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THERAPEUTIC POTENTIAL OF SHITIVAR (CELOSIA ARGENTEA L.)

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ABSTRACT

Since ancient time, medicinal plants have been the major source of drugs. They play vital role in the drug development programme and providing nutrition and treatment of various diseases for man. In rural areas, traditional healers gain more prominence in the use of plants of ethnomedicinal origin for prophylaxis and cure of disease. *Celosia argentea* Linn. is widely used in traditional medicines to cure several disorders such as kidney stone, fever, diarrhoea, inflammation, jaundice, gonorrhoea, itching, wounds, mouth sores, bleeding piles, bleeding nose, gastrointestinal diseases, haematological disorders, uterus disorder, rheumatoid arthritis, snakebite and as abortifacient. Literature review from Vedic, *Ayurvedic* and contemporary literature like books, Journals of traditional Indian medicine revealed that *Celosia argentea* Linn. has a lot of medicinal properties. A variety of phytoconstituents have been isolated fromthe *Celosia* species which includes phenols, tannins, flavonoids, amino acids, carbohydrate, phenolic acids, novel triterpenoids saponins including Celosin E, F, and Celosin G together with a known compound Cristatain, betalain, alkaloids which include Celogenamide A, celosin, amaranthin. This plant has potential pharmacological activities such as, anti–inflammatory, immuno–stimulating, anti-urolithiatic, anti–diabetic, anti–diarrhoeal, wound healing, anti–oxidant activity, anti–metastatic activity, anti–hepatotoxic activity and eye disorders. Different parts of the plant are reported to be used of which seed is most frequently used part. Present review is an attempt to validate classical claims regarding therapeutic efficacy of *C. argentea* Linn. on the basis of evidences collected from various pharmacological studies.

KEYWORDS: *Celosia argentea* Linn, Phytochemistry, Pharmacological activity,

Traditionaluses.

INTRODUCTION

Human civilization has been using medicinal plants since the Vedic times. While defining the term *Ayurveda, Acharya Charak* has given the importance to *Dravya*. While explaining *Sapta padhartha, Acharya Charaka* has given importance to Dravya firstly and mentioned that every substance on earth is medicine (*Aushadhi Dravya*) when it is used rationally in proper doses and formulation. In developing countries, the majority of people living in rural areas, almost exclusively depend upon traditional medicine in treating all sorts of diseases. It, thus, becomes important to identify and evaluate commonly available natural drugs.

Celosia argentea is an herbaceous plant belonging to the family Amaranthaceae and one of the leading leafy vegetables. *Celosia* species have been designated as a quantitative short-day plant with alternate entire or rarely lobed leaves. It is an erect annual herb up to 2 meters tall. The stem is rigid and glabrous. The leaves are alternate, simple, without stipules; petiole indistinctly demarcated; blade ovate to lanceolate – oblong or narrowly linear, up to 15cm. X 7 cms., tapering at base, acute to obtuse and shortly mucronate at apex, entire, glabrous and pinnately veined. Inflorescence a dense, many flowered spikes at first conical but becoming cylindrical up to 20 centimetres long, silvery to pink in ornamental forms completely or partly sterile and in many colours. Flowers are small, bisexual, regular pentamerous, tepal free, narrowly elliptical oblong, 6-10 mm long, stamen fused at base, stigma 2-3, very short. Fruit is an ovoid to globose capsule 3-4 mm long, few seeded with seeds being lenticular, 1-1.5 mm long, black, shinning, shallowly reticulate.[1] *C. argentea* is an annual dicotyledon (Ron et al., 1995; Jain 2005). The plant of *C. argentea* is shown in Figure 1.

MATERIAL AND METHODS

A thorough literary survey was conducted as a part of MD (Ay) Dravyaguna research study. Literary review includes ancient texts starting from Vedic literature to contemporary texts including indexed and peer reviewed journals for collection of information's regarding pharmacological properties and therapeutic uses. The information collected from different sources has been critically analysed to validate ancient claims with evidences from pharmacological screening studies.

OBSERVATIONS

On reviewing the available Vedic, Classical and contemporary texts, it was observed that the drug *Celosia argentea* is identified as the botanical source of the classical drug *Shitivar* by scholars of *Ayurveda*. In Vedic texts, there is no drug mentioned with the name of *Shitivar*.

Table No. 1: *Celosia argentea* in Classical Texts.

