

## A CRITICAL REVIEW OF *SUDARSHANA* PLANT (*CRINUM LATIFOLIUM* L.) - AN EXTRAPHARMACOPOEIAL DRUG W.S.R. TO ITS AUTHENTIC BOTANICAL SOURCE IN CURRENT ERA

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Article Received on 23/11/2024

Article Revised on 13/12/2024

Article Accepted on 02/01/2025

### ABSTRACT

*Ayurveda* is one of the most well-known ancient medical systems that has endured and grown throughout the millennia. Present study is focused on critical analysis of an *anukta dravya* (extrapharmacopoeial drug) - *Sudarshana* for its comprehensive review and authentic botanical source. *Sudarshana* (*Crinum latifolium* L.) also known as *Sukhdarshana*, *Chakrahva*, *Madhuparni* etc. belongs to family Amaryllidaceae is widely used in *ayurveda* mainly for painful swellings, fevers of unexplained origin, poisoning, ear disorders and skin ailments. There are various chemical constituents present there such as Crinamine, Lycoricidine, Lycoriside, Crinasiatin, Hippadine, Crinine, Crinasiatine responsible for its pharmacological activities like anti-inflammatory, anti-diarrhoeal, hypoglycemic, antioxidant, hepatoprotective, antipyretic, antimicrobial, anticancer, anti-ulcer, antisecretory, hepatoprotective, hypoglycaemic and wound healing. *Sudarshana* is *Ruksha*, *Teekshna guna*, *Tikta rasa*, *Madhura Vipaki* and *Ushna Virya*. There is no direct as such reference of *Sudarshana* mentioned in texts of *Vedic & Samhita Kala*. However, it comes under recognition in *Nighantu Kala* found at various instances in various lexicons. This review critically evaluates the historical and contemporary perspectives of *Crinum latifolium* as *Sudarshana* focusing on its ethnomedicinal relevance, phytochemistry, pharmacological evidence and safety profile. There are three varieties of *Sudarshana* known in practice as *Sudarsahana*, *Brihatkandali* (*Nagadamani*) and *Kandali* resp. as *Crinum latifolium*, *Crinum asiaticum* and *Crinum defixum*. The analysis seeks to bridge gaps between ancient texts and modern research offering insights into its relevance and applications in the current era. This critical appraisal aims to establish a standardized understanding of botanical source, ensuring its appropriate use in clinical and research contexts.

**KEYWORDS:** *Sudarshana*, *Crinum latifolium*, Literary review, Pharmacology, *Crinum*.

### INTRODUCTION

The word *anukta* is derived from the root ‘*n -ukta*’ with negation attached to the basic root. Thus *anukta* literally means ‘*ana*’ meaning ‘no/un’ and ‘*ukta*’ ‘written/said’ meaning unsaid and unuttered. Definition: “*nuktam-anuktam*.” i.e., which has not been said or stated or documented in *Ayurvedic* texts. *Anukta dravya* or Extrapharmacopoeial drugs means all those folklore plants not mentioned in *Ayurvedic* classical literature which include majorly *Brihatrayee*, *Laghutrayee* and Classical *Nighantu*. For example *Sudarshana* not described in *Samhita* and *Veda*. A historically significant plant, *Sudarshana* (*Crinum latifolium* Linn) is valued for its therapeutic qualities. Many synonyms have been used for it in *Ayurveda* such as *Nagdaman* (the large wide leaves resemble a snake hood), *Medhi* (it helps with

memory), *Jambu* (the fruit looks like *jambu* fruit), *Dudarshan* (because the crushed fruit smells bad), *Chakravaha* (because the flowers grow in a circle and on umbels) and *Madhuparnika* (the leaves taste sweet and bitter). It belongs to family Amaryllidaceae and is widely used in *ayurveda* mainly for painful swellings, fevers of unexplained origin, poisoning and skin ailments. The main chemical constituents of *Sudarshana* are Crinamine, Lycoricidine, Lycoriside, Crinasiatin, Hippadine, Crinine, Crinasiatine, Methyl linoleate, Crinidine Glucans A & B, Alkaloids-zeylamine crinofoline, crinofolidine, tazetine, flexinine, harmenthamine, ambelline, galanthamine.

The leaves contain alkaloids latifine, cherilline, 3-O-acetamine, crinomine and crinine. Thus the plant has

diverse pharmacological actions. It exhibits various pharmacological effects like anti-inflammatory, anti-diarrhoeal, hypoglycemic, antioxidant, hepatoprotective, antipyretic, and antimicrobial activities anti-bacterial, anticancer, anti-ulcer, antisecretory, hepatoprotective, hypoglycaemic, sore throat and wound healing etc. There are over 180 species in the genus *Crinum*, which includes a family of lovely perennial plants. They can be used as decorations, in the garden or in bouquets. They are also known by a variety of names such as swamp lily, spider lily, and trumpet lily. A tropical plant, criums are found in Asia, the South East, Australia and Pacific islands. They have also expanded to the Caribbean, Florida and Louisiana.

## AYURVEDIC REVIEW

### 1). HISTORICAL REVIEW

The Literary Review of *Sudarshana* is classified into three periods i.e. *Vedic Kala*, *Samhita Kala* and *Nighantu Kala* respectively.

#### A) VEDIC & SAMHITA KALA

There is no direct as such reference of *Sudarshana* mentioned in texts of *Vedic & Samhita Kala*.

#### B) NIGHANTU KALA

*Sudarshana* comes under recognition in *Nighantu Kala* found at various instances in various Lexicons. Following is the description mentioned at different places with its Synonyms, Properties and Therapeutic Uses.

Table no. 01: *Sudarshana* in various groups as reported in *Nighantu*.

| S.no. | Nighantu                         | Varga                                       |
|-------|----------------------------------|---|
| 01.   | <i>Bhavprakash Nighantu</i>      | <i>Guduchyadi Varga</i> <sup>[1]</sup>      |
| 02.   | <i>Kaiyadeva Nighantu</i>        | <i>Oshadhi Varga</i> <sup>[2]</sup>         |
| 03.   | <i>Shaligram Nighantu</i>        | <i>Guduchyadi Varga</i> <sup>[3]</sup>      |
| 04.   | <i>Madanpal Nighantu</i>         | <i>Abhyadi Varga</i> <sup>[4]</sup>         |
| 05.   | <i>Nighantu Adarsh</i>           | <i>MusaliKandai Varga</i> <sup>[5]</sup>    |
| 06.   | <i>Brihat Dravyaguna Adarsha</i> | <i>KrishnaMushlyadi Gana</i> <sup>[6]</sup> |

