



Antioxidant Study of One Ayurvedic Medicine, “Sukumara Kashayam”

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ABSTRACT

Sukumara Kashayam is an Ayurvedic preparation for treating menstrual pain and also constipation. The Kashayam is made of twenty seven medicinal plants. The present study is to understand the antioxidant potential of this Kashayam. It was observed that the three antioxidant assays, namely, DPPH, FRAP and Hydrogen peroxide scavenging activity, have shown very good activities. This could be one of the mechanisms of action of this medicine. This is the first step in understanding the medicinal efficacy of Sukumara Kashayam.

Keywords: Sumkumara Kashayam, Antioxidant, Ayurvedic, DPPH, FRAP, Hydrogen Peroxide.

INTRODUCTION

Ayurveda is an age old practice of healthy living and well being is a part of Rigveda. It deals with specific properties of drugs and various aspects of science of life and the art of healing.¹

Ayurveda, and other forms of complementary and alternative medicinal practices like Siddha, Unnani, etc, are gaining importance and many herbal drugs are clinically tested and accepted for manufacturing.²

Ayurvedic formulations are prepared by traditional processing methods which involve the use of several herbs and minerals.

They are available in different forms such as decoction, fresh juice, oil, vati, powder, clarified butter preparation and alcoholic preparation.

Among the 7,000 species of medicinal plants recognized all over the world, about 1500 plants are systematically used in indigenous system of medicine, like Ayurveda, Unani and Siddha.

There is a paucity of scientific validation and efficacy evaluation of Ayurvedic, sidha, Unani and Homeopathy medicines which is urgently warranted. The present work is one step in this direction in which the antioxidant properties of one Ayurvedic formulation Sukumara kashayam was studied.

The Ayurvedic reference of Sukumara Kashayam is found in Sahasra yoga, Kashaya Yoga Prakarana. Sukumaram Kashayam is an Ayurvedic medicine, useful in treating severe pain during menstruation and severe back pain during menstruation.

It is also helpful to relieving constipation. This medicine is made with a number of constituent plants or plant parts. The names of the ingredient plants are mentioned below.

Punarnava – *Boerhaavia diffusa*

Vilwa – *Aegle marmelos*

Kasmari – *Gmelina arborea*

Patala – *Stereospermum suaveolens*

Syonaka – *Oroxylum indicum*

Agnimantha – *Premna corymbosa*

Prisniparni – *Desmodium gangeticum*

Saliparni – *Pseudarthria viscida*

Kantakari – *Solanum melongena*

Bhadra – *Aerua lanata*

Gokshura – *Tribulus terrestris*

Payasya – *Holostemma annulare*

Aswagandha – *Withania somnifera*

Eranda – *Ricinus communis*

Satavari – *Asparagus racemosus*

Darbha – *Desmostachya bipinnata*

Kusa – *Eragrostis cynosuroides*

Sara – *Saccharum spontaneum*

Kasa – *Imperata cylindrica*

Ikshumoola – *Saccharum officinarum* (sugar cane root)



Potagala – *Spearanthus hirtus*

Krishna – *Piper longum* (long pepper)

Krishnamoola – *Piper longum* (root) (long pepper root)

Yasthimadhu – *Glycyrrhiza glabra*

Mridweeka – *Vitis vinnifera* (dry grapes)

Yavani – *Cuminum cyminum*

Shunti – *Zingiber officinale* (ginger)

The above constituent herbs are made into coarse powder in equal quantities and soaked in water for one night. In the next morning the mixture is added with 8 parts of water and heated in low flame till the quantity becomes one fourth of the original volume. This Kashayam is filtered and taken warm as per the advice of the medical practitioner. Usually 5ml of this Kashayam is mixed with equal part of water and taken before food. This medicine is available in tablet form also and the dose is usually two tablets twice a day before food.

There is a dearth of scientific reports on the mechanism of action, chemical composition and other parameters of this medicine to prove its efficacy.

The present study is a step in this direction. The antioxidant activities presented in this study could be one of the main modes of action of this medicine. Further work is in progress.

The medicinal values of each constituent plant are mentioned hereunder to correlate their action with that of Sukumara Kashayam.