Texts	*Gana/ Varga/ Skandhas*	Properties / Indications	Part Used	Pharmacological Attributes		
				Rasa	*Guna*	*Veerya*
Charak Samhita[2]	*Trimarmiya Adhyaay*	Dysuria	Seed	-	-	-
Sushruta Samhita[3] *& Ashtanga Hridaya*[4]	*Veertarvadi Gana*	Disorders caused by *Vata*, Urolithiasis, Crystalluria, Dysuria, Retention of Urine, and Pain	Whole Plant	-	-	-
Dhanwantari Nighantu[5]	*Shitivar*	Absorbent, Pacifies all three *doshas*, cures diseases of Heart, Spleen, Abdominal lump, Haemorrhoids and is best bladder cleanser	Whole Plant	*Kashaya* (Astringent)	-	-
Siddhamantra Nighantu[6]	*Kaphagna Pittahar Dravya*	*Kaph-pitta* pacifying	Whole Plant	-	-	-
Madanpal Nighantu[7]	*Shitvar naam guna*	Mild laxative, Aphrodisiac, Relieve Swelling and aggravates *Vata* and *Pitta doshas*	Whole Plant	-	*Sara* (Laxative)	-
Raj Nighantu[8]	*Shatahvaadi*	Absorbent, Pacifies all three *doshas*, Improves intellect,relishing, relieves burning,fever and act as rejuvenator.	-	*Kashaya* (Astringent)	-	*Ushna* (Heating)
Kaiyadev Nighantu[9]	*Aushadhi Varga*	Aphrodisiac, *Vata* and *Pitta* Aggravating, relieves *Vata* Lodged in bladder, cures Dysuria, Urolithiasis, haematuria.	Whole Plant	*Madhura* (Sweet), *Katu* (Pungent) *Patu* (Salt), *Tikta* (Bitter)	*Ruksha* (Dry), *Sara* (Laxative) *Guru* (Heavy)	*Sheeta* (Cooling)
Shaligram Nighantu[10]	*Shakavarga*	Alleviates worms, dysuria	Whole Plant	-	-	-
Priya Nighantu[11]	*Shatpushava di Varga*	Urolithiasis, Dysuria	Whole Plant	*Madhura* (Sweet)	-	*Sheeta* (Cooling)
Madanadi Nighantu[12]	*Vinshg Gana*	Aphrodisiac, pacifies Haemoptysis, rejuvenator, relieves Dysuria and *Vata* lodged in bladder.	Whole Plant	*Madhura* (Sweet)	-	*Sheeta* (Cooling)
Abhidhan Ratnamala[13]	*Madhura Skandh*	Will pacify *Vat-Pitta*, Nourish body tissues	Whole Plant	*Madhura* (Sweet)	-	-
Abhidhan Manjari[14]	*Madnadi gana, Vellantaraadi Varga*	Pacify *Vatadoshas*, cure Urolithasis, Crystalluria, Dysuria, Retention of Urine, and Pain	Whole Plant	-	-	-

Properties and Action[9]

Rasa: Madhura, Katu, Lavan, TiktaGuna: Ruksha, Guru, Sara

Virya: Sheeta

Vipaka: Madhura

Karma: Tridoshahara, Bastishodhaka, Samgrahi, Mutrala, Vrsya, Snehana, Medhya, Rasayan.

According to *Sushrutacharya* and *Dhanvantari Nighantu, Rasa* of *shitivar* is *Kashaya* whereas *Kaiyadev Nighantu* has described four *rasa* as *Madhur, Tikta, Katu, lavana.*

Guna Karma[7]

According to *Dhanvantari Nighantu, Shitivarak* has astringent effect. It pacifies *tridoshas* i.e. *Vata Pitta Kapha*. It acts on cardiovascular system as cardiac tonic, and effectively works on bladder disorders. It mainly acts on calculi (renal) and also possesses activity on anorectal disorders.

Table No. 2: Taxonomical classification.[15]

Kingdom	Plantae – Plants
Subkingdom	Tracheobionta – Vascular Plants
Division	Magnoliopsida – Flowering Plant
Superdivision	Spermatophyte – Seed Plants
Class	Magnoliopsida – Dicotyledons
Subclass	Caryophyllidae
Order	Caryophyllales
Family	Amaranthaceae
Genus	*Celosia*
Species	*Argentea*
Binominal name	*Celosia argentea* Linn.

Vernacular name[16]

Botanical Name: *Celosia argentea* Linn.

English Name: Silver cockscomb, white cockscomb, Flamingo feathers, wheat celosia. Sanskrit Name: *Shitivar*

Hindi Name: *Siriyaari, Suravaali, Siravaari*

Marathi Name: *Kurdu, kurda*. Gujarati Name: *Laanpadi, Lonpadi* Punjabi Name: *Suravali*

Morphology[17]

Celosia argentea belongs to Amaranthaceae family. It is a shrub of erect stem, leaves of various size 2.5 to 10 by 0.6 to 3.2 linear, acute entire, glabrous base much tapering into a

short petiole or leaves sessile. Flowers are first pinkish and afterword glistening white, crowded and imbricate enclosed, cylindrical blunt or acuminate terminal spike. Perianth 8mm long or more sepals linear lanceolate acute scarious with three close parallel slender on back stamens. Capsule 3.4 mm long ellipsoid tapering at apex into style. Seeds 4.8 subreniform, compressed 1.5 diameter, black, polished and shining.

