Research Article

Antioxidant Studies of One Ayurvedic Medicine Sahacharadi Kashayam

P. Praveen Kumar [1], M.R. K. Rao[2*], Arul Amutha Elizabeth[3], K Prabhu [4]

[1]Tutor, ESIC Hospital, Coinmatore and Research Scholar, Bharath University, [2]Professor, Dept of Industrial Biotechnology, Bharath University, [3]Professor, Dept. of Pharmacology, Sree Balaji Medical College & Hospital, [4]Associate Professor, Dept of Anatomy, Sree Balaji Medical College and Hospital, Chennai, India.

***Corresponding author's E-mail:** mrkrao1455@gmail.com

Received: 21-11-2016; **Revised:** 09-01-2017; **Accepted:** 10-04-2017.

ABSTRACT

Sahacharadi Kashayam is an ayurvedic medicine used to treat vata related diseases like palsy, disc prolapsed, sciatica, back pain and paralysis. It is of interest to know the antioxidant activity of this medicine to know the possible mechanism of action. The present study analyze the antioxidant potential of one Ayurvedic medicine, Sahacharadi Kashayam by three procedures, namely, reducing power assay, DPPH assay and ABTS assay. It was observed that all the three assays gave fair results to prove the antioxidant potential of this Kashayam. This knowledge could be of help to understand further the medicinal efficacy of Sahacharadi Kashayam.

Keywords: Sahacahardi Kashayam, DPPH, ABTS, Vata, Palsy, Siatica, Paralysis.

INTRODUCTION

Ayurveda and Sidha are age old systems of medicinal practices of India. Majority of the population depend on these medicinal systems for their primary health care. But there is a lack of scientific studies to prove the efficacy of these medicinal systems, although the Ayurvedic medicines are cheap, more effective, with less or no side effects, easily available and affordable. Thus there is an obvious need to ascertain the scientific basis of the roles of these medicines. This need is being felt the world over to find easily affordable, cheap, more effective medicines due to increase in the incidence of many disease for which the cure is still elusive in the modern medical practice.

It is heartening that of late some reports have appeared towards understanding the efficacy of Ayurvedic and Sidha medicines, which is a welcome sign. [1-23] The present study deals with antioxidant study of one ayurvedic preparation, Sahacharadi Kashayam.

Kashayam is also known as Kwatham or Kashaya, which is essentially the water decoction of one or more herbs. Since most of the active principle in plants are water soluble the decoction contains them and help cure the disease. These medicines are mostly taken empty stomach since the absorption will be maximum and medicinal effects will be swift. But some Kashayams may have bitter or acidic components causing gastric irritation. Such are taken just before food. The Kasahayams are prepared by Ayurvedic practitioners based on the Ayurvedic treatise and the various herbs used have compatibility, effectiveness and also synergy among themselves.

Sahacharadi Kashayam is a decoction prepared out of three herbal ingredients, namely Sahachara (*Barleria prionitis/Strobilanthes heynianus*), Suradaru (Devadaru) (*Cedrus deodara*) and Sunthi (*Zingiber offcinale)* in water. This is used in Ayurveda for the management of Vata related diseases like Sciatica, low back pain, disc prolapsed, facial palsy and paralysis. This Kashayam is administered at doses of 5 to 15 ml diluted with water to be taken twice a day before food or as advised by the physician. The tablet forms of this medicine are also available which are taken 1-2 tablets twice a day.

The medicine is prepared by the three ingredients at equal proportions. The coarse powder of the three plant parts are boiled in 16 parts of water till it reduces to 4 parts, filtered and stored to be used as medicine. The literature for preparation of this medicine is from Astangahridayam Vatavyadhi chikitsa 21/57. There are a number of manufactures of this medicine like Arya Vaidya Sala, Kottakkal, Ashoka Pharmaceuticals, SNA Oushadhasala Pvt. Ltd., Nagarjuna Ayurvedic Group etc.

There is lack of knowledge on the scientific aspects of the role of this medicine. The present work is one step in understanding the possible mechanism for the activity of Sahacharadi Kashyam by doing antioxidant assays.