## BHAV PRAKASH NIGHANTU

### ➤ Synonyms

सुदर्शना सोमवल्ली चक्राह्वा मधुपर्णिका |  
(भावप्रकाश-पूर्वखण्ड-मिश्रप्रकरण - ४. गुडुच्यादिवर्ग/258)<sup>[7]</sup>

### ➤ Guna-Karma

सुदर्शना स्वादुरुष्णा कफशोफास्रवातजित् ||२७८||  
(भावप्रकाश-पूर्वखण्ड-मिश्रप्रकरण - ४. गुडुच्यादिवर्ग/258)<sup>[8]</sup>

## 2). CLASSICAL CATEGORIZATION<sup>[9]</sup>

Table no. 02: Classical Categorization of *Sudarshana*.

| S.no | Classical                             | Categorization                      |
|------|---------------------------------------|-------------------------------------|
| 1.   | <i>Bhavprakash Nighantu</i>           | <i>Guduchyadi Varga</i>             |
| 2.   | <i>Kaiyadeva Nighantu</i>             | <i>Oshadhi Varga</i>                |
| 3.   | <i>Shaligram Nighantu</i>             | <i>Guduchyadi Varga</i>             |
| 4.   | <i>Madanpal Nighantu</i>              | <i>Abhyadi Varga</i>                |
| 5.   | <i>Nighantu Adarsh</i>                | <i>Musali Kandai Varga</i>          |
| 6.   | <i>Brihat Dravyaguna Adarsha</i>      | <i>Krishna Mushlyadi Gana</i>       |
| 7.   | <i>Ayurveda Dravyaguna Vigyana</i>    | <i>Talmulyadi Varga</i>             |
| 8.   | <i>Dravyaguna Vijnana(P.V.Sharma)</i> | <i>Karnya Varga</i> <sup>[10]</sup> |

## 3). PARYAYA/SYNONYMS<sup>[11][15]</sup>

Table no. 03: *Paryayas/Synonyms* of *Sudarshana*.

| Sr. no. | Paryaya/Synonyms    | B.P. | K.N. | S.N. | M.P.N. | D.V.(P.V.) |
|---------|---------------------|------|------|------|--------|------------|
| 1.      | <i>Chakrahvah</i>   | +    | -    | -    | -      | -          |
| 2.      | <i>Chakranga</i>    | -    | -    | -    | +      | -          |
| 3.      | <i>Chakrangi</i>    | -    | +    | +    | -      | +          |
| 4.      | <i>Dadhyali</i>     | -    | +    | -    | -      | +          |
| 5.      | <i>Madhuparnika</i> | +    | +    | +    | +      | -          |
| 6.      | <i>Maeyaka</i>      | -    | +    | -    | -      | -          |
| 7.      | <i>Mechaka</i>      | -    | +    | -    | -      | -          |
| 8.      | <i>Somavalli</i>    | +    | +    | +    | +      | -          |
| 9.      | <i>Sudarshan</i>    | +    | -    | -    | -      | -          |
| 10.     | <i>Sudarshana</i>   | +    | +    | +    | +      | +          |
| 11.     | <i>Vatsadani</i>    | -    | +    | -    | -      | -          |

**EXPOSITION OF SOME SYNONYMS OF SUDARSHANA<sup>[16]</sup>****Table no. 04: Exposition of Paryayas/Synonyms of Sudarshana.**

| S.no. | Synonym                                 | Meaning  |
|-------|---|--|
| 1.    | <i>Chakrahvah, Chakranga, Chakrangi</i> | The Arrangement of Leaf is in a <i>Chakra</i> manner.            |
| 2.    | <i>Madhuparnika</i>                     | The Leaves tastes <i>Madhura</i>                                 |
| 3.    | <i>Somavalli</i>                        | Promotes strength and vitality                                   |
| 4.    | <i>Sudarshan</i>                        | Plant is very beautiful & pleasing to look at.                   |
| 5.    | <i>Sudarshana</i>                       | Plant which gives peace and happiness just by its <i>darshan</i> |
| 6.    | <i>Vatsadani</i>                        | Eaten by Calves  |

**4). PRABHEDA/VARIETIES**

In Ayurveda Classical texts following varieties of *Sudarshana* are found to be available.

**Table no. 05: PRABHEDA/VARIETIES of Sudarshana.**

| S.no. | Variety                         | Latin Name               | Author   |
|-------|---------------------------------|--------------------------|--|
| 1.    | <i>Sudarshana</i>               | <i>Crinum latifolium</i> | P.V. Sharma ( <i>Ayurveda Dravyaguna Vigyan</i> ) <sup>[17]</sup><br>Vaidya Banvari Lal Mishra ( <i>Dravyaguna Hastamalka</i> )  |
| 2.    | <i>Nagdamani/Brihat Kandali</i> | <i>Crinum asiaticum</i>  | P.V. Sharma ( <i>Ayurveda Dravyaguna Vigyan</i> )<br>Sri Bappa Lal Vaidya ( <i>Nighantu Adarsh</i> ) <sup>[18]</sup><br>Vaidya Banvari Lal Mishra ( <i>Dravyaguna Hastamalka</i> ) <sup>[19]</sup> |
| 3.    | <i>Kandali</i>                  | <i>Crinum defixum</i>    | P.V. Sharma ( <i>Ayurveda Dravyaguna Vigyan</i> )<br>Vaidya Banvari Lal Mishra<br>( <i>Dravyaguna Hastamalka</i> )   |

**5). RASA PANCHAKA/AYURVEDA ENERGETICS<sup>[20]-[24]</sup>****Table no. 06: Rasa Panchaka/Ayurveda Energetics of Sudarshana.**

| SUDARSHANA |                 | B.<br>P.<br>N. | K.<br>N. | S.<br>N. | M.<br>P.<br>N. | D.V.<br>(P.V.) |
|------------|-----------------|----------------|----------|----------|----------------|----------------|
| Rasa       | <i>Madhura</i>  | +              | +        | +        | +              | +              |
|            | <i>Tikta</i>    | -              | +        | -        | -              | +              |
| Guna       | <i>Ruksha</i>   | -              | -        | -        | -              | +              |
|            | <i>Teekshna</i> | -              | -        | -        | -              | +              |
| Veerya     | <i>Ushna</i>    | +              | +        | +        | +              | +              |
| Vipaka     | <i>Swadu</i>    | +              | +        | +        | +              | +              |

**6). DOSHA KARMA/AYURVEDA ENERGETICS<sup>[25][29]</sup>****Table no. 07: Dosha Karma/Ayurveda Energetics of Sudarshana.**

| SUDARSHANA<br>(DOSHA KARMA) | B.P.<br>N. | K.<br>N. | S.<br>N. | M.P.<br>N. | D.V.<br>(P.V.) |
|-----------------------------|------------|----------|----------|------------|----------------|
| <i>Vatashamaka</i>          | +          | +        | +        | +          | +              |
| <i>Kaphashamaka</i>         | +          | +        | +        | +          | +              |

**7). ROGAGHANTA/PHARMACOLOGICAL ACTIONS<sup>[30][34]</sup>****Table no. 08: Rogaghanta /Pharmacological Actions of Sudarshan.**

| SUDARSHANA<br>(ROGAGHANTA) | B.<br>P.<br>N. | K.<br>N. | S.<br>N. | M.<br>P.<br>N. | D.V.<br>(P.V.) |
|----------------------------|----------------|----------|----------|----------------|----------------|
| <i>Shoth</i>               | +              | +        | +        | +              | +              |
| <i>Rakta Vikara</i>        | +              | +        | +        | +              | +              |
| <i>Kapha Vikara</i>        | +              | +        | +        | +              | +              |
| <i>Vata Vikara</i>         | +              | +        | +        | +              | +              |
| <i>Karna Shoola</i>        | -              | -        | -        | -              | +              |
| <i>Karna Srava</i>         | -              | -        | -        | -              | +              |
| <i>Kushtha</i>             | -              | -        | -        | -              | +              |

## 8). TEXTUAL REFERENCES/FORMULATIONS OF SUDARSHANA

### 1. CHAKRADUTTA

चक्रमर्दकबीजानि जीरकञ्च समांशिकम्।

स्तोकं सुदर्शनामूलं दद्रुकुष्ठविनाशनम्। (चक्रवर्त 50/23)<sup>[35]</sup>

In case of *Dadru* and *Kushtha*, Equal quantity of seeds of *Chakramarda* and *Jeeraka* are to be taken along with *Sudarshana moola* powder.

### 2. RAJA MARTANDA

स्त्रीणांमज्जं प्रदशमयस्य प्रवृत्तिरुग्रा शममेति सद्यः।

सुश्लक्षणापिष्टेन पयोऽ न्वितेन पीतेन मूलेन सुदर्शनायाः॥ (राज मार्तण्ड 31/01)<sup>[36]</sup>

According to *Raja Martanda*; In case of Heavy Menstrual Bleeding, Paste of *Sudarshana moola* should be consumed along with Milk.

### 3. Mahasudarshana Churna & Sudarshna Vati<sup>[37]</sup>

In *Ayurveda* Classics, there are certain references to formulations in the name of *Sudarshana* drug, including *Mahasudarshana Churna* (*Bhaishajya Ratnavali*, *Jwararogadhikara*) and *Sudarshna Vati* (*Bhaishajya Ratnavali*, *Jwararogadhikara*). They are termed thus because not having *sudarshana* as main ingredient but having such capability in healing diseases exactly as like “the *sudarshana chakra*” of Lord *Vishnu* kills demons. One of the finest polyherbal Ayurvedic formulas, *Sudarshan Churna*, is used to treat a wide range of fevers, both acute and chronic, fever with no known cause, malaria, typhoid, appetite loss, jaundice, respiratory infections, cough, debility, and fever-related breathing issues. Improves immunity and protects the body from infections; stimulates diaphoresis and urine; improves digestion and appetite; and removes toxic substances from the blood. *Swertia chirayita* (Roxb. ex Flem.) Karst makes up half of the other ingredients in *Sudarshan Churna*.

## 9). CONTROVERSIES REGARDING BOTANICAL SOURCE OF SUDARSHANA

- There are various controversies regarding the original source of *Sudarshana* in our classic lexicons. As per *Bhavprakash Nighantu*, *Acharya* has mentioned *Sudarshana* and *Nagdamni* separately two drugs in *Guduchyadi varga*.<sup>[38]-[39]</sup>
- *Kayidev Nighantu* mentioned both these drugs in *Oshadha Varga* considering both as different entities.<sup>[40]</sup>
- *Madanpal Nighantu* addresses *Nagdamani*, *Balamota* and *Sudarshana* as three different drugs of *Abhyadi Varga*. As *Balamota* is also one of the Synonyms for *Ngadamini* in various classical texts but *acharya* here mentioned other *dravya* with same name.<sup>[41]-[42]</sup>
- *Shaligram Nighantu* also follows the same opinion in description of *Sudarshana* and *Nagdamini* in *Guduchyadi Varga*.<sup>[43]-[44]</sup>
- In *Nighantu Adarsh*, Author *Sri Bappa Lal Vaidya Ji* has explained *Nagdamni* as *Sudarshana* under name *Crinum asiaticum*. He has described the role of

Nasal instillation of *Sudarshana moola nasya* in *Mahasarpavisha*.<sup>[45]</sup>

