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Review Article

REVIEW OF SWARASA KALPANA OF SINGLE DRUG BY SHARANGADHARA SAMHITA WSR TO PHYTOCHEMICAL ANALYSIS

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ABSTRACT

Sharangadhara Samhita is most important *Samhita* on *Bhaishajya Kalpana* (Ayurvedic pharmacy) and considered in *Laghutrayee*. It consists of three *Khand* (Division)- *Poorva Khand*, *Madhyam Khand*, *Uttar Khand*. *Ayurveda* offers personalised treatment according to each patient's unique *Doshavastha*. *Acharya Charaka* has described *Chikitsa Chatushpada* which includes *Bhishak* (Physician), *Upasthata* (Medical Attendant), *Rogi* (Patient) and *Dravya* (medicine). The selection of *Dravya* (medicine) is important step in management of disease. *Acharya Charaka* has mentioned qualities of *Dravya* like 1) *Bahuta* 2) *Yogyatam* 3) *Aanekvidha kalpana* 4) *Sampat*. We use whole drug which contain many chemicals which are separated by *Agni* (Digestive system). These chemicals are absorbed and move in the body through *Rasavaha Strotasa.* They interact with each other and modify gene expression at cellular level. Proper *Kalpana* (formulations) facilitates better chemical separation, absorption and interaction. Thus, overall efficacy of the drug.

Phytochemical analysis includes alkaloids, flavonoids, glycosides, phenols, saponins, sterols, tannins, anthraquinone etc. These are important phytochemicals and termed as active principles responsible for action of drug. Different *Bhaishajya Kalpana* are used to extract active principles of *Dravya* with the help of medium like water, oil, alcohol, *Ghrita*. *Panchavidha kashaya Kalpana* includes *Swarasa* (liquid), *Kalka* (paste), *Kwatha* (decoction), *Hima* (cold infusion) and *Phanta* (hot infusion) and are fundamental *Ayurvedic Bhaishajya Kalpana*. *Churna*, *Vati*, *Avaleha*, *Sneha* & *Sandhan Kalpana* are modified forms of *Panchavidha Kashaya Kalpana*. Hence review of *Swarasa Kalpana* of single drug by *Sharangadhara Samhita* wsr to phytochemical analysis is taken.

INTRODUCTION

Laghutrayee (lesser triads) is the group of three classical Ayurvedic *samhitas* namely *Madhavnidana*, *Sharangdhara Samhita* and *Bhavprakasha Samhita*. *Sharangadhara Samhita* is most important *Samhita* on *Bhaishajya Kalpana* (Ayurvedic pharmacy). It consists of three *Khand* (Division), *Poorva Khand*, *Madhyam Khand*, *Uttar Khand*. *Purvakhanda* has seven chapters, *Madhyam khanda* has twelve chapters and *Uttarkhanda* has thirteen chapters. Total thirty-two chapters and two thousand and six hundred verses are described in whole *Sharangadhara Samhita*.

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Poorva Khand of *Sharangadhara Samhita* deals with *Mana Paribhasha*, *Aushadh Sevan Kala*, *Rasapanchaka*, *Nadipariksha*, *Dravya Karma*, fundamental concepts of *Sharir Rachana* (anatomy) and *Sharir Kriya* (physiology). [1]

Madhyam Khand of *Sharangadhara Samhita* includes *Panchavidha Kashaya Kalpana* such as *Swarasa*, *Kalka*, *Kwatha*, *Hima*, *Phanta* and other *Kalpana* like *Churna*, *Vati*, *Avaleha*, *Taila*, *Asava*, *Arishta*, *Rasa Aushadhas* etc. [2]

Uttara Khand of *Sharangadhara Samhita* deals with *Chikitsa* principles, *Panchakarma*, *Swasthavritta*, *Lepadi Karmas*, *Anjanadi kriyas* etc. [3]