MATERIALS AND METHODS

Sahacharadi Kashayam was procured from Kottakkal Ayurveda Sala at Chennai. The drug was subjected to Reducing Power, DPPH and ABTS assays.

Reducing Power Assay[24]

Various concentrations of the Sahacharadi Kashayam in 1.0 ml of 10% DMSO solution was mixed with phosphate buffer (2.5 ml) and potassium ferricyanide (2.5 ml) and incubated at 50°C for 20 min. Aliquots of trichloroacetic acid (2.5 ml) were added to the mixture, which was then centrifuged at 3000 rpm for 10 min. The upper layer of

solution (2.5 ml) was mixed with distilled water (2.5 ml) and a freshly prepared ferric chloride solution (0.5 ml). The absorbance was measured at 700 nm. A blank was prepared without adding sample or standard. Ascorbic acid at various concentrations was used as reference standard. Increased absorbance of the reaction mixture indicates increase in reducing power.

% inhibition = [Test – control/Test] x 100

DPPH Radical Scavenging Assay[25]

The method described by Oyedemi *et al* (2011) was used to determine DPPH scavenging activity of the Sahacharadi Kashayam. The solution of 0.135mM DPPH was prepared in methanol. Different concentration of the medicine (0.1ml) was mixed with 1.9ml of DPPH solution. The reaction mixture was vortexed thoroughly and left in the dark are room temperature for 30 min. The absorbance of the mixture was measured at 517 nm. Ascorbic acid was used as the reference drug. The ability of the medicine to scavenge DPPH radical was calculated from the following formula:

%DPPH inhibition= [(OD of control - OD of test)/ (OD of control)] x100

ABTS Radical Scavenging Assay[26]

A stock solution of ABTS radical cation was prepared by dissolving ABTS (7 mM, 25 mL in deionised water) with potassium persulfate ($K_2S_2O_8$) (140 mM, 440 µL). The mixture was left to stand in the dark at room temperature for 15-16 h (the time required for formation of the radical) before use. For the evaluation of ABTS radical scavenging activity, the working solution was prepared by the previous solution and diluting it in ethanol to obtain the absorbency of 0.700 ± 0.02 at 734 nm. The solvent extracts and purified compounds (0.1 mL) at different concentrations were mixed with the ABTS working solution (1.9 mL) and the reaction mixture was allowed to stand at Room temperature for 20 min, then the absorbance was measured by using a UV-visible spectrophotometer at 734 nm. The radical scavenging activity is given as ABTS radical scavenging effect that is calculated by equation:

ABTS radical scavenging effect (%) = [(A0-A1)/A0] × 100

RESULTS AND DISCUSSION

The Reducing Power Assay results of Sahacharadi Kashayam are shown in Table 1. The DDPH assay is indicated in Table No. 2 and that of ABTS assay is shown in Table 3.

Table 1: Indicates the Reducing Power assay of Sahacharadi Kashayam

Sl. No	Concentration (µg)	Absorbance	% Inhibition	IC 50
1	5	0.512	7.22	
2	10	0.538	11.21	
3	50	0.614	13.90	
4	100	0.708	32.91	
5	500	1.327	64.21	
6	1000	1.399	76.23	
7	Control	0.475		

The results clearly indicate that Sahacharadi kashayam shows promising reducing activity.

Table 2: Indicates the absorbance and percent inhibition due the activity of Sahacharadi kashayam with respect to DDPH scavenging activity as compared with Ascorbic acid as standard.

Sl. No	Concentration (µg)	Absorbance	% Inhibition	IC 50
1	5	0.845	5.59	
2	10	0.821	8.27	
3	20	0.805	40.6	
4	50	0.431	51.84	
5	100	0.335	62.57	
6	200	0.286	68.04	69.20
7	Control	0.895		

Ascorbic Acid

Sl. No	Concentration (µg)	Absorbance	% Inhibition	IC 50
1	1	0.827	7.6	
2	5	0.676	24.47	
3	10	0.474	47.04	
4	20	0.33	63.13	
5	50	0.212	76.31	
6	100	0.179	80.00	13.3
7	Control	0.895		

The DDPH assay results thus show that Sahacharadi Kashayam has promising antioxidant activity.

ABTS Assay

Table 3: Indicates the absorbance and percent inhibition due the activity of Sahacharadi Kashayam with respect to ABTS scavenging activity as compared with Ascorbic acid as standard.

Sl. No	Concentration (µg)	Absorbance	% Inhibition	IC 50
1	5	0.488	26.60	
2	10	0.463	29.85	
3	20	0.431	34.70	
4	50	0.410	37.88	160.04
5	100	0.374	43.33	
6	200	0.288	56.36	
7	Control	0.66		

Ascorbic acid

Sl. No	Concentration (µg)	Absorbance	% Inhibition	IC 50
1	1	0.503	23.79	
2	5	0.5452	31.52	
3	10	0.416	36.97	
4	20	0.361	45.30	17.6
5	50	0.184	72.12	
6	Control	0.660		

The ABTS assay results also indicate the antioxidant role of Sahacharadi Kashayam.

The three ingredients, Sahachara (*Barleria prionitis/Strobilanthes heynianus*), Suradaru (Devadaru) (*Cedrus deodara*) and Sunthi (*Zingiber offcinale)* of Sahacharadi Kashayam have been reported to have antioxidant potentials. [27-40]

The GC MS analysis of Sahacharadi Kashayam revealed the possible presence of some molecules with antioxidant properties. The most promising molecules were eugenol, abietic acid, sesquiterpenes, n-hexadecanoic acid, hexadcanoic acid, pimaric acid and 3-decanone.[41-48]

Our study with some of the Kashayams and Kwathas, namely, Katakakhadiradi Ksahayam, Kulathadi Kasahayam and Patolakaturohinyadi Kwatham, also indicated fair degrees of antioxidant potentials.[49-52]

CONCLUSION

The antioxidant potential of Sahacharadi Kashaym is indicated by the three assays done. This information could help in further analysis of this medicine to be tested for various other standard medical parameters to prove its efficacy.

REFERENCES

1. Shankari C, Venkatesan V, Rao MRK, Saravanan, Prabhu K, Seppan Prakash. The GC MS analysis study of one Ayurvedic medicine “Ajaswagandhadi lehyam”. Int. J. Pharm. Sci. Rev. Res., 40(1), 2016, 33-37.
2. Edel Queen Z, Rao MRK, Jecintha Anthony, Prabhu K, Johnson WMS, Shanthi Balasubramanian B, Lakshmi Sundaram, Shruthi Dinakar. The GC MS Study of One Ayurvedic Preparation Amritamehari Churnam. Int. J. Pharm. Sci. Rev. Res., 39(2), 2016, 169-172.
3. Rao MRK, Hassan Mohammad, Narayanan S, Prabhu K, Kalaiselvi VS, Ravi A, Hari Babu, Guru Rajan, Suganya S. Antioxidant Assay and GC-MS Analysis of One Sidha Medicine Swasa Kudori Tablets. Int. J. Pharm. Sci. Rev. Res., 37(1), 2016, 19-25.