Distribution[18] India: all over India**;** Other Country: Nepal, Bhutan, SE Asia, China, Japan, Korea, tropical Africa, at altitudes of 500- 1600m.

Ethnomedicinal uses[19]

Edible uses

- Leaves and young shoots, used as a vegetable, used in soup and stew. The leaves retain a pleasant green colour when cooked.

Medicinal uses

- The flower and seeds are astringent, haemostatic, ophthalmic and poultice.
- They are used in the treatment of uterine bleeding, leucorrhoea, dysentery and diarrhoea.
- Poultice of leaves, coated with honey, used as cooling application to inflamed areas and painful condition such as abscesses.
- It is used for the treatment of fatigue, atherosclerosis, leucorrhoea and osteoporosis.
- Whole plant is used as antidote for snake – poison.
- Seeds are traditionally used to treat jaundice, gonorrhoea, wounds, and fever.
- Seed powder administered in dose of 5 gm daily give result in kidney stone.

Phytochemistry[20]

Multiple classes of chemical constituents have been isolated and identified in different investigations, including saponins, peptides, phenols, fatty acid, amino acids, minerals.

Table 3: Phytochemicals reported in different plant parts of *C. argentea*.[19]

Part of plant	Class	Chemical constituents
Seed and Leaf	Aminoacids	Alanine, Glycine, Arginine, Lysine, Glutamic acid, Valine, Methionine, Abscisic acid, Phenylalanine, Serine, Tyrosine, Proline, Cystine, Threonine, Ornithine[21]
	Minerals	K, Ca, Mg, Na, Fe, Mn, Cu, Zn, S, Si, Hg, Cr.[21]
Seed	Saponins	Celosin A, B,[22] C, D,[23] E, F, G, H, I, II,[24] H, I, J;[25] Cristain[26]
	Cycpeptide	Moroidin,[27] Celogentins A, Celogentins C,[28] Celogenamide A[29]
	Fatty acids	Arachic acid,[30] Arachidonic acid,[31] Linolenic acid,[30]

		Hexadecanoic acid[21], Oleinic acid[30], Linoleic acid[30], Palmitoleic acid,[30] Octadecanoic acid,[21] Octadecanoic monoenoic acid[21]
Leaf	Phenols	Lutin, Epigallocatechin-tt[32]
Seed	Others	ß-Sitosterol, Cholesteryl palmitate, 3-4–Dihydroxyl benzalde-hyde, ꝑ-Hydroxybenzoic acid, 3, 4-Dihydroxy benzoic acid, n-Butyl-ß-d-fructose glycoside, Sucrose,[33] Stigmasterol, Oleanolic acid, Daucosterol.[34]

Biological activities reported in *Celosia argentea*

1) **Anti-Urolithiatic activity[35]-** Ethanolic extract of *Celosia argentea* (Seeds) was evaluated for its anti-urolithiatic activity in rats. Ethanolic seed extract at a dose level of 250 Mg/Kg body weight (low dose) to 500 Mg./Kg (high dose) demonstrated antiurolithiatic activity in ethylene glycol induced urolithiasis in animal models (rats). Thus, use of *C. argentea* for prophylaxis and treatment of urolithiasis stands authenticated.
2) **Anti–Diabetic activity[36] –** Vetrichelvan et al. (2002) researched the anti-diabetic effect of alcoholic extract of *Celosia argentea* seeds in alloxan–induced diabetic rats. The continuous treatment with alcoholic extract of *C. argentea* seeds for a period of fifteen days produced a significant decrease in the blood glucose levels of diabetic rats.
3) **Anti–Diarrheal activity[37]** – Anti-diarrheal potential of *Celosia argentea* leaves was studied by Sharma et al. in 2010. An alcoholic extract of *C. argentea* leaves effectively inhibit castor oil induced diarrhoea, Charcoal meal induced diarrhoea and prostaglandin E (PGE) induced diarrhoea in rats. The results of the study showed that the extract of *C. argentea* leaves inhibited diarrhoea within a dose of 100 to 200 mg/kg.
4) **Wound healing activity[38]** – Studies conducted by Priya et al. by using an ointment formulated on alcoholic extract of *Celosia argentea* in rat burn wound model demonstrated a salutary action of the *C. argentea* extract on wound healing. This may be due to mitogenic promotion of dermal fibroblasts (Priya et al., 2004)
5) **Anti–oxidant activity[39]** – Urmila et al., 2013 carried out an in vitro- antioxidant study of methanolic extract of *C. argentea* leaves. In study they showed that plant leaf exhibited in vitro antioxidant activity on DPPH, NO, and H_2O_2 radical scavenging in models and established that the phytochemical constituents present in the plant extract possess anti-oxidant properties. In another study, invitro and in vivo antioxidant activity of aqueous extract of *C. argentea* leaves was studied by Malomo et al. in 2011 and reported that 10 mg/ml of the extract inhibited linoleic acid oxidation for ascorbic acid. In addition, 2 mg/ml of the extract produced a membrane stabilizing activity against indomethacin.