Ayurveda offers person-centred medicine according to each patient's unique *Doshavastha*. *Chikitsa Chatushpada* (Quadruple of therapeutics) is mentioned by *Acharya Charaka* includes *Bhishak* (Physician), *Upasthata* (Medical Attendant), *Rogi*

(Patient) and *Dravya* (Medicine). *Acharya Charaka* has mentioned the qualities of *Dravya* to be administered to the patient are 1) *Bahuta* 2) *Yogyatam* 3) *Aanekvidha kalpana* and 4) *Sampat*. [4] *Vagbhatacharya* also mentioned that *Dravya* administering to patient must have qualities like 1) *Bahukalpa* 2) *Bahuguna* 3) *Sampanna* 4) *Yogya*. [5]

The term *Bhaishajya Kalpana* (Ayurvedic pharmaceutical preparations) consists of two words, *Bhaishajya* & *Kalpana*. *Bhaishajya* means medicine and *Kalpana* meaning different formulations. The selection of a proper medicine along with its form in the treatment of disease is very important.

Swarasa Kalpana is described in *Sharangadhara Samhita Madhyam Khanda* in first *Adhyaya*. This *Kalpana* is mentioned for single plant as well as for multiple plants. This *Kalpana* is mainly for fresh drug but in absence of fresh drug it can be prepared using dry drug. *Swarasa* is used as *Aushadha*, *Anupana*, *Bhavana Dravya* and for preparation of secondary formulations. Water is used as media to extract active constituents (water soluble) with or without heating.

Phytochemical analysis includes alkaloids, flavonoids, glycosides, phenols, saponins, sterols, tannins, anthraquinone etc. These are important phytochemicals and termed as active principles responsible for action of drug. These chemicals are absorbed and move in the body through *Rasavaha Strotasa.* They interact with each other and modify gene expression at cellular level. Proper *Kalpana* (formulations) facilitates better chemical separation, absorption and interaction. Thus, overall efficacy of the drug.

Importance of water as media

Water is non-flammable, non-toxic to human and the environment. It allows for clean processing, and reduces pollution, selective extraction of bioactive compounds (depending on the type of solvent, it allows avoiding extraction of unwanted components).[6] It is economical and safest solvent and easily accessible.

AIM & OBJECTIVES

1. To understand *Swarasa Kalpana* from *Sharangadhara Samhita*.
2. To collect and summarize the information about phytochemicals present in *Swarasa* of single drug described in *Sharangadhara Samhita*.
3. To review the *Swarasa Kalpana* wsr to its phytochemical analysis.

MATERIAL AND METHODS

Systematic review is done from *Sharangdhara Samhita*, published articles, Evidence based research studies for *Swarasa Kalpana* and its phytochemical analysis. The data and information of phytochemicals of each drug mentioned as *Swarasa* from *Sharangadhara Samhita* was collected from the published papers available online. It is done by browsing different words or terms like 'phytochemical analysis', 'Aqueous extracts and botanical name of respective medicinal plant. For this review article scientific name, family name, indications are collected and presented in tabular form.

RESULTS

1) *Swarasa Kalpana* (Fresh juice) [7]

The juice extracted from fresh green drug by pounding it and squeezing through cloth is called *Swarasa*. It used for preparation of different medicinal formulation such as *Asavas*. *Swarasa Kalpana* is *Guru* (hard to digest/ highly concentrated). It is clearly said that *Swarasa* should be used when the *Aturabala* (patient's strength) is good and the *Vyadhibala* (disease strength) is also stronger. *Upakalpana* of *Swarasa* is *Putapaka* (bolus method).

Methods of preparation of *Swarasa*: Total three methods are mentioned as below:

1) Freshly available drug: The fresh green drug (pure) is pounded and squeezed through cloth.

2) Dry drug: One *Kudava* of powder of dry drug is put in twice its quantity of water, kept over for *Ahoratra* (a day and a night) then filtered is also a good *Swarasa*.

3) Dry drug: The very dry drugs which do not give out any juice, boiling them in eight times their quantity of water and reducing to a quarter can also be called as *Swarasa*.

Table 1: *Swarasa Kalpana* mentioned in *Sharangadhara Samhita*

Sr.No.	*Swarasa*	Plant Species & Family	Phytochemical Analysis (Aqueous Extract) Present Phtochemicals	Absent phytochemicals	Indications
1.	*Guduchi Swarasa*	*Tinospora cordifolia* (Willd.) Miers. Menispermaceae	Saponin, Steroids, alkaloids, cardiac glycosides, tannins, phenols, carbohydrates [8]	Flavonoids, Terpenoids, Amino acid [8]	*Prameha* (Polyuria/ Diabetes), *Kamala* (Jaundice)
2.	*Amalaki Swarasa*	*Emblica officinalis* Gaertn.	Fruit: glycosides, tannins, saponins, phenols, and	Alkaloids, Proteins, Quinones, Coumarins,	*Prameha* (Polyuria/

		Euphorbiaceae	carbohydrates [9]	Flavonoids, Sterols [9]	Diabetes)
3.	*Vasa Swarasa*	*Adhatoda zeylanica* Medic. Acanthaceae	Phenols, tannins, alkaloids, anthraquinone, saponins, flavonoids and reducing sugars, vasicine, Vasicinone, Vasicinol, Adhatodine, Adhatodine, Adhvasinone, Anisotine and hydroxypeganine, betaine, steroids and alkanes.[10]		*Raktapitta* (*Purpura*), *Jwara* (Fever), *Kasa* (Cough), *Kshaya* (Consumption), *Kamala* (Jaundice)
4.	*Daruharidra Swarasa*	*Berberis aristate* DC Berberidaceae	Berberine alkaloids, flavonoids, amino acids, tannins, protein. [11]	Carbohydrates, Saponins [11]	*Kamala* (Jaundice)
5.	*Nimba Swarasa*	*Azadirachta indica* A. Juss. Meliaceae	Saponin, steroid and terpenoid are most present; tannins and glycoside moderately; alkaloids, flavonoids, phenol and oxalic acid have low concentration. [12]	-	*Kamala* (Jaundice)
6.	*Tulasi Swarasa*	*Ocimum sanctum* Linn. Lamiaceae	Alkaloids, Flavonoids, Tannin, Saponin [13]	Glycosides, oil, Carbohydrates, Steroids, Proteins [13]	*Vishama Jwara* (Intermittent Fevers)
7.	*Dronapushpi Swarasa*	*Leucas cephalotes* Spreng. Lamiaceae	Glycosides, Tannins, Phenols, Flavonoids, Carbohydrates [14]	Alkaloids, Saponins, Steroids, Amino acids, Proteins [14]	*Vishama Jwara* (Intermittent Fevers)
8.	*Jambu patra Swarasa*	*Syzgium cumini* (Linn.) Skeels Myrtaceae	Alkaloids, flavonoids, glycosides, steroids, phenols, tannins, saponins and cardiac glycosides.[15]	-	*Raktatisara* (Bloody Diarrhoeas)
9.	*Amra patra swarasa*	*Magnifera indica* Linn. Anacardiaceae	Acarbose; manindicin A; manindicins B; mangiferin; norathyriol Acetaldehyde; 2-hydroxyacetophenone; 2-furanmethanol; furfural; phenol; 2,3-Dihydro-3,5-dihydroxy-6-methyl-4H-pyran-4-one; oleic acid; o-catechol; hydroquinone; pyrogallol [16]	-	*Raktatisara* (Bloody Diarrhoeas)
10.	*Amalaki Patra Swarasa*	*Embelia officinalis* Gaertn. Euphorbiaceae	Tannins and phenolic compounds significantly, flavonoids poorly, alkaloids and saponins moderately.[17]	Terpenoids	*Raktatisara* (Bloody Diarrhoeas)
11.	*Babbula Patra Swarasa*	*Acacia nilotica* (Linn.) Willd. Leguminosae	Tannins and phenolic compounds, flavonoids significantly present. Alkaloids, terpenoids poorly present.[17]	Saponins [17]	*Sarvatisaran* (All Kinds of Diarrhoeas)
12.	*Shyonaka Tvaka Swarasa*	*Oroxylum indicum* Vent. Bignoniaceae	Alkaloids, Carbohydrates, Glycosides, Flavonoids, Phenolic Compounds.[18]	Saponins, Steroids, Tannins.[18]	*Sarvatisaran* (All Kinds of Diarrhoeas)

13.	*Kutaja Tvaka Swarasa*	*Holarrhena antidysenterica* Apocynaceae	Alkaloids, carbohydrate, resins, saponin, steroid, glycoside, tannins.[19]	Flavonoids, starch.[19]	*Sarvatisaran* (all kinds of diarrhoeas)
14.	*Adraka Swarasa*	*Zingiber officinale* Rosc. Zingiberaceae	Alkaloids, flavonoids, saponins, tannins, phenolics.[20]	Glycosides, Steroid, Anthraquinone, Phytate, Oxalate.[20]	*Vrushanavatanut* (orchitis), *Shwasa* (dyspnoea), *Kasa* (cough), *Aruchi* (loss of taste), *Pratishyaya* (rhinitis)
15.	*Beejapura Swarasa*	*Citrus medica* Linn. Rutaceae	Alkaloids, carbohydrates, Steroids, terpenoids, Glycosides, phenolic compounds, tannins, proteins, amino acids, flavonoids, fixed oils and fats.[21]	-	*Parshva* (flanks), *Hruda* (heart), *Basti* (bladder) *Shoola* (pain), *Koshthavata* (Tympanitis)
16.	*Shatavari Swarasa*	*Asparagus racemosus* Willd. Liliaceae	Alkaloid, flavonoids, tannins/phenolic substances, carbohydrates, Glycosides, proteins, fixed oils and fats.[22]	Phytosterols.[22]	*Pittashoolahara* (colic due to pain)
17.	*Kumari Swarasa*	*Aloe barbadensis* Liliaceae	Tannins, Carbohydrates, Anthraquinone glycosides.[23]	Alkaloids [23]	*Pleeha* (spleenic disorders), *Apachi* (Scrofula) *Hara*
18.	*Mundi Swarasa*	*Sphaeranthus indicus* Asteraceae	Carbohydrates, reducing sugars, monosaccharides, proteins, amino acids, tannins, phenolic compounds, saponins and alkaloids.[24]	Pentose sugar, hexose sugar, glycosides, cardiac glycosides, anthraquinone glycosides, flavonoids, steroids, fats and oils.[24]	*Apachi* (Scrofula), *Gandamala* (Lymphadenoma), *Kamala* (Jaundice), *Suryavarta* (Migraine), *Ardhavabhedaka* (Hemicrania)
19.	*Brahmi Swarasa*	*Bacopa monnieri* (Linn.) Wettst. Scrophulariaceae	Carbohydrates, flavonoids, saponins, steroids, and phytosterols.[25]	Tannins, phenolic compounds.[25]	*Sarva Unmada* (Insanity of all types)
20.	*Vacha Swarasa*	*Acorus calamus* Linn. Acoraceae	Carbohydrates, monosaccharides, reducing sugar, Saponins, Glycosides.[26]	Phenolic compounds, alkaloids.[26]	*Sarva Unmada* (Insanity of all types)
21.	*Shankhapushpi Swarasa*	*Convolvulus pluricaulis* Choisy Convolvulaceae	Alkaloids, Carbohydrates, Coumarine glycosides, Tannins & Phenols, Proteins, Amino acids, Steroids.[27]	Cardiac glycoside, anthraquinone glycoside, saponin glycoside, flavonoids.[27]	*Sarva Unmada* (Insanity of all types)
22.	*Kushmanda Swarasa*	*Benincasa hispida* (Thunb.) Cogn. Cucurbitaceae	Alkaloids, carbohydrates, reducing sugars and steroids.[28]	Flavonoids, saponins, tannins, proteins, glycosides.[28]	*Sarva Unmada* (insanity of all types), *Dushta Kodrava* (intoxication of *Paspalum scrobiculatum*)
23.	*Gangeruki Swarasa*	*Grewia tenax* Tiliaceae	Alkaloid, flavonoid, coumarin, tannin	Anthraquinone, Saponins, steroids, triterpenoids	*Khadgadichchhinna Gatra* (ulcer by sharp weapon)

DISCUSSION

Swarasa Kalpana is very basic form of *Bhaishajya Kalpana*. Preparation of *Swarasa* includes simple processes compared with other *Bhaishajya Kalpana*. Simple preparation methods don't harm the structures of phytochemicals and keep them in their natural forms. It is used to safely transfer active principles of plants to medicine depending on solubility and temperature sensitivity of active constituents. Sharangadhara Samhita has 23 *Swarasa Kalpana* of single plants. *Swarasa Kalpana* is mentioned for plants which have significant liquid portion. Plants produce primary and secondary phytochemicals which show significant pharmacological action. Primary metabolites are essential for growth, development and reproduction of plants. Plants generate secondary metabolites in response to unfavourable environment, through a variety of physiological and biochemical mechanisms that increase their chances of survival and growth. Secondary metabolites depend on species and development of plant. The review of phytochemical analysis of *Swarasa* of single drug from Sharangadhara Samhita revealed the presence of various alkaloids, cardiac glycosides, saponins, tannins, phenols, flavonoids, Anthraquinone, terpenoids, carbohydrates, reducing sugars, amino acids, proteins, fixed oils, fats and steroids. Phytochemicals giving cumulative pharmacological properties to the *Swarasa*. Different phytochemicals are accumulated in different parts of Plants. *Swarasa* of *Amalaki* fruits is indicated in *Prameha* while *Swarasa* of its leaves is indicated in *Raktatisara*. *Amalaki* fruit and leaves contain different phytochemicals. These phytochemicals interact with each other and ultimate effect may be synergism / antagonism / receptor activation.

Alkaloids: are nitrogen-containing substances that are found in entire plant or in certain part of plant. Each of which differs from the others and has a unique chemical structure.

Alkaloids are present in *Swarasa* of *Guduchi*, *Vasa*, *Daruharidra*, *Nimba*, *Tulasi*, *Jambu patra*, *Amalaki Patra*, *Babbula Patra*, *Shyonaka Tvaka*, *Kutaja Tvaka*, *Adraka*, *Beejapura*, *Shatavari*, *Mundi*, *Shankhapushpi*, *Kushmanda* and *Gangeruki*.

Glycosides: Different types of glycosides are found in different plants and possess particular type of characteristics.

Glycosides are present in *Swarasa* of *Guduchi, Amalaki, Nimba, Dronapushpi, Jambu patra, Shyonaka Tvaka, Kutaja Tvaka, Beejapura, Shatavari, Kumari, Vacha* and *Shankhapushpi.*

Cardiac glycosides are present in *Swarasa* of *Guduchi* and *Jambu patra*.

Saponins: Saponins are present in *Swarasa* of *Guduchi*, *Amalaki*, *Vasa*, *Nimba*, *Tulasi*, *Jambu patra*, *Amalaki Patra, Kutaja Tvaka*, *Adraka, Mundi*, *Brahmi* and *Vacha*.

Phenolic Compounds: Are present in *swarasa* of *Guduchi*, *Amalaki*, *Vasa*, *Dronapushpi*, *Jambu patra*, *Amra patra*, *Amalaki Patra, Babbula Patra, Shyonaka Tvaka*, *Adraka*, *Beejapura*, *Shatavari*, *Mundi*, *Shankhapushpi*.

Tannins: It is complex chemical substances derived from phenolic acids. It helps to protect the individual plant species. Tannins are present in *Swarasa* of *Guduchi, Amalaki, Vasa, Daruharidra, Nimba, Tulasi, Dronapushpi, Jambu patra, Amalaki Patra, Babbula Patra, Kutaja Tvaka, Adraka, Beejapura, Shatavari, Kumari, Mundi, Shankhapushpi* and *Gangeruki*.

Flavonoids: Flavonoids are present in *Swarasa* of *Vasa, Daruharidra, Tulasi, Dronapushpi, Jambu patra*, *Amalaki Patra, Babbula Patra, Shyonaka Tvaka, Adraka, Beejapura, Shatavari, Brahmi, Gangeruki*.

Phytosterols: It is present in *Swarasa* of *Brahmi*.

Steroids: Are present in *Guduchi*, *Vasa*, *Nimba*, *Jambu patra*, *Kutaja tvaka*, *Beejapura*, *Brahmi*, *Shankhapushpi and Kushmanda.*

Anthraquinone: Are present in *Swarasa* of *Vasa* and *Kumari*.

Terpenoids: Are present in *Swarasa* of *Nimba*, *Babbula patra* and *Beejapura*.

Carbohydrates: Are present in *Swarasa* of *Guduchi*, *Amalaki, Dronapushpi, Shyonaka Tvaka, Kutaja Tvaka, Beejapura, Shatavari, Kumari, Mundi, Brahmi, Vacha, Shankhapushpi and Kushmanda.*

Reducing Sugars: Are present in *Swarasa* of *Vasa*, *Mundi*, *Vacha* and *Kushmanda*.

Amino Acids: Are present in *Swarasa* of *Daruharidra*, *Beejapura*, *Mundi* and *Shankhapushpi*.

Proteins: Proteins are present in *Swarasa* of *Daruharidra*, *Beejapura*, *Shatavari*, *Mundi* and *Shankhapushpi*.

Fixed oils & Fats: Are present in *Swarasa* of *Beejapura* and *Shatavari*.

CONCLUSION

Sharangadhara Samhita has mentioned total 23 *Swarasa Kalpana* of single drug. Among 23 *Swarasas* of single drug, 18 *Swarasas* contain tannins; 17 *Swarasas* contain alkaloids; 14 *Swarasas* contain phenolic compounds; 13 *Swarasas* contain flavonoids & carbohydrates; 12 *Swarasas* contain glycosides & saponins; 9 *Swarasas* contain steroids; 5 *Swarasas* contain proteins; 4 *Swarasas* contain amino acids and reducing sugars; 3 *Swarasas* contain terpenoids; 2 *Swarasas* contain cardiac glycosides, anthraquinone, and fixed oils and fats. Phytosterol is present in one *Swarasa*. Tannins are present mostly in all *Swarasas*.

Five *Swarasas* are mentioned for *Kamala*; four *swarasas* are mentioned for *Sarva Unmada*; three *swarasas* are mentioned for *Raktatisara* & *Sarvatisara*; two *swarasas* are mentioned for *Kasa, Prameha*, *Vishama Jwara & Apachi. Vasa swarasa* is metioned for *Jwara, Raktapitta, Kshaya. Adraka swarasa* is mentioned for *Vrushanavatanut, Shwasa, Aruchi, Pratishyaya. Beejapura swarasa* is mentioned for *Parshva, Hruda, Basti Shoola, Koshthavata. Shatavari swarasa* is described for *Pittashoolahara. Kumari swarasa is Pleehahara. Mundi swarasa* is described for *Gandamala, Suryavarta, Ardhavabhedaka. Kushmanda swarasa* is mentioned for *Dushta Kodrava. Gangeruki swarasa* is described for *Khadgadichchinna Gatra Vrana*.

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