



Title: REVIEW OF ANTI-OXIDANT HERBAL DRUGS W.S.R TO *MADHURASKANDHA* (CHARAKASAMHITA)

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ABSTRACT:

Majority of the diseases occurs due to decreased level of the endogenous antioxidants like SOD (Super oxide dismutase), GPX (Glutathione per oxidase) and CAT (catalyse). Therefore exogenous anti-oxidants like vitamin C and E, zinc, beta carotene etc. need to be incorporated. These anti-oxidants protect the cell from damage caused by free radicals and increase cell longevity. In Ayurvedaperspective such type of function may be attributed to *Madhurarasa*. Acharya Charaka mentioned a group (*Skandha*) of drugs basing on their rasa (taste). Also he stated that these drugs do possess not only *Madhurarasa*, but also *Madhuravipaka* and *Madhuraprabhava*. Scientifically one of its *Rasayana* properties can be evaluated by anti-oxidant activity. The present review of *Madhuraskandha* drugs showed that majority of drugs do possess anti-oxidant activity.

Key words: Anti-oxidant activity, *Madhuraskandha*

◆ INTRODUCTION:

The free radical theory of aging (FRTA) states that organisms age because cells accumulate free radical damage over a period of time. A free radical is any atom or molecule that has a single unpaired electron in the outer shell. They are highly unstable and reactive in nature and cause oxidative chain reaction. The free radical oxidation moves from molecule to molecule, cell to cell and causes immense damage to human body. These radicals are generated endogenously as well as exogenously. Damage caused by free radicals is called as oxidative stress. Antioxidants are reducing agents, and limit oxidative damage to biological structures by passivating them from free radicals. Anti-oxidants like SOD (Super oxide dismutase), GPX (Glutathione per oxidase) and CAT (catalyse) are endogenously help to remove free radicals, while vitamin A, vitamin C, vitamin E (alpha-tocopherol), beta-carotene, selenium, zinc etc. and many of phytochemicals are exogenous agents, having potent anti-oxidant activity.^[1]

The anti-oxidant agent decreases the cell destruction activity of free radical and promotes cell longevity which falls under the spectrum of *Rasayana* activity. The drugs of *Madhurarasa* attributed mainly with *Balya*, *Jeevaniya*, *Preenana*, *Brimhaniya*, *Saptadhatu vardhana* effect indicating cell protective and promotive effect falling under anti-oxidant pharmacological profile. Acharya Charaka had mentioned *Madhuraskandha* and included drugs having *Madhurarasa*, *Madhura vipaka* and *Madhura prabhava* in it. Therefore in the present study total drugs belonging to *Madhuraskandha* was reviewed for their reported antioxidant activity.

◆ MATERIAL AND METHOD:

The commentaries on Charakasamhita like *Ayurvedadipika*, *Jalpalkapataru*, *Charakopskara* were consulted to interpret the source of drugs of *Madhuraskandha*. For proper identification of the drugs 'Glossary of vegetable drugs in Bruhatrayi' by Thakur Balawant Singh was referred. Different Karmas attributed to dravyas were reviewed from *Dhanvantari nighantu*, *Bhavaprakasha nighantu*, *Raj nighantu*, *Kaiyadev nighantu* and *Priya nighantu*. Internet browsing from Google was done and around 70 articles regarding antioxidant activity were downloaded and reviewed.

◆ **OBSERVATION AND RESULT:**

Forevaluating anti-oxidant activity there are 407 methods which are repeated from 29 different modalities. They are classified as *in vivo* and *in vitro* methods. There are 19 *in vitro* method and 10 *in vivo* established methods. Among them DPPH method was found to be used mostly for the *in vitro* anti-oxidant activity evaluation purpose while LPO (Lipid peroxide) was found as mostly used *in vivo* antioxidant assay. Ethanol with its highest frequency used as solvent for extraction purpose.^[2]