Punarnava -*Boerhaavia diffusa*

Boerhaavia diffusa is used as a Rasayana in Ayurveda, meaning a medicine which maintains good health and rejuvenates the body. Mishra have described in details the various therapeutic activities of *B. diffusa*. It has activities such as hepato protective, immuno modulatory, anticancer, anti diabetic and hypoglycemic, anti fibrinolytic, anti-Inflammatory, diuretic, antibacterial, antioxidant, anti asthmatic and anticonvulsant.³

Vilwa - *Aegle marmelos*

Extensive experimental and clinical studies prove that *Vilva* has antidiarrhoeal, antimicrobial, antiviral, radio protective, anticancer, chemo preventive, antipyretic, ulcer healing, anti genotoxic, diuretic, anti-fertility and anti-inflammatory properties.⁴

Kasmari - *Gmelina arborea*

This plant has undergone extensive medicinal screening for activities such as toxicity (Ashalatha and Sankh), antioxidant (Rohith), ant helminthic, anti-microbial, diuretic, cardio protective, anti-diabetic, immuno modulatory, antipyretic and analgesic.^{5,6}

Patala – *Stereospermum suaveolens*

This plant has various medicinal values as reported by

Meena.⁷ The therapeutic effects of this plant are among others, renal protective, anti-inflammatory, anti hyperglycemic, antioxidant, analgesic and antipyretic.⁸

Syonaka – *Oroxylum indicum*

This is another medicinal plant with various therapeutic potential (Ahad).⁹ This plant has activities such as antibacterial, anti-inflammatory and anti hyperlipidemic, anti-inflammatory and analgesic, hepato protective, nephro protective, anti-diabetic, immuno-modulatory, gastro protective, anticancer and anti mutagenic.

Agnimantha - *Premna corymbosa* syn. *P. integrifolia*

The pharmacological properties of *Premna corymbosa* were reviewed by Khatun. This plant has medicinal roles such as hypo lipidemic, anti-inflammatory, anti-diabetic, CNS depressant and antitumor.¹⁰

Prisniparni – *Desmodium gangeticum*

The phytochemical and ethnopharmacological profile of this plant is reviewed by Bhattacharjee.¹¹ Studies on this plant have resulted in reports on medicinal activities like anti-inflammatory and nociceptive, anti leishmanial and immune modulatory, cardio protective, antiulcer, nootropic, hepato protective activity and renal protective.¹²

Saliparni – *Pseudarthria viscida*

This plant has activities like anti diabetic, antioxidant and anticancer.¹³⁻¹⁵

Bhadra – *Aerua lanata*

Gajalakshmi have reviewed the pharmacological perspectives of this plant. This plant has anti-hepatotoxic, anti-oxidant, antimicrobial and cytotoxic, renal protective, immuno modulatory, antitumor and anti-diabetic properties.¹⁶

Gokshura – *Tribulus terrestris*

Tribulus is known as Gokshura in Ayurveda. It is an ancient herb with immense medicinal qualities. *Tribulus*, in modern day, is used for body building, to relieve diseases of uro-genital system and as an aphrodisiac. Fatima has elaborated in their review the various pharmacological activities of *Tribulus*. This plant has various medicinal applications such as diuretic, antitumor, antibacterial and antifungal, antioxidant and hypoglycemic.¹⁷

Kantakari (*Solenum melongena*)

Various parts of the plant are useful in the treatment of inflammatory conditions, cardiac debility, and neuralgia, ulcers of nose, cholera, bronchitis and asthma. Its antioxidant and analgesic activities have been reported by Muthalik.¹⁸

Payasya – *Holostemma annulare*

Traditionally the plant is used as an alternative, astringent to the bowels, cures ulcers, diseases of the blood and in



treatment of worms.¹⁹ There are reports of its being anti-itching, anti leucoderma, antidiabetes, anti-cough, anti-gonorrhoea, as aphrodisiac and hepatoprotective.

Aswagandha – *Withania somnifera*

Another wonder drug plant having activities like antitumor, anti-inflammatory, anti stress, antioxidant, sleep inducing, effective in memory related conditions, insomnia, immuno modulatory, hemopoetic, effect on CNS and cardiopulmonary systems.²⁰

Eranda – *Ricinus communis*

The oil of Erand is commonly used in India as purgative for children. It has medicinal roles such as cytoprotective, antidiabetic, antibacterial, anti-inflammatory, wound healing, antioxidant, apoptotic activities.²¹⁻²⁷

Satavari – *Asparagus racemosus*

Sharma have reviewed the medicinal properties of *Asparagus*.²⁸ Alok in their exhaustive review have listed a number of medicinal properties of *Asparagus* such as, galactogogue, anti-secretory and antiulcer activity, anti tussive, adaptogenic, antibacterial activity, anti protozoal activity, anti-hepatotoxic, anti-neoplastic, cardiovascular, immuno modulatory, antioxidant, anti lithiatic, anti-inflammatory, enhances memory and protects against amnesia, aphrodisiac and diuretic. It is known as a versatile female tonic.²⁹

Darbha (*Desmostachya bipinnata* Linn.)

