and cooling.

Food colorant: Corke *et al.,*[23] reported that the fresh crude extract samples Gomphrena without any purification was used for MALDI-QIT-TOF MS analysis using 2,5- dihydroxybenzoic acid as a matrix fourteen free and acylated betacyanins, belonging to amaranthin type betacyanins, respectively were identified 'Lans[24] Confirmed that the Gomphrena *globosa* flowers contains betacyanins which have potential as food colorants and antioxidants.

Reproductive problems: *Gomphrena globosa* are used for prostate and reproductive problems[25].The root decoction of *Gomphrena demissa mart* in a liter of water is used for the treatment of female sterility, amenorrhea, inflammation and ovarian diseases.

CONCLUSION

The studies on *Gomphrena* species elaborate the biological and medicinal applications in various ways from the ancient time have been discussed in the present review. I t has been used throughout India not only as an ornamental source but also as a natural remedy for treatment of kidney failure and reproductive problems, cough, etc., On the basis of the above biological screenings and folk medicinal uses it can be concluded that this plant has significant medicinal properties and hence it can be carried out to isolate and characterize the active compounds responsible for this activities in the plant is recommended. The present knowledge on medicinal uses of plants needs scientific investigation to confirm their medicinal values.

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