Table no. 1 showing proven anti-oxidant activity of Madhuraskandha drugs

No	Drugs	Botanical source	Karma (Dh.Ni, Bh.Ni, R.Ni, K.Ni, P.Ni)	Part used	Experimental model
1.	<i>Jivanti</i>	<i>Leptadeniareticulata</i> W & A	<i>Rasayani, Balakari, Chakshushya</i>	Ethanolic extract of leaf	Immunomodulatory and antioxidant ^[3]
2.	<i>Vira</i>	<i>Lasia spinosa</i> (L.)Thw.	-	Methanolic extract of leaves	Free radical scavenging by DPPH ^[4]
3.	<i>Tamalaki</i>	<i>Phyllanthus niruri</i> Linn. <i>P.urinaria</i> Linn	-	Phenolic extract of whole plant	DPPH radical scavenging & mushroom-tyrosinase-inhibitory assays ^[5]
4.	<i>Mudgaparni</i>	<i>Phaseolus trilobus</i> Ait	<i>Chakushya, Grahi, Shukrala</i>	Methanolic extract of root	Free radical scavenging by DPPH method ^[6]
5.	<i>Mashaparni</i>	<i>Teramnus labialis</i> Spreng	-	Methanolic extract of whole plant	Anti-oxidant and lipid peroxidation effect ^[7]
6.	<i>Shalaparni</i>	<i>Desmodium gangeticum</i> DC	<i>Brihmana, Rasayana, Vishahari</i>	Total alcoholic extract	Superoxide dismutase, glutathione and catalase increases with lipid peroxide decrease ^[8]
7.	<i>Prishniparni</i>	<i>Uraria picta</i> Desv	<i>Vrishya</i>	Aqueous extract of leaves	ABTS radical scavenging activity ^[9]
8.	<i>Asanaparni/ Shanaparni</i>	<i>Clitoria ternatea</i> Linn	<i>Medhya, Kanthya, Smriti-budhhida</i>	Different extracts of leaves, stem, root	DPPH, FRAP, Metal chelating ability, Reducing power assay ^[10]
9.	<i>Madhuparni</i>	<i>Flacourtia indica</i> Merr <i>Gymnospora spinosa</i> (Forsk) Fiori	-	Methanolic and aqueous extract of leaves	Free radical scavenging method ^[11]
10.	<i>Karkatashringi</i>	<i>Pistacia integrima</i> Stew. ex.Brandis	-	Methanol extract of gall	DPPH, reducing power, scavenging activity of hydroxyl radical ^[12]
11.	<i>Shringatika</i>	<i>Trapa bispinosa</i> Roxb.	<i>Vrishya, Grahi</i>	Fruit extract	DPPH, ABTS

				(DCM:MeOH & acetone)	radical scavenging assay, FRAP assay, Metal chelating assay ^[13]
12.	<i>Chhinnaruha</i>	<i>Tinospora cordifolia</i> (Willd.) Miers ex Hook. f. &Thoms.	<i>Rasayani, Balya, Deepaniya</i>	Five different extracts of leaves	Total reducing sugar, lipid peroxidation, DPPH & superoxide radical scavenging method ^[14]
13.	<i>Chhatra</i>	<i>Astercantha longifolia</i> Nees	<i>Vrishya</i>	Various parts of extract/ root extract	Anti-oxidant, total phenol content ^[15] DPPH assay
	<i>Ikshuvalika</i>				
14.	<i>Shravani</i>	<i>Sphaeranthus indicus</i> Linn	<i>Medhya</i>	Extract of root	ABTS,DPPH radical scavenging assay, Superoxide radical, NO radical scavenging, iron chelating activity ^[16]
15.	<i>Mahashravani</i>	<i>Sphaeranthus africanus</i> Linn	<i>Medhya</i>	Ethanollic extract of crude whole plant	Free radical scavenging activity ^[17]
16.	<i>Vishwadeva</i>	<i>Grewia hirsuta</i> Vahl.		Methanolic extract of leaves	DPPH, hydroxyl radical scavenging, metal chelating activity ^[18]
17.	<i>Shukla</i>	Sharkara	<i>Ruchya, Shukrakari</i>		
18.	<i>Bala</i>	<i>Sida cordifolia</i> Linn	<i>Grahi, Bala-kantikrit</i>	Ethanollic extract of root/ whole plant	Free radical scavenging by DPPH ^[19] Anti-lipid peroxidation, free-radical scavenging, reducing power, nitric oxide, superoxide scavenging antioxidant assay ^[20]
19.	<i>Atibala</i>	<i>Abutilon indicum</i> Linn	<i>Grahi, Bala-kantikrit</i>	Methanolic extract of leaf	Ferric reducing anti-oxidant assay (FRAP) ^[21]
	<i>Rushyaprokta</i>			Methanolic, Aqueous, Hydro-alcoholic extract of stem	Total phenol content & free radical scavenging activity by DPPH ^[22]
	<i>Kulingakshi</i>				
	<i>Sahadeva</i>				
20.	<i>Vidari</i>	<i>Puerariatuberosa</i> DC	<i>Brimhani,</i>	Tuber	ABTS assay, lipid