Golla have demonstrated the anti hyperglycemic effect of this plant on rats.³⁰ In addition pharmacological studies established its anti, anti ulcerogenic, antipyretic and anti-inflammatory activities, anti diarrhoeal and anti-fungal activity.³¹⁻³⁴

Kusa – *Eragrostis cynosuroides*

Shahalkar and Kamble have studied the biological activities of this plant based on Ayurvedic literature.³⁵

Sara- *Saccharum spontaneum*

Khalid and Siddiqui have reported the various pharmacological properties of this plant.³⁶ Aerial parts possess laxative and aphrodisiac properties, and are useful in burning sensations, strangury, phthisis, vesical calculi, blood diseases, biliousness and haemorrhagic diathesis. The stems are useful in vitiated conditions of pitta and vata burning sensation strongly and dyspepsia, haemorrhoids, menorrhagia dysentery, phthisis and general debility.³⁷

Kasa – *Imperata cylindrica*

This plant is reported to have antihypertensive and antibacterial activities.^{38, 39}

Sugar Cane - *Saccharum spontaneum*

The potential health benefits of sugar cane is reported by Singh.⁴⁰ In the Ayurvedic system of medicine sugarcane is used either as a single drug or in combination with some

other plant materials. Some native and traditional healers of the world have recommended sugarcane juice for its diuretic property.⁴¹ It is also used as aphrodisiac, laxative, cooling, demulcent, antiseptic, and tonic.⁴²

Potagala - *Sphaeranthus indicus* Linn

The pharmacological studies reported in this plant are antiulcer, antimicrobial, and immune-stimulant activities of sesquiterpene glycoside present in this plant.⁴³⁻⁴⁵

Krishna – *Piper longum* (long pepper)

Kumar have reviewed the various health benefits of *Piper longum*. *Piper longum* has many important medicinal values such as anticancer, antioxidant, hepatoprotective, anti-inflammatory, immune modulatory, antimicrobial, anti-platelet, anti hyperlipidemic activity, analgesic, antidepressant, anti-amoebic, vasodilatory, bioavailability enhancer due the presence of piperine in it, anti-obesity activity, radio protective, cardio protective and antifungal.⁴⁶

Yasthimadhu – *Glycyrrhiza glabra*

Glycyrrhiza glabra is known for its medicinal properties (Damle).⁴⁷

It has activities like antioxidant and antibacterial, anti-inflammatory, antiviral, memory enhancer, antifungal, antibacterial, anti-hyperglycemic, immune stimulatory, hepato protective and anticancer and anticoagulant.

Mridweeka – *Vitis vinnifera* (Dry grapes)

The cardio-protective role of grapes was reported.⁴⁸⁻⁵¹ The antioxidant properties of the polyphenols such as resveratrol, phenolic acids, anthocyanins and flavonoids present in grapes are attributed to secondarily help to avoid atherosclerosis, platelet aggregation and stenosis.

These compounds also possess a range of additional cardio protective and vaso-protective properties including anti-atherosclerotic, anti-arrhythmic, and vaso-relaxation actions.

Yavani – *Cuminum cyminum*

Sahoo have given extensive review of the several biological activities of *Cuminum cyminum* which indicate its activities like anti-diabetic, antioxidant, anti-bacterial, anti-fungal, bronchodilatory, hepatoprotective and renoprotective, chemopreventive, anti-epileptic, galactagogue, hypolipidemic, male anti-fertility, memory-enhancing and anti-stress effects.⁵²

Shunti – *Zingiber officinale* (ginger)

Ginger is one of the household medicines used against common cold, cough and indigestion. Its medicinal values are well documented (Zadeh and Ko).⁵³

Adel and Prakash have reported its antioxidant properties.⁵⁴ Ginger controls vomiting and nausea during pregnancy.⁵⁵ It controls blood pressure by blocking calcium channels.⁵⁶



MATERIALS AND METHODS

Sukumara kashayam was procured from standard Ayurvedic medical pharmacy at Chennai and was used for the study.

Antioxidant study

Antioxidant study was performed by DPPH Assay, FRAP Assay and Hydrogen Peroxide Scavenging Activity assay.

DPPH Assay (1,1-diphenyl-2-picrylhydrazyl) (Bliss, 1958)⁵⁷

The sample was dissolved in 3 different solvents (Ethanol) in 1mg/ml concentration and used as stock.

From the stock, various concentrations (100, 200, 300, 400mg) were taken for further analysis.

Respective solvents were taken as negative control.

Conc. = Concentration of the sample

OD = OD of the sample

Neg. Control = The Solvent

Activity = Neg. Control – OD / Neg. Control

% of Activity = Activity/100

IC50 = 50 – c value / m value

IC50/ml = IC50/3 (3 ml of DPPH for the assay).

To find the activity in 1 ml, the value had been divided by 3).

FRAP Assay (Pulido)⁵⁸

Sample of Sukumara kashayam was dissolved in Ethanol.

Triplicates had been put for the Processes.

Conc = Concentration of the sample

OD = OD of the sample

Linearity (y) = mx + c

M = Slope

C = The point x crosses y axis

X = OD – c value / m value

mM Fe/mg = X value / concentration x 1000

Mean = Average of mM Fe/mg

STDEV = Standard Deviation for mM Fe/mg

Hydrogen Peroxide Scavenging Activity (Ruch)⁵⁹

Sample of Sukumara Kashayam was dissolved in Methanol.

Triplicates had been put for the Processes.

Conc = Concentration of the sample

OD = OD of the sample

Neg. control = The Solvent

Activity = Negative control – OD / Negative control

% of activity = Activity / 100

Mean = Average of % of Activity

STDEV = Standard Deviation of % of Activity

Graph = (For Mean of % of Inhibition vs samples) Drawn using 2D clustered column

RESULTS AND DISCUSSION

Table 1 Indicates the results of DDPH assay with Ethanol Sukumara Kashayam.

Table 1: The DDPH assaya results of Sukumara Kashayam

S. No	Solution	Conc.	OD	Neg.Control	% Activity	m value	C value	IC50	IC50/ml
1	Ethanol	100	0.574	0.989	41.96158	0.1613	12.76	230.8741	76.95805
2		200	0.492		50.25278				
3		300	0.371		62.48736				
4		400	0.293		70.37412				

From the results it shows that IC50/ml was lowest value (76.95805) indicating highest activity.

FRAP Test Results are mentioned in Table No. 2

Table 2: Indicates the FRAP assay patterns of Sukumara kashayam in Ethanol solution.

Solvent	Conc.	OD	m Value	c Value	X	mM Fe(II)/mg	Mean	STDEV
Ethanol	10	0.441	0.0274	0.1086	12.13139	121.3138686		
	10	0.447	0.0274	0.1086	12.35036	123.5036496		
	10	0.591	0.0274	0.1086	17.60584	176.0583942	140.29	30.99

From the Table 2, it is clear that ethanol solution of Sukumara Kashayam indicated antioxidant activity (30.99).

Hydrogen peroxide scavenging assay results of Sukumara Kashayam in shown in Table 3



Table 3: Hydroden peroxide scavenging assay results of Sukumara Kashayam.

Solvent	Conc.	OD	Neg Control	% Activity	Mean	STDEV
Methanol	100	0.448	0.748	40.10695		
	100	0.414	0.748	44.65241		
	100	0.498	0.748	33.42225	39.39	5.65

From the results it is clear that the Methanol solution of Sukumara Kashayam indicated antioxidant activity.

Reactive Oxygen Species plays a vital role in disease etiology. Most of the physiological diseases are caused due to these reactive species which may lead to debility, old age, morbidity and finally mortality. The use of antioxidants as medicine has become a common practice of late.

The antioxidant potential of Sukumara Kashayam, as show in the results could be one of the mechanisms of action for the cure of menstrual disorders, particularly, backache and pain. The pharmacological efficacy of Sukumara Kashaym is under way and this report is the first step in this direction. It is interesting to note that most of the constituent plants do show antioxidant activities and the same is reflected in Sukumar Kashayam, as is reported in the present study. This correlation is a positive direction in understanding the mechanism of action of the medicine.

CONCLUSION

From the above mentioned paragraphs it is concluded the Sukumara Kashayam is a potential antioxidant medicine which could be one of the reasons for the treatment of menstrual backache and pain. The mechanism for such action demands further research.

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