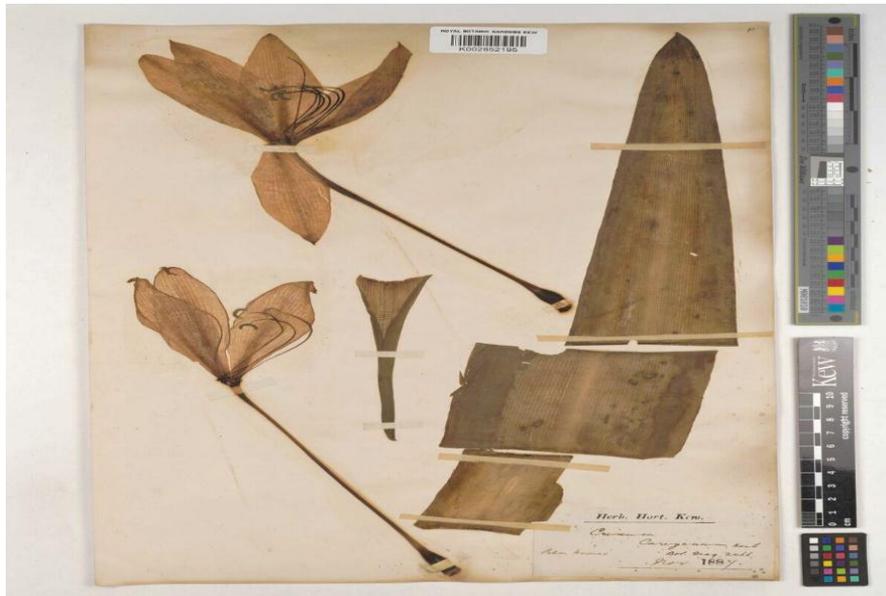
- *Acharya Priyavrat Sharma Ji* in his *Dravyaguna* text has mentioned *Sudarshana* under *karnya Varga* as *Crinum latifolium*. Also he has mentioned its two varieties as – *Brihat Kandali* (*Nagdamani*) and *Kandali* as *Crinum asiaticum* and *Crinum defixum* resp. He has mentioned its rhizome as toxic with its lethal dose 1.75 gms. Per Kg/Body wt.<sup>[46]</sup>
- Dr. *JLN Shastry* has mentioned *Nagadamani* and *Sudarshana* as different drugs. He has described *Nagadamani* as *Crinum asiaticum* also with syn. name *Crinum defixum*. Here *Sudarshana* is described with *Crinum latifolium* name.<sup>[47]</sup>
- Similarly Dr. *Gyanendra Pandey* explained *Sudarshana* as *Crinum latifolium* with its two varieties namely *Brihat Kandali* (*Nagdamani*) and *Kandali* as *Crinum asiaticum* and *Crinum defixum* resp.<sup>[48]</sup>
- *Vaidya Banwari Lal Mishra* in his book *Dravyaguna Hastamalka* describes it as *Crinum latifolium* and mention its two varieties which are *Crinum asiaticum* and *Crinum defixum*.<sup>[49]</sup>
- Dr. *S. D. Kamat* in his text *Studies on Medicinal Plants & Drugs in Bhavprakash Nighantu* describes *Sudarshana* as *Tinospora malbarica*. Also he differentiated this from *Sudarshan* which is known as *Crinum latifolium* in Bengal.<sup>[50]</sup>
- *Proff. J. K. Ojha* in his *Dravyaguna* text has mentioned *Crinum latifolium* as *Sudarshana*.<sup>[51]</sup>
- *Thakur Balwant Singh* in *Glossary of Vegetable Drugs in Brihatrayi* describes variety of *Sudarshana* as *Kandali* (*Crinum defixum*).<sup>[52]</sup>
- *Proff CP Khare* in *Glossary of Indian Medicinal Plants Springer* has described *Crinum asiaticum* and *Crinum latifolium* as *Nagdamani* and *Sudarshana* resp. with its properties and uses.<sup>[53]</sup>
- *Medicinal Plants* by *S.G. Joshi* describes *Nagdamani* and *Sudarshana* as *Crinum asiaticum* and *Crinum defixum* resp. Author suggests *Crinum latifolium* as synonym for *Crinum defixum*.<sup>[54]</sup>
- *Vanoshadhi Vigyan* by *Brahmvarchas* tells *Sudarshana* and *Nagdamni* synonym as *Crinum asiaticum*.<sup>[55]</sup>
- *Herbal Wealth of Uttarakhand* describes one variety of *Tinospora* Genus i.e. *Tinospora sinensis* under the name *Sudarshana*.<sup>[56]</sup>
- *R.N. Chopra* in *Glossary of Indian Medicinal Plants* mentioned three varieties *Crinum asiaticum*, *Crinum defixum* and *Crinum latifolium* as *Nagdamani* and *Sukhdarshana*. Uses species *latifolium* and *defixum* for *Sudarshana* synonymously.<sup>[57]</sup>

**MODERN DRUG REVIEW****1). Taxonomic Classification of *Sudarshana*<sup>[58]</sup>****Table no. 09: Taxonomic Classification of *Sudarshana*.**

|                |                             |
|----------------|-----------------------------|
| Kingdom        | Plantae                     |
| Phylum         | Tracheophyta                |
| Class          | Liliopsida                  |
| Order          | Asparagales                 |
| Family         | Amayllidaceae               |
| Genus          | Crinum                      |
| Species        | Latifolium                  |
| Botanical Name | <i>Crinum latifolium</i> L. |

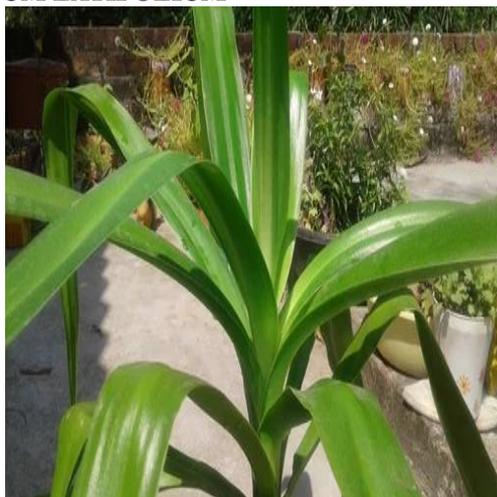
**2). Vernacular Names of *Sudarshana* in different Languages<sup>[59]</sup>****Table no. 10: Vernacular Names of *Sudarshana* in different Languages.**

| Vernacular Name | Language  |
|-----------------|---|
| English Name    | Ceylon Swamplily<br>Milk And Wine Lily<br>Pink Striped Trumpet Lily |
| Hindi Name      | Sudarshana, Sukhdarshana, Chinder, Kanwar, Kunwal, Pindar Baranwa   |
| Tamil Name      | VishaPungil, Vishamungil, Perumanarivingaatam                       |
| Bengali Name    | Sukhdarshana  |
| Marathi Name    | Gadambhikanda,<br>Gandani-kanda, Golkamdo                           |
| Kannada Name    | Vish Mungli   |
| Telgu Name      | KesaraChettu  |
| Gujrati Name    | Nagadamani, Nagarikanda   |
| Punjabi Name    | Sukhdarshana  |
| Malyalama Name  | Jovannapolatali   |
| Arabic Name     | Haliyon   |
| Konkani Name    | Kirathi Maari   |
| Urdu            | Nagdaun   |

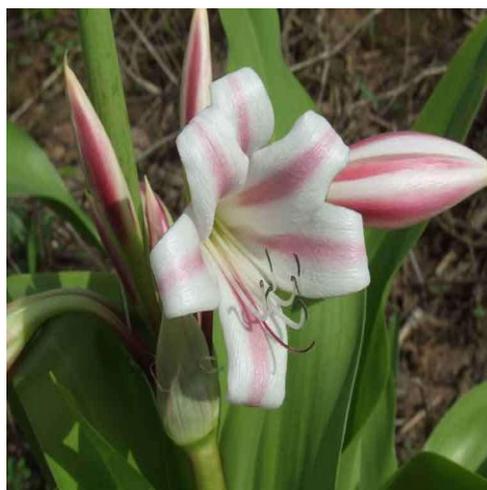
**3). BOTANICAL DESCRIPTION****Fig. no. 01: *Crinum latifolium* Herbarium specimen.**

**Botanical Voucher Specimen  
The New York Botanical Garden  
International Plant Science Centre  
The C.V. Starr Virtual Herbarium<sup>[60]</sup>**

#### 4). Morphology of *Sudarshana*<sup>[61]</sup> CRINUM LATIFOLIUM



A) Leaves



B) Flower



C). Fruit



D).Bulbs



E). Whole Plant



F).Roots

Fig no. 02 Morphology of *Crinum latifolium* and its parts.

*Crinum latifolium* is the only pantropical genus in the family Amaryllidaceae, and its constituent species are distributed across Africa, America, Asia, and Australia. *C. latifolium* L. is an ornamental herbaceous bulb with

long ligulate fleshy leaves of length approximately 70 cm or more and umbels with several large, white, often tinged with red, flowers of about 9 cm in size (WFO, 2021). Flowering stems are long and stout,

measuring around 2 - 3 mm in length. Fruits are spherical, 2 - 3 inches in diameter, and contain 8 - 10 seeds.

### CRINUM ASIATICUM<sup>[62]</sup>



**B) Leaves**



**B) Flower**



**C). Fruit**



**D). Roots**



**E). Whole Plant**

**Fig no. 03 Morphology of *Crinum asiaticum* and its parts.**

*Crinum asiaticum* is a bulbous herbs; bulb globose, 12 x 10 cm, neck 10-20 cm. The leaves are oblong, 70-100 x 1.5-8.5 cm, flat, coriaceous, glabrous, thin at the base,

edge whole and taper at the apex. They are grouped from the bulb apex. Flowers 16.5 cm long, 10(14) cm across. Perianth salver-shaped; tube to 10 cm; lobes white,

oblong-linear, to 7 x 1.2 cm, glabrous, 18-20 nerved, subacute, cuspidate. Filaments to 4.5 cm; anthers 2x0.2 cm. The fruit is a green, oblate capsule that is 3–5 cm across. The exotesta is spongy, and the seeds are big.

## 7). REVIEW IN CONTEMPORARAY TEXTS

### ➤ Medicinal Plants by S. G. Joshi<sup>[63]</sup>

*Sudarshana* is mentioned with its Synonyms, Habit, Description, Indications, Ayurvedic properties, Part Used, Dosage, Therapeutic Usage.

#### Therapeutic Use

1. Leaves are used as external application on swelling after applying castor oil to them.

### ➤ Dravyaguna Vigyana by Acharya Priyavrat Sharma<sup>[64]</sup>

In this text *Sudarshana* is mentioned under *Karnya dravya varga*. It is mentioned with its Family, Synonyms, Ayurvedic properties, Chemical constituents, Indications, Therapeutic Usage, Part Used and Dosage. Author has described two other varieties of *Sudarshana* which are *Crinum asiaticum*. *Crinum defixum* which are known as *Brihat kandali* and *Kandali*.

#### Therapeutic Use

1. Leaf juice is administered in case of Ear disorders like Otagia, Otorrhoea etc.  
2. In case of osteoarthritis and associated swelling hot fomentation is done with its leaf.  
3. The lukewarm paste of its rhizome is applied on pile mass in order to reduce swelling and pain  
4. Oil prepared from its Leaf juice is applied topically in skin disorders.

### ➤ Dravyaguna Vigyana by Dr. JLN Shastry<sup>[65]</sup>

*Sudarshana* is mentioned with its Synonyms, Habit, Description, Indications, Ayurvedic properties, Part Used, Dosage, Therapeutic Usage, Formulation and Research Work.

### ➤ Materia Medica by Dr.Gyanendra Pandey<sup>[66]</sup>

Here the drug is described with Synonyms, Vernacular names, Morphological description, Two Varieties which

are *Brihat Kandali* and *Kandali* i.e. *Crinum asiaticum* and *Crinum defixum*. Out of which latter one is toxic. Its Chemical composition, Pharmacodynamics, Properties and Action with various Textual Therapeutic References.

#### Therapeutic Use

1.The Juice of the Leaves is obtained and instilled in Otagia. Otorrhoea and similar ailments of ear.  
2.*Sudarshana* is useful in fever, oedema, Skin disorders, Blood impurities, Leucorrhoea and other disease.  
3.The plant is highly acid its roasted and crushed bulbs are used as rubefacient in rheumatism.  
4.The leaves are applied on body parts in case of osteoarthritis, rheumatism and pain related disorders.  
5.The bulb is used as an emetic and purgative agent.  
6.The bulb paste is applied to haemorrhoids for alleviating painful condition.  
7. The paste of bulb is applied over abscess.  
8.Oil processed with leaves is applied over skin disorders.

### ➤ Glossary of Indian Medicinal Plants Springer<sup>[67]</sup>

*Crinum latifolium* is explained with its Habit, Habitat, Ayurvedic, Siddha, Unani and Folk Synonyms, Therapeutic Action, Chemical Constituents, in-vitro & in-vivo pharmacological actions research and Dosage.

### ➤ Dravyaguna Hastamalka<sup>[68]</sup>

Drug is mentioned under *Taalmooli kula* (Amaryllidaceae Family) with Synonyms, Categorization, Morphological Description, Chemical Constituents, Pharmacodynamics, Therapeutic indications, Dosage and Identification. Two Different Varieties of *Sudarshana Crinum latifolium* are mentioned here which are *Brihat kandali (Crinum asiaticum)* and *Kandali (Crinum defixum)*.

#### Therapeutic Use

1. Administration of Lukewarm *Sudarshana* Leaf juice is indicated in case of Otagia.  
2. Oral intake of Leaf juice of *Sudarshana* is mentioned in case of Fevers.  
3. The leaves are applied on body parts in case of osteoarthritis, rheumatism and pain related disorders.

## 8). MAJOR CHEMICAL CLASSES & THEIR ACTIVE CONSTITUENTS OF SUDARSHANA<sup>[69]</sup>

Table no. 11: Major Chemical classes and active constituents of *Sudarshana*.

| S.no.                            | CHEMICAL CLASS | ACTIVE CONSTITUENT   |
|----------------------------------|----------------|--|
| <b>ALKALOID CONSTITUENTS</b>     |                |  |
| 1.                               | Alkaloids      | Galantamine, Lycorine, 1-O-acetyllycorine, 2-Epilycorine, Pratorimine, Oxoassoanine, Pratosine, Crinamine, Crinumlatine A, Crinumlatine B, Crinumlatine C, Latifaliumin A, Latifaliumin A-N-demethyl, 4a-Methoxyl-Latifaliumin A-N-demethyl, Latifaliumin B, Dihydro-Latifaliumin C, Pratorimine, Pratorinine, Hippadine, Ambelline, Powelline, Undulatine, Augustamine, Crinane-3alpha-ol, Hippeastrine, Hamayne, Delagoensine, Buphanidrine, Colchicine, Beta-Carboline. |
| <b>NON-ALKALOID CONSTITUENTS</b> |                |  |
| 2.                               | Terpenoids     | Cycloartenol, Lupeol, Oleanolic Acid.  |
| 3.                               | Glycosides     | Glucan A, Glucan B.  |
| 4.                               | Phenol         | Hydroxybenzoic acid, Latifine, Gallic Acid, Tannic Acid, Catechin  |

|    |                 |  |
|----|-----------------|--|
| 5. | Flavanoids      | Quercetin, 5,6,3'-Trihydroxy-7,8,4'-trimethoxyflavone, 4',7-Dihydroxy-3'-methoxyflavan (racemate), 4',7-Dihydroxyflavan (racemate), 2',4',7-Trihydroxydihydrochalcone. |
| 6. | Fatty Acids     | Linoleic acid.   |
| 7. | Other compounds | Lectin.  |

## 10. PHARMACOLOGICAL ACTIONS

### IN-VITRO STUDIES

#### 1). LEAVES

##### ➤ Cytotoxic activity

Eaq from *C. latifolium* leaves inhibited the proliferation of human carcinoma prostate PC3 cells, androgen-sensitive LNCap cells, and benign prostate hyperplasia (BPH1) cells in a dose-dependent manner, with half-maximal inhibitory concentration (IC<sub>50</sub>) values of 4.5, 2.3, and 2.1 mg/mL respectively.<sup>[70]</sup>

##### ➤ Anti-Oxidant activity

The amount of AA in extracts from *C. latifolium* leaves was estimated to be between 40 and 55 mg TE/g in the DPPH assay, 40 and 20 mg TE/g in the ABTS assay, 225 and 275 mg Fe(II)/g in the FRAP assay, and 45 and 90 mg ascorbic acid equivalent (AAE)/g in the ABTS assay for Eaq and EMeOH, respectively.<sup>[71]</sup>

##### ➤ Anti-Inflammatory activity

Two methods were used to evaluate the anti-inflammatory properties of two E<sub>aq</sub> obtained from *C. latifolium* leaves: *i*) E<sub>aq</sub> obtained by maceration in cold water (E<sub>aq1</sub>), and *ii*) E<sub>aq</sub> obtained by decoction (E<sub>aq2</sub>). Neopterin level was normalized and expressed as fold values as a function of PBMCs cultivated in a complete RPMI medium (control group) that produced 7.2±1.6 nmol neopterin/L. The cells incubated with the lower dose (1:10) of E<sub>aq1</sub> and E<sub>aq2</sub> showed significantly enhanced neopterin production, with the levels increased by up to ~2.5- and 1.75-fold, respectively. At a higher dose (1:5) of the extracts, a slight increase in neopterin levels (1.6- and 1.2-fold for E<sub>aq1</sub> and E<sub>aq2</sub>, respectively) occurred. In a parallel experiment, it was observed that after treating the PBMCs with concanavalin A (10 µg/mL), PHG (100 U/mL), or IFN-γ (10 µg/mL), there was a 5.8-, 7.0-, or 5.4-fold increase in neopterin production, respectively. These values were significantly reduced after co-incubation with E<sub>aq1</sub> and E<sub>aq2</sub> in a dose-dependent manner, showing a major effect at higher concentrations.<sup>[72]</sup>

##### ➤ Anti-Microbial activity

Rahman et al. (2016) used the disk diffusion technique to investigate the antibacterial qualities of EMeOH extracted from *C. latifolium* leaves. When tested against *Escherichia coli*, disks containing 25–100 µL of crude extract generated inhibition zones (IZs) with a diameter of 1.0–1.6 cm. Additionally, disks impregnated with 100 µL of crude extract produced an IZ with a diameter of 1 cm when tested against *Staphylococcus aureus*.<sup>[73]</sup>

##### ➤ Thrombolytic activity

Blood clot lysis was used to assess the thrombolytic activity of EMeOH derived from *C. latifolium* leaves. In

contrast to the positive control (streptokinase, 30000 IU), which produced clot lysis of 47.27%, the lysis activity increased in a dose-dependent manner from around 10% to 34% when clots were treated with varying doses of the extract (2 to 10 mg/mL).<sup>[74]</sup>

#### 2). ROOT

##### ➤ Anti-Diabetic activity

In vitro antidiabetic potential of both the plant parts were assessed by starch iodine color assay and 3, 5 DNS method of alpha-amylase inhibition model. The starch-Iodine assay reveals that activity increases linearly with concentration i.e. 0.1-0.5 mg/ml of tested plant extract. Results of α-amylase inhibition by DNS shows that an increase in the concentration of inhibitors, degradation of starch reduces and thus indicating the inhibition of enzyme activity. From the above study, it was observed that the methanolic extract of *C. latifolium* has potential antidiabetic property when compared to the standard drug. The results indicate that the aerial parts of the plant possess more antidiabetic potential in comparison to the root. Thus, the aerial part can be used to get better results as a drug and roots can be used as an alternative.<sup>[75]</sup>

##### ➤ Immunomodulatory activity

Aqueous extract of *C. latifolium* showed immunomodulatory properties in human peripheral blood mononuclear cells. Extracts of *C. latifolium* slightly enhance neopterin production in unstimulated peripheral mononuclear cells, whereas an effective reduction of neopterin formation in cells stimulated with concanavalin A (Con A), phytohemagglutinin (PHA), or interferon gamma (IFN-γ) was observed.<sup>[76]</sup>

### IN-VIVO STUDIES

#### 1). LEAVES

##### ➤ Cytotoxic Activity

The hot and cold dilutions (1:1, 1:5, and 1:10) of Eaq from leaves of *C. latifolium* retarded the in vivo growth of left thoraco-abdominal sarcoma type tumors (2–3 mm) induced by subcutaneous inoculation of 20-methylcholanthrene in Wistar male rats. The life span of rats treated with Eaq instead of water was 75% longer than that of rats from the control group (recipients of tap water). The authors suggested that components, mainly alkaloids and flavones found in several *Crinum* species, could be correlated with the antitumor and immunomodulatory properties of decoction preparations of the extract.<sup>[77]</sup>

##### ➤ Anti-Helminthic activity

Aziz et al. (2014) studied the anthelmintic activity of EMeOH from leaves using an in vivo model of *Pheretima posthuma*. The duration of paralysis was

measured at a dose of 50 mg/mL, and the extract caused total paralysis after 24 min of treatment and death at 46.4 min. Albendazole (10 mg/mL), used as a positive control, caused total paralysis after 56.2 min of treatment and total death after 77.4 min.<sup>[78]</sup>