6) **Anti–metastatic and immunomodulating activities**[40] – The anti-metastatic and immunomodulating properties of the water extract from *Celosia argentea* seeds for 7 days before tumour inoculation significantly inhibited liver metastasis caused by intraportal injection of colon 26 – L5 carcinoma cells in a dose–dependent manner and also production of maximal levels of IL–12 and interferon (IFN) – gamma in serum were achieved at 2-3 and 6 hour, respectively. Study was conducted by Hayakawa et al. in 1998. Celosin A was reported to be effective in the apoptosis of human cervical cancer Hela cell 1 (Huang et al., 2013) and HepG2 cell (Cheng et al., 2013), (Wu et al., 2011) tested four triterpenoid saponins had a certain degree of inhibition of cancer cells. They concluded that *C. argentea* is a potent agent for tumour treatment.
7) **Hepatoprotective effect**[41] – Seeds of *C. argentea* were found to be a potent anti–hepatotoxic. As we known, liver is the most important channel and hepatoprotection is a main effect of *C. argentea*. Hase et al. (1996) found that the celosian, an acidic polysaccharide from the Semen Celosia, is a potent anti–hepatotoxic agent for chemical and immunological liver injury models in animals. Celosian is also an immune-stimulating agent in addition to its anti–hepatotoxic effects (Hase et al., 1997). It induces tumour necrosis factor–α (TNF–α) production, the production of interleukin–1beta (IL-1beta), and nitric oxide (NO) in macrophage cell line J774.1 in a concentration–dependent manner (1- 1000µg/ml). Moreover, celosian induces IL-1beta secretion in human mononuclear cells. In addition, celosian also enhanced the gamma interferon (IFN-gamma) production activityof concanavalin A (Con A) in mice spleen cells. Although celosian alone did not significantly influence IFN–gamma production.
8) **Therapeutic effect on eye disease**[42]**:** *Celosia argentea* is widely used as traditional medicine and effective herb for treating eye diseases with a long history in China and Japan. Compatible with other herbs, *Semen Celosiae* is being used to treat Keratitis, Epiphysitis, iridocyclitis, Optic atrophy. Huang et al., 2004b researched the effects of four Chinese herbs, which pass through the liver channel, on improving eye sight and on protecting oxidative injury of lens and apoptosis of lens epithelial cells. The water extract of Semen Celosiae could decrease the oxidative damage of lens, inhibit lens epithelial cells apoptosis, and reduce lens opacity, better than Catalin eye drops. Liu et al., 2007 observed the treatment of 20% water extract of *C. argentea* on senile cataract, compared with an effective drug, Catalin eye drops. The therapeutic effect of *Semen Celosiae* on senile cataract was not significant. In both administration routes, there were no iritis, cornea injury, or choroiditis side effect.

DISCUSSION

Celosia argentea has been widely described and indicated for the management of various diseases in classical texts of *Ayurveda*. The plant has also been used in traditional Chinese medicine with a long history. A number of chemical compound including Oleanane – type triterpenoid saponins (Celosin H, I & J), Cristatain, Celosin E, Celosin F, Celosin G, havebeen isolated from *Celosia argentea*. It's various indications in *Ayurveda* and medicinal uses in folk-medicine has been authenticated by biological activities demonstrated in various pharmacological screening studies both in vitro and in vivo models. In addition, no serious side effects or marked toxicity of *C. argentea* have been reported. Yet a further study is still urgently needed to gain a better understanding of *C. argentea*.

CONCLUSION

Celosia argentea is an important medicinal herb growing as weed in various parts of country. Classical drug *Shitivarak* has been equated with *C. argentea*. It is worth consideration that in present day *Ayurveda*, use of this potential herb is limited and there is not even a single formulation in the market. Use of this potent herb has been limited to folk-medicine only. Therefore, it is the need of the hour that *C. argentea* must be properly investigated for its therapeutic efficacy in clinical trials and induced to the main stream of Ayurveda therapeutics.

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