4. Sivakumaran G, Rao MRK, Prabhu K, Kalaiselvi VS, Sumathi Jones, Johnson WMS, Antony J. Preliminary GC-MS Anlaysis and Antioxidant Study of One Ayurvedic Medicine "Manasa Mitra Vatakam". Int. J. Pharm. Sci. Rev. Res., 37(1), 2016, 190-199.
5. Lenin, Rao MRK, Prabhu K, Bindu R, Arul Amutha Elizabeth, Shruthi Dinakar. The study of antioxidant activities of an Ayurvedic medicine Ayaskriti. Der Pharmacia Lettre, 2016, 8 (6):203-211.
6. Rao MRK, Ravi A, Narayanan S, Prabhu SK, Kalaiselvi VS, Shruthi Dinakar, Guru Rajan, Kotteeswaran N. Antioxidant Study and GC MS Analysis of an Ayurvedic Medicine 'Talisapatradi Choornam'. Int. J. Pharm. Sci. Rev. Res., 36(1), 2016, 158-166.
7. Rao MRK, Phillips S, Kumar MH, Saranya Y, Divya D, Prabhu K. GC MS analysis, antimicrobial, antioxidant activity of an Ayurvedic medicine, Salmali Niryasa. Journal of Chemical and Pharmaceutical Research, 7(7), 2015, 131-139.
8. Chandrasekar T, Rao MRK, Kumar RV, Prabhu K, Nandha Kumar S, Divya D. GC-MS analysis, antimicrobial, antioxidant activity of an Ayurvedic medicine, Nimbapatradi Choornam. Journal of Chemical and Pharmaceutical Research, 7(8), 2015, 124-136.
9. Ravi A, Hassan Mohammad, Rao MRK, Prabhu K, Hari Babu, Shridhar. Antibacterial, antioxidant activity and GC MS analysis of a Sidha medicine "Neerkovai tablets". Int Journ. Pharmacy Tech, 7(3), 2015, 10091-10112.
10. Rao MRK, Kumar MH, Amutha A, Prabhu K, Chatterjee B, Selva Kumar S. Phytochemical Analysis and Antioxidant Efficacy of the Resin of *Bombax ceiba* (Salmali). Int J Pharm Sci Rev Res, 30(1), 2015, 335-339.
11. Rao MRK, Ganesan A, Rengasundari G, Sathish Kumar M, Jha NK. Treatment of peptic ulcer in animal model by Sirucinni Uppu (Herbal salt of *Acalypha fruticosa* Forssk.) Der Pharmacia Lettre, 6(3), 2014, 20-26.
12. Rao MRK, Ganesan A, Rengasundari G, Sathish Kumar M, Jha NK. The clinical efficacy of *'Kodasuri veeravaippu' (a sidhha formulation)* in patients affected by the disease *"Keelvayu"*
13. (Arthritis). Der Pharmacia Lettre, 6(1), 2014, 71-77.
14. Rao MRK, Ganesan A, Rengasundari G, Sathish Kumar M. The curative role of *Acalypha fruticosa F*orrssk. (Sirucinni uppu) salt on peptic ulcer patients. Der Pharmacia Lettre, 6(4), 2014, 44-51.
15. Velpandian V, Anbu N, Selangovan S, Musthafa MM. Antihypertensive activity of *Ardostachys jatamansi* in hypertensive rats following renal gold blatt occlusion method. World Journal Pharmaceutical Res, 3(8), 2014, 769-777.
16. Parekar RR, Jadhav KS, Marathe PA, Rege NN. Effect of Saraswatarishta in animal models of behavior despair. J Ayurveda Integr Med, 5(3), 2014, 141–147.
17. Sandhiya S, Kumar MP, Velpandian V, Thenmozhi P, Banumathi V. Standardization of Siddha polyherbal formulation Vaeppampoovathy Mathirai. American J of Pharmacy and Health, Research, 10, 2014, 129-137.
18. Rao MRK, Ganesan A, Rengasundari G, Sathish Kumar M, Jha NK. 'Kodasuri Veeravaippu' a sidha preparation, against Carrageenan induced paw edema and Cotton pellet induced granuloma in albino rats. Der Pharmacia Lettre, 5(6), 2013, 99-104.
19. Sathish Kumar M, Rao MRK, Ganesan A, Rengasundari G. Antibacterial Screening of Kodasuri Veeravaippu, A Siddha Salt Preparation. Int J of Pharmaceutical Science Rev and Res, 20(1), 2013, 140-141.
20. Velpandian V, Kumar MP, Gnanavel IS, Anbu N, Abdul Khader AM. Clinical evaluation of Kodipavala Chunnam in the treatment of Infective hepatitis, drug induced hepatitis and alcoholic hepatitis. Int Res J Pharma, 4(4), 2013, 152-157.
21. Kanimozhi B, Arumugam K, Velpandian V, Kumar MP. Diuretic activity of Siddha formulation Ashta Gunma Triaavagam in rat. International Journal of Pharmaceutical & Phytopharmacological Research, 2(5), 2013, 340-343.
22. Gupta K, Ashok BK, Ravishankar B, Thakar AB. Anti-anxiety and anti-depressant activities of Sarasvata choorna in experimental animals. Ayu., 32, 2011, 590–593.
23. Pandey N, Chaurasia JK, Tiwari OP, Tripathi YB. Antioxidant properties of different fractions of tubers from *Pueraria tuberosa* Linn. Food Chem, 105, 2007, 19–22.
24. Govindarajan R, Vijayakumar M, Pushpangadan P. Antioxidant approach to disease management and the role of Rasayana herbs of Ayurveda. J Ethnopharmacol, 99, 2005, 165–78.
25. Arulpriya P, Lalitha P, Hemalatha S. Invitro antioxidant testing of the extracts of *Samanea saman* (Jacq.)Merr. Der Chemica Sinica, 2010, 1 (2): 73-79.
26. Oyedemi SO, Afolayan AJ. In vitro and in vivo antioxidant activity of Aqueous extracts of *Leonotis leonurus*. International Journal of Pharmacology, 7(2), 2011, 248-256.
27. Fan H, Guang-Zhong Yang, Tong Zheng, Zhi-Nan Mei, Xiang-Ming Liu, Yu Chen, Su Chen. Chemical Constituents with Free-Radical-Scavenging Activities from the Stem of *Microcos paniculata.* Molecules 2010, 15, 5547-5560.
28. Banerjee D, Maji AK, Mahapatra S, Banerji P. *Barleria prionitis* Linn. A Review of its Traditional Uses, Phytochemistry, Pharmacology and Toxicity. Research Journal of Phytochemistry, 6, 2012, 31-41.
29. Sharma P, Sharma GN, Shrivastava B, Jadhav HR. Evaluation of Antioxidant Potential of *Barleria prionitis* Leaf and Stem. American Journal of Phytomedicine and Clinical Therapeutics, 2(10), 2014, 1177-1186.
30. Amoo SO, Ndhlala AR, Finnie JF, Van Staden J. Antifungal, acetylcholinesterase inhibition, antioxidant and phytochemical properties of three *Barleria* species. S Afr J Bot, 77, 2011, 435-445.
31. Chetan C, Suraj M, Maheshwari C, Rahul A, Priyanka P. Screening of antioxidant activity and phenolic content of whole plant of *Barleria prionitis* linn. Int J Res Ayurveda Pharm, 2, 2011, 1313-1319.
32. Dheer R, Bhatnagar P, 2010. A study of the antidiabetic activity of *Barleria prionitis* Linn. Ind J Pharm, 42, 2010, 70-73.
33. Khadse CD, Kakde RB. Anti-inflammatory activity of aqueous extract fractions of *Barleria prionitis* L. roots. Asian J Plant Sci Res, 1, 2011, 63-68.
34. Singh B, Bani S, Gupta DK, Chandan BK, Kaul A. Anti-inflammatory activity of TAF, an active fraction from the plant *Barleria prionitis* Linn. J Ethanopharmacol, 85, 2003, 187-193.
35. Jaiswal SK, Dubey MK, Das S, Verma AR, Rao CV. A comparative study on total phenolic content, reducing power and free radical scavenging activity of aerial parts of *Barleria prionitis*. Int. J. Phytomed., 2, 2010, 155-159.
36. Nair AK, Chandrasekhar MJN, Shiji Kumar PS. Phytochemcial and pharmacological aspects of *Strobilanthes ciliatus*: A Review. Int J Res Ayur Pharma, 7(4), 2016, 72-77.
37. Saxena A, Saxena AK, Singh J, Bhushan S. Natural antioxidants synergistically enhance the anticancer potential of AP9-cd, a novel lignan composition from *Cedrus deodara* in human leukemia HL-60 cells. Chemico-Biological Interactions, 188(3), 2010, 580–590.
38. Zeng WC, Zhang Z, Gao H, Jia LR, He Q. Chemical composition, antioxidant, and antimicrobial activities of essential oil from pine needle (*Cedrus deodara)*. J Food Sci, 77(7), 2012, C824-829.

Source of Support: Nil, **Conflict of Interest:** None.