#### ➤ Anti-Inflammatory activity

The aqueous extract of *Crinum latifolium* produced dose related acute anti-inflammatory activity (Carrageenan, dextran, histamine and formalin), chronic anti-inflammatory activity (Cotton pellet) and analgesic activity (Acetic acid and formalin). These studies have shown that the aqueous extract of *Crinum latifolium* contains some active ingredients with the potential of being good anti-inflammatory and analgesic agents.<sup>[79]</sup>

## 2). WHOLE PLANT

#### ➤ Anti-Depressant activity

Rats were made to lick their paws with formalin, and the analgesic properties of the aqueous extract were tested in mice using a writhing paradigm generated by acetic acid. While indomethacin (2.5 mg/kg) showed a 46% reduction in abdominal writhes, the extract (200 and 400 mg/kg) showed a 31% and 35% decrease, respectively, as compared to the control group (saline-treated). In the second experiment, which included an antinociceptive activity model, the paw licking onset time as measured after formalin injection increased by 7% and 22%, respectively, following treatment with 200 and 400 mg/kg of the extract. It can be concluded that *C.latifolium* shows optimum antidepressant activity at a dose of 400mg/kg body weight.<sup>[80]</sup>

## 11). TOXICITY STUDIES<sup>[81]</sup>

The alkaloidal component of *Crinum* plants is well recognized to make them poisonous. Ingesting raw bulbs or fresh roots might result in vomiting, diarrhea, and nausea (Refaat et al., 2013). When compared to the standard vincristine sulphate (0.839 g/ml), the crude methanolic extract produced a satisfactory result (LD50 15.652 µg/ml) for toxicity testing, indicating that the leaves of *Crinum latifolium* showed mild toxicity effects. It is generally known that plant extracts have higher concentrations of bioactive substances and a number of cytotoxic substances. Among other active compounds, anthocyanins, saponins, tannins, flavonoids and polyphenols were reported to be hydrogen donors, antioxidants, reactive species quenchers, free radical scavengers, normal cell differentiation promoters, detoxification inducers, enzyme activators, tumor production and proliferation cell inhibitors, and inducers of apoptosis. Therefore, the bioactive compounds may be responsible for the potential toxicity of the methanolic extract of *Crinum latifolium* leaves. However, the precise mechanism of action is yet unknown.(Parihar et al., 2021; Aziz et al., 2014).

## 12). CULTIVATION & PROPAGATION<sup>[82][85]</sup>

Succeeds in full sun or partial shade, requiring a well-drained. The plant sometimes escapes from cultivation.

Bulbs are sensitive to transplanting and can take several years to become established. After this, they will usually reproduce rapidly from offsets to produce the overcrowded conditions that stimulate them to flower freely. The flowers open at night and last for just one day. Propagation: By bulbs and seeds.

## 14). SUBSTITUTION AND ADULTERATION<sup>[86]</sup>

Two varieties which are available under the name of *Sudarshana* are *Brihat Kandali* i.e. *Crinum asiaticum* and *Kandali* i.e. *Crinum defixium* which can be used as a substitute under *Sudarshana*.

## 15). PHENOLOGY<sup>[87]</sup>

Flowering and Fruiting Time: May - June.

## 16). *Pryojyanga*/PART USED<sup>[88]</sup>

Table No. 2.38 *Pryojyanga* (PART USED) of *Sudarshana*

| S.no. | Part Used          |
|-------|--------------------|
| 1.    | Root.Rhizome(Bulb) |
| 2.    | Leaf               |

## 17). *Matra*/POSOLOGY<sup>[89]</sup>

Table No. 2.39 *Matra* (POSOLOGY) of *Sudarshana*.

| S.no. | Yoga (Formulation)   | Matra (Dosage) |
|-------|----------------------|----------------|
| 1.    | <i>Patra Swarasa</i> | 05-10 ml       |
| 2.    | <i>Kanda Churna</i>  | 01-02 gms.     |

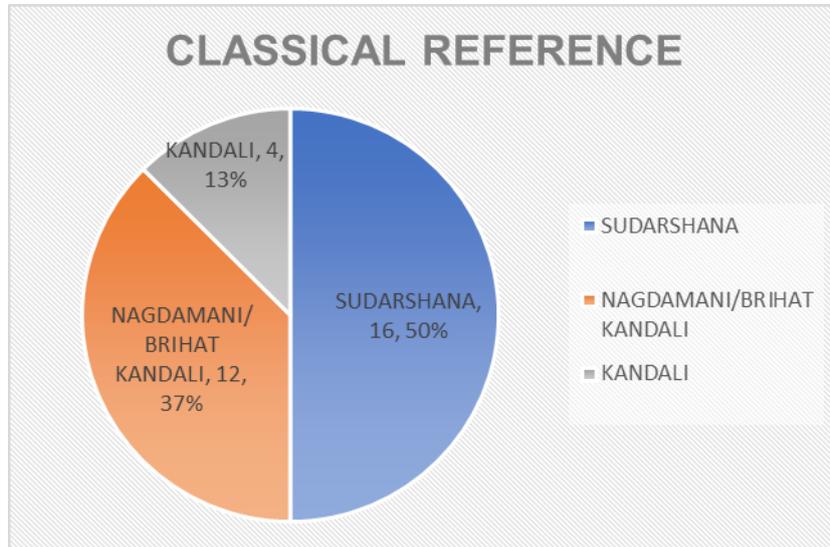
## DISCUSSION

*Sudarshana* is a promising herb in clinical practice under various pathological conditions as a single drug therapy as well as in combined form with various other herbs such as most commonest *Guduchi* (*Tinospora cordifolia*). It is found to be an extra-pharmacopoeial drug i.e. *anukta dravya* that means the drug which is not mentioned in *brihatrayai* period but came into know in later century and we got to know its references in various lexicons and contemporary texts. Its primarily description has been found in various *Nighantu* such as *Bhavprakash Nighantu*, *Kaiyadeva Nighantu*, *Shaligram Nighantu*, *Madanpal Nighantu*, *Nighantu Adarsh* and *Brihat Dravyaguna Adarsha* in *Guduchyadi Varga*, *Oshadhi Varga*, *Guduchyadi Varga*, *Abhyadi Varga*, *MusaliKandai Varga* and *KrishnaMushlyadi Gana* respectively. Its leaf would be probably *Madhur rasatmak* and root *Tikta rasatmaka*, *Ruksha*, *Teekshna*, *Swadupaki* and *Ushna virya*. Because of which *dosh karmukta* have *Vatakaphashamak* action. Major classics accounts for its *shothhara*, *vata*, *kapah* and *rakta vikara* whereas *Acharya Priyavrat Sharma ji* mention for it *karna roga hara* and *kushtha hara* activity also. *Chakradutta* has mentioned its role in *dadru* and *kushtha*. *Raja martanda* has mentioned its activity in DUB. *Mahasudarshana churna* and *Sudarshna ghan vati* are so called not because of *Sudarshana* as a major content but because of fact such capability in healing diseases exactly as like “the *sudarshana chakra*” of Lord *Vishnu* kills demons.

### Classical references for *sudarshana* varieties among different texts

Three main varieties has been found throughout the literature as *Sudarshana* (*Crinum latifolium*),

*Nagdamani/BrihatKandali* (*Crinum asiaticum*) and *Kandali* (*Crinum defixum*).

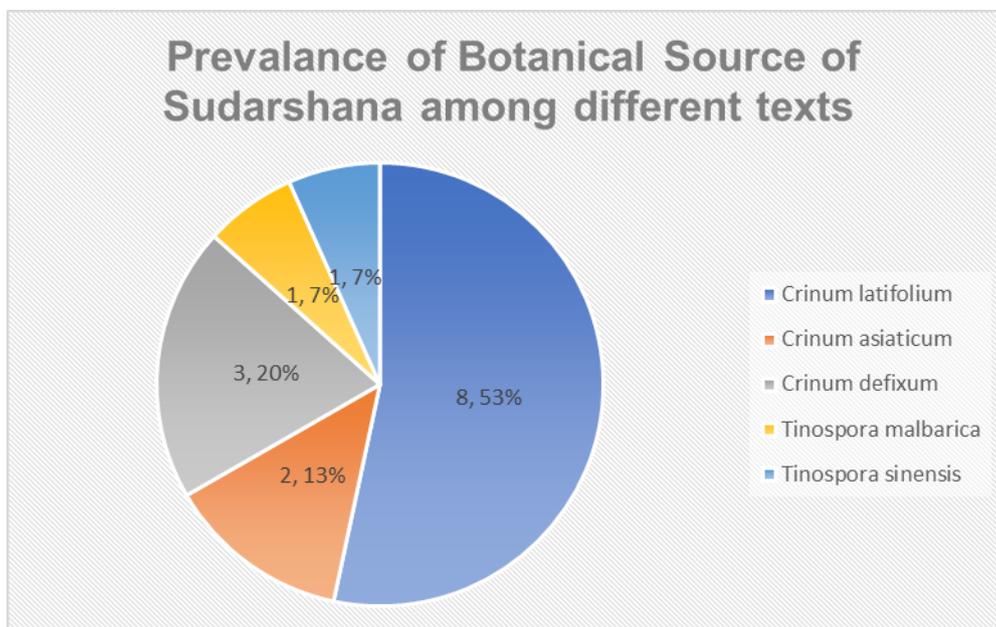


Pie Chart no. 01 showing variety of *Sudarshana* across different texts.

Here the above mentioned pie chart plotted on the basis of data collected shows that out of the three varieties mentioned across classical texts *Sudarshana* has been mentioned in maximum percentage followed by *Nagadamani/Brihatkandali* and *Kandali* 50%, 37% and 13% respectively founds *Sudarshana* to be the major and popular variety found.

### Classical references for authentic botanical source of *sudarshana* among different texts

Yet *Sudarshana* is a controversial drug though there are various textual references for its botanical source. Majority of views which focuses for its true authenticity are as follows.



Pie Chart no. 02 showing botanical source of *Sudarshana* across different texts.

Here the above mentioned pie chart has mentioned the different authentic botanical source among various texts. It suggests that *Crinum latifolium* is believed to be the genuiene *sudarshana* followed by *Crinum asiaticum*, *Crinum defixum*, *Tinospora malbarica* and *Tinospora*

*sinensis* 53%, 20%, 13% 7% and 7% respectively. However in general pharmacological practice *Crinum latifolium* and *Crinum asiaticum* are being used.

This plant contains variety of phytochemicals such as **Alkaloids** (Galantamine, Lycorine, 1-O-acetyllycorine, 2-Epilycorine, Pratorimine, Oxoasosanine, Pratosine, Crinamine, Crinumlatine A, Crinumlatine B, Crinumlatine C, Latifaliumin A), **Terpenoids** (Cycloartenol, Lupeol, Oleanolic Acid), **Glycosides** (Glucan A, Glucan B), **Phenol** (Hydroxybenzoic acid, Latifine, Gallic Acid, Tannic Acid, Catechin), **Flavonoids**(Quercetin, 5,6,3'-Trihydroxy-7,8,4'-trimethoxyflavone, 4',7-Dihydroxy-3'-methoxyflavan (racemate), 4',7-Dihydroxyflavan (racemate), 2',4',7-Trihydroxydihydrochalcone), **Fatty Acid** (Linoleic acid), Other compounds as Lectin responsible for pharmacological actions such as anti inflammatory, antimicrobial, cytotoxic, anti cancerous, anti oxidant, anti diabetic, thrombolytic activity, immunomodulatory activity, anti obesity, anti alzheimeric activity and so on.

### CONCLUSION

This review summarizes the literary, phytochemical and pharmacological properties of *Sudarshana*. It has wealth of therapeutic characteristics and is also employed in folk medicine as described in numerous literature texts. It shows a diverse range of phytochemicals such as Alkaloids, Terpenoids, Glycosides, Phenol, Flavonoids, Fatty acids, Lectin being responsible for respective pharmacological actions anti inflammatory, antimicrobial, cytotoxic, anti cancerous, anti oxidant, anti diabetic, thrombolytic activity, immunomodulatory activity, anti obesity, anti alzheimeric activity etc. There are three varieties of *Sudarshana* known in practice as *Sudarsahana*, *Brihatkandali* (*Nagadamani*) and *Kandali* resp. as *Crinum latifolium*, *Crinum asiaticum* and *Crinum defixum*. All of three varieties are in use in today's era in different regions accordingly. While majority of today's modern era authors opinion and fact of considering *Crinum latifolium* as *Sudarshana* while preparing simple and compound formulations are in support of making *Crinum latifolium* as *Sudarshana*. The therapeutic effects of medicinal plants, which can be discovered all over the world, are unknown in strength but may be useful in treating a variety of medical conditions. Further research work requires pharmacognostical study of different sources available under the name of *Sudarshana* in different regions for authentication purposes. With extraction of various alkaloids to detect pharmacological actions using various in-vitro, in-vivo and clinical phases.

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