			<i>Stanya-shukrada, Mootrala, Jivaniya, Balavarnakara, Rasayani</i>		peroxidation, superoxide, hydroxyl radical scavenging activity ^[23]
21.	<i>Kshiravidari</i>	<i>Ipomoea digitata</i> Linn	<i>Brimhani, Stanyashukrada, Mootrala, Jivaniya, Balavarnakara, Rasayani</i>	Methanolic extract of tuberous root	Anti-oxidant and lipid peroxidation ^[24]
	<i>Kshiravalli</i>				
22.	<i>Kshudrasaha</i>	<i>Aloe vera</i> <i>Phaseolus trilobus</i> Ait <i>Barleria strigosa</i> Willd.	<i>Brihmani, Balya, Vrishya, Rasayani, Netrya</i>	Extracts of aloe gel	DPPH, superoxide radical, metal ion chelation, reducing power, hydroxyl radical scavenging activity ^[25]
23.	<i>Mahasaha</i>	<i>Teramnuslabialis</i> Spreng (Mashaparni) <i>Barleria cristata</i> Linn. (Sahachara)	<i>Grahi</i>	Ethanollic and aqueous extracts of leaves	DPPH, ABTS radical scavenging activity, FRAP assay ^[26]
24.	<i>Ashwagandha</i>	<i>Withania somnifera</i> Dunal	<i>Atishukrala, Balya, Rasayani</i>	Powdered root extract	Immunomodulatory activity ^[27]
25.	<i>Vrischira</i>	<i>Trianthemaportulacastrum</i> Linn.	<i>Chakshushya, Balya, Varnya, shukrala, keshya, Svarya</i>	Ethanollic extract of leaves	Anti-oxidant in relation to hepatotoxins, lipid peroxidation effect. ^[28]
26.	<i>Punarnava</i>	<i>Boerhaviadiffusa</i> Linn <i>B. repens</i> <i>B. rependa</i>	<i>Grahi</i>	Ethanollic extract of root	Anti-stress, adaptogenic activity, immunomodulatory ^[29]
27.	<i>Brihati</i>	<i>Solanum indicum</i> Linn	-	Methanolic extract of berries	Free radical scavenging by DPPH ^[30]
28.	<i>Kantakarika</i>	<i>Solanum xanthocarpum</i> Schrad & Wendle	<i>Deepana, Pachana</i>	Various extract of berries	Free radical scavenging by DPPH ^[31]
29.	<i>Urubuka</i>	<i>Ricinus communis</i> Linn		Stem with six different extract	Free radical scavenging by DPPH method, NO radical inhibition ^[32]
				Dry leaves	DPPH method
			<i>Vrishya</i>	Methanolic extract of root	Free radical scavenging by DPPH, NO and Hydroxyl radical method ^[33]

30.	<i>Shvadranshta</i>	<i>Tribulus terrestris</i> Linn	<i>Deepana, Vrishya, Pushtida, Balya</i>	Ethanollic extract of whole plant	Adaptogenic activity ^[34]
31.	<i>Samharsha</i>	<i>Loranthus longiflorus</i> Desr (<i>Dendrophthoe falcate</i> (Linn.f) Etting	<i>Vrishya, Rasayana</i>	Hydro-alcoholic extract	Anti-oxidant activity ^[35]
32.	<i>Shatavari</i>	<i>Asparagus racemosus</i> Willd.	<i>Rasayani, Shukrastanyakari, Balya, Netrya</i>	Root extract	DPPH method ^[36]
33.	<i>Shatapushpa</i>	<i>Peucedanum graveolens</i> Linn <i>Foeniculum vulgare</i> Mill	<i>Deepana</i>	Various extracts of seed	BHA: BHT ratio was evaluated for antioxidant activity. ^[37]
34.	<i>Madhooka-pushpi</i>	<i>Bassia latifolia</i> (Roxb.) Macbride	<i>Brihmana, Balya, Shukrala</i>		Anti-oxidant activity of allied species i.e. <i>Bassialongifolia</i> is reported.
35.	<i>Yashtimadhu</i>	<i>Glycyrrhiza glabra</i> Linn	<i>Chakshushya, Balya, Varnya, Shukrala, Keshya, Svarya</i>	Ethanollic extract of leaves	Lipid peroxidation, antioxidants ^[38]
36.	<i>Madhulika</i>	<i>Eleusine indica</i> Gaertn. <i>Eleusine coracana</i> Gaertn	<i>Shukrala, Brihmana, Pathya</i>	Aqueous extract of plant	Free radical scavenging by DPPH method ^[39]
37.	<i>Mridvika</i>	<i>Vitis vinifera</i> Linn	<i>Chakshushya, Brimhani, Vrishya, svarya</i>	Methanolic extract of fruit	Free radical scavenging DPPH, ORAC ^[40]
38.	<i>Kharjura</i>	<i>Phoenix sylvestris</i> Roxb.	<i>Ruchya, Tarpana, Balya</i>	Methanolic extract of fruit	Free radical scavenging activity and reducing capacity ^[41]
	<i>Kharjuramastaka</i>				
39.	<i>Parooshaka</i>	<i>Grewia asiatica</i> Linn	<i>Vishtambhi, Brihmana</i>	Methanolic extract of fruit	DPPH, β -carotene linoleic acid assay, total reducing power ^[42]
40.	<i>Aatmagupta</i>	<i>Mucuna pruriens</i> DC	<i>Vrishya, Brihmaniya Balya</i>	Three types of extract of whole plant	DPPH radical scavenging, Superoxide anion scavenging, Iron chelating activity ^[43]
41.	<i>Pushkara-beeja</i>	<i>Nelemubo nucifera</i> Hook.f.		Methanolic extract of Leaf	Free radical scavenging, hydroxyl radical, metal binding, reducing power ^[44]
				Hydro-ethanollic extract of Flower	Ferric reducing antioxidant power (FRAP), Hemoglobin-

					glycosylation, Reducing power and Phosphomolybdenum and compared with the standard ascorbic acid in dose dependent manner. ^[45]
			<i>Garbha-samsthapaka</i>	Hydro-alcoholic extract of Seed	Total phenolic content, free radical scavenging activity by DPPH and NO method. ^[46]
42.	<i>Rajadana</i>	<i>Buchanania lanzan</i> Spreng <i>Mimusops hexandra</i> Roxb.	<i>Vrishya, Balya</i>	Methanolic extract of Leaves	Anti-oxidant activity ^[47] Adaptogenic activity
43.	<i>Kataka</i>	<i>Strychnos potatorum</i> Linn.f.	<i>Netrya</i>	Aqueous extract of seed	Anti-oxidant activity & hepatoprotective ^[48]
44.	<i>Kashmari</i>	<i>Gmelina arborea</i> Linn	<i>Deepana, Pachana, Medhya, Bhedana</i>	Methanolic extract of stem bark Hexane extract of leaves	Free radical scavenging activity ^[49]
45.	<i>Odanapaki</i>	<i>Barleria strigosa</i> Willd.	-	-	Yet to be validate
46.	<i>Taalamastaka</i>	<i>Borassus flabellifer</i> Linn	<i>Abhishyandi, Shukrada</i>	Methanolic extract of leaves & root	FRAP, reducing power assay ^[50]
47.	<i>Ikshu</i>	<i>Sachharum officinarum</i> Linn	<i>Balya, Vrishya, Mootrala</i>	Phenolic compound of sugarcane juice	In vivo MeHgCl intoxication and potent inhibition of ex vivo lipoperoxidation of rat brain homogenates ^[51]
48.	<i>Darbha</i>	<i>Imperata cylindrica</i> Rausch.	-	Methanolic extract of root	NO scavenging, Hydrogen peroxide and reducing power capacity ^[52]
49.	<i>Kusha</i>	<i>Desmostachys bipinnata</i> Stapf	-	Hydroalcoholic extract of root	In vivo and in vitro H ₂ O ₂ radical scavenging assay ^[53]
50.	<i>Kasha</i>	<i>Saccharum spontaneum</i> Linn	-	Methanolic extract of Root	Thiocyanate, DPPH, NO radical scavenging, reduction potential ^[54]

51.	<i>Shaali</i>	<i>Oriza sativa</i> Linn	<i>Hridya, Brihmana, Ruchya, Balya, Svarya</i>	Rice extract	DPPH, ABTS, FRAP assay ^[55]
52.	<i>Gundra</i>	<i>Typha elephantine</i> Roxb.	<i>Vrishya, Chakshushya</i>	-	Yet to be validate
53.	<i>Itkata</i>	<i>Sesbania bispinosa</i> Syn <i>Sesbania aculeate</i> Pers	-	Methanolic extract of Stem	DPPH, β -Carotene and Linoleic acid assay ^[56]
54.	<i>Sharamula</i>	<i>Saccharum munja</i> Roxb	<i>Vrishya</i>	4 types of extracts of root	Anti-oxidant activity ^[57]
55.	<i>Rajakshavka</i>	<i>Euphorbia hirta</i> Linn	<i>Hridya, Shukrala</i>	Ethanol, hexane, methanol and aqueous extracts of leaves	In vitro antioxidant activity ^[58]
56.	<i>Dvarada</i>	<i>Tectona grandis</i>	-	Methanolic extract of Bark	Anti-oxidant in diabetic rat ^[59]
57.	<i>Bhaaradvaji</i>	<i>Thespesia lampas</i> Dalz &Gibs	<i>Seed- stanyada, Vrishya</i>	Aqueous extract of root	DPPH & ABTS Free radical scavenging ^[60]
58.	<i>Kasheruka</i>	<i>Scirpus kysoor</i> Roxb	<i>Stanyakara</i>	-	Yet to be validate.
59.	<i>Rajakasheruka</i>	<i>Scirpus grossus</i> Linn	-	-	Yet to be validate.
60.	<i>Hansapadi</i>	<i>Adiatum lunulatum</i> Burn	<i>Rasayani</i>	Ethanollic extract of plant	DPPH assay, total phenolic, reducing power, H ₂ O ₂ radical, Hydroxyl radical, NO radical scavenging and total anti-oxidant activity. ^[61]
61.	<i>Kapotavalli</i>	<i>Elettaria cardamomum</i> Maton	-	Methanolic extract of seed	Free radical scavenging by DPPH method ^[62]
62.	<i>Gopavalli</i>	<i>Hemidesmus indicus</i> (L.) R. Br.	<i>Shukrakara</i>	Methanolic extract of root	Lipid peroxidation and scavenge hydroxyl and superoxide radical ^[63]

Dh.Ni- Dhanvatari nighantu, R.Ni.- Rajanighatu, K.Ni- Kaiyadeva Nighantu, Bh.Ni- Bhavaprakash nighatu, P.Ni.- Priyanighantu, DPPH- 2,2-diphenyl-1-picrylhydrazyl, NO- Nitric oxide, ABTS- 2,2'-azino-bis(3-ethylbenzothiazoline-6-sulphonic acid

The drugs namely *Mridvika*, *Kharjura*, *Parooshaka* and *Ikshu* are administered as food supplements bestowed with *Rasayana* property. Grape seed extract is reported to have significant anti-oxidant activity.^[64]

The drugs namely *Guduchi, Bala, Atibala, Hansapadi, Ashwagandha, Punarnava, Shvadanshtra, Shatavari, Yashtimadhu, Kapikachhu, Vidari, Kshrivaidari, Jivanti, Kumari, Samharsha, Shalaparni*, are attributed with *Rasayana* activity. *Shukrala Karma* is mainly attributed to *Ashwagandha, Gopavalli, Jivaka, Kakoli, Kshirakakoli, Kshiravidari, madhukapushpi, Madhulika, Mudgaparni, Rajakshvaka, Rushabhaka, Shatavari, Taala, Vidari, Vrischira, Yashtimadhu*. Some of them are also referred to possess *Vajeekarana Karma* (Fertility producing and aphrodisiac activity) like *Aatmagupta, Bharadvaji, Ikshu, Ikshuvalika, Gundra, Kumari, Mahameda, Meda, Mridvika, Prishniparni, Rajadana, Samharsha, Sharamoola, Shringataka, Gokshura*.

Sahadeva, Rushyaprokta, Kulingakshi, Atibala have been identified with same botanical source *Abutilon indicum* Linn. *Kshiravalli* and *Kshiravidari* have been taken as *Ipomoea digitata* Linn. And Chakrapani interpreted *Chhatraas Kokilaksha* having botanical source *Astercantha longifolia* Nees and synonymous with *Ikshuvalika*. Basing on the interpretations furnished by different writers it appears that the number of *Madhuraskandha* drugs should be 79.^[65]

Indra imparted the knowledge of Ayurveda which is like ambrosia to the sages and said that all the *Divyaushadhi* (celestial drugs) which grow in the Himalaya get matured with potency. He had given some examples of *divyaushadhi* (celestial drugs) like *Aindri, Brahmi, Payasya, Kshirapushpi, Shrivani, Mahashrivani, Shatavari, Vidari, Jivanti, Punarnava, Nagabala, Sthira, Vacha, Chhatra, Atichhatra, Meda, Mahameda, and other Jivaniya dravya*. Among them majority of drugs are included in *Madhuraskandha*. If these *divyaushadhis* administered for 6 months along with milk, person gets endowed with excellent longevity, youth and freedom from diseases, voice, complexion, nourishment, intellect, memory and strength.^[66]

Table no.2 showing list of unidentified drugs of *Madhuraskandha*

No .	Drug	Identification	Karma (Dh.Ni, Bh.Ni, R.Ni, K.Ni, P.Ni)	Part used	Experimenta l model
1.	<i>Kakoli</i>	<i>Roscoea procera</i> Wall	<i>Shukrala, Brihmana</i>	Ashtavarga plant can be substituted by Ashwagandha	-
2.	<i>Kshirakakoli</i>	<i>Roscoea procera</i> Wall	<i>Shukrala, Brihmana</i>	(<i>Withaniasomnifera</i> (Linn.) Dunal)	-
3.	<i>Jivaka</i>	<i>Microstylis wallichii</i> Lindl	<i>Balya, Shukraprad a</i>	Ashtavarga plant, can be substituted by Vidarikanda (<i>Pueraria tuberosa</i> DC.)	-
4.	<i>Rushabhaka</i>	<i>Microstylis musifera</i> Lindl	<i>Balya, Shukraprad a</i>		-
5.	<i>Meda</i>	<i>Polygonatum verticillatum</i> All	<i>Vrishya, Brihmana</i>	Ashtavarga plant can be substituted by Shatavari (<i>Asparagusracemosus</i> Willd.)	-
6.	<i>Mahameda</i>	<i>Polygonatum multiflorum</i> All.	<i>Vrishya, Brihmana</i>		-
7.	<i>Atichhatra</i>	<i>Arun kokilaksha</i> (Ck, Ys)	-	Unidentified	-
8.	<i>Kshirashukla</i>	<i>Brihat-shringatika</i> (Ck)	-	-	-
		<i>Swalpa-kshiravidari</i> (Gr)	-	-	-
		<i>Trivrut</i> (Ys)		Methanolic extract of Stem	Anti-oxidant activity ^[67]
9.	<i>Rushyagandh</i>	<i>Rushya-jangalaka/</i>	-	<i>Sida</i> species	-

	<i>a</i>	<i>Balabheda (Ck,Gr,Ys)</i>			
10.	<i>Sheetapaki</i>	<i>Shitala (Ck,Ys)</i> <i>Kakolibheda (Gr)</i>	-	Unidentified	-
11.	<i>Vanatrapushi</i>	<i>Brihatphalagodumba (Ck,Ys)</i> <i>Vanyaswalpatrapusha (Gr)</i>	-	Unidentified	-
12.	<i>Abhirupatri</i>	<i>Shatavaribheda</i>	-	<i>Asperagus species</i>	-
13.	<i>Kapolavalli</i>	<i>Kavadavenduaa (Ck)</i>	-	Unidentified	-
14.	<i>Madhuvalli</i>	<i>Yashtimadhubheda (Ck,Gr,Ys)</i>	-	Unidentified	-

Ck- Chakrapani commentary, Gr- Gangadhar commentary, Ys- Yogindranath Sen commentary, Dh.Ni- Dhanvatari nighantu, R.Ni.- Rajanighatu, K.Ni- Kaiyadeva Nighantu, Bh.Ni- Bhavaprakash nighatu, P.Ni.- Priyanighantu,

Chakrapani interpreted *Kshirashukla* as *Brihatshringataka*; Gangadhar Roy opine it as *Shuklavarnanikshiravidari* while Yogendra Sen equated it with *Trivrit*. *Brihatshringataka* as a variety of *Shringataka* is not explained in any of the classical text. And it cannot be taken as *Vidari* to avoid repetition. Therefore one can consider *Trivrit* for it. As it has reported anti-oxidant activity. Other drugs like *Vanatrapushi*, *Abhirupatri*, *Kapolavalli*, *Madhuvalli*, *Sheetapaki* and *Rushyagandha*, though interpreted by commentators, till date its appropriate botanical source is not evaluated.

Ashtavarga is a group of eight drugs, about which definite identity is not established. Bhavamishra described that drugs of this group are difficult to procure even by the King; hence physician should make use of substitutes of the drugs of same properties. In the absence of the two *Meda*, two *Jivaka*, two *Kakoli* and two *Riddhi*, *Shatavari*, *Vidarikanda*, *Ashvagandha* and *Varahikanda* respectively are suggested as substitute. Among them *Shatavari* and *Vidarikanda* possess *Madhurarasa* and *Madhuravipaka* while *Ashvagandha* possess *Tiktarasa* and *Katuvipaka*.^[68] Currently, many of the Ayurvedic practitioners and Ayurvedic pharmacies are using certain substitutes for *ashtavarga* drugs. These substitutes are to be tested to ascertain whether they possess any of the attributed properties of *ashtavarga*. The list of the substitutes employed for *ashtavarga* are enumerated below^[69]:

Table no.3 showing list Ashtavarga drugs substitute

No.	Drugs	Substitute	Botanical source
1.	Jivaka	Bahman Safed	<i>Centaurea behen</i> Linn.
2.	Rishabhaka	Bahman Lal	<i>Centaurea species</i>
3.	Kakoli	Krishnamusali	<i>Curculigoorchioides</i> Gaertn.
4.	Kshirakakoli	Shwetamusali	<i>Chlorophytum arundinaceum</i> Baker.
5.	Meda	Salam mishri	<i>Eulophiacampestris</i> Wall.
6.	Mahameda	Shakakul mishri	<i>Polygonatumverticillatum</i> All.

Table no.4 showing list of Controversial drugs in Madhuraskandha

No.	Drug	Botanical source	Part used	Experimental model
1.	<i>Morata</i>	<i>Maerua arenaria</i> Hook f and Th. <i>Marsdenia tenacissima</i> W & A	-	-
2.	<i>Kakanasika</i>	<i>Pentatropis microphylla</i> W & A	Methanolic extract of leaves	Total antioxidant, free radical scavenging, reducing power and metal ion chelating activities ^[70]
		<i>Trichosanthes cucumerina</i>	Aerial	DPPH scavenging assay,

		Linn	parts	thiobarbituric acid reactive substances (TBARS) assay, β – carotene – linoleic acid assay, in vivo studies using a rat model. ^[71]
		<i>Clitoriaternatea</i> Linn	Flowers and leaves	The total phenolic compounds (TPC) and 1, 1-diphenyl-2-picrylhydrazyl (DPPH) scavenging activity ^[72]
		<i>Martyniaannua</i> Linn	Methanolic and aqueous extract of leaves	Reducing power assay, DPPH radical-scavenging activity, nitric oxide scavenging activity, H ₂ O ₂ radical scavenging activity, superoxide radical scavenging assay, hydroxyl radical scavenging activity, and total antioxidant capacity. ^[73]
3.	<i>Somavalli</i>	<i>Ephedraagerardiana</i> Wall. ex Stapf.	Ethanollic extract of aerial parts	Free radical scavenging by DPPH method ^[74]
		<i>Sarcostemma brevistigma</i> W. & A.	Stem	Highest xanthine oxidase inhibitory activity ^[75]

◆ DISCUSSION

The drugs enumerated under *Madhuraskandha* are 79. Among them 62 are identified drugs, while 14 drugs are yet to be identified and 3 drug belongs to controversial category. Out of 68 drugs, all the drugs are proven for their anti-oxidant activity except *Typha elephantine* Roxb., *Scirpus kysoor* Roxb, *Scirpus grossus* Linn, *Barleria strigosa* Willd. and *Bassia latifolia* (Roxb.) Macbride. These 4 drugs are yet to be scientifically validated for anti-oxidant activity.

Those (medicines) which invigorate a healthy person are mostly aphrodisiacs and rejuvenators. To some extent they also help in alleviating diseases. Similarly medicines who cure the disease also have aphrodisiac and rejuvenating property. *Rasayana* therapy means by which one gets the excellence of Rasa (the nourishing fluid which is produced immediately after digestion). A person undergoing this therapy attains longevity, memory, intellect, freedom from disease, youth, and excellence of lustre, complexion, and voice, excellent potentiality of the body and sense organ.^[76]

Madhurarasa drugs and diets are wholesome to the body and as such they promote the growth of *rasa* (body fluid), *rakta* (blood), *mamsa* (muscle), *meda* (fat), *asthi* (bone), *majja* (bone marrow), *shukra* (semen), *ojas* and longevity; sooth to the six sense organs; promote strength and complexion; alleviate *Pitta*, *Vata*, and effects of poison; relieve thirst and burning sensation, promote healthy skin, hair, voice and strength; and have *Preenana* (soothing), *Jeevaniya* (invigorating) and *Brihmaniya* (nourishing) properties. They bring about stability and heal up emaciation and consumption. They are soothing to the nose, mouth, throat, lips and tongue and relieve *Daha* (burning sensation) and *Murchha* (fainting). They possess *Snigdha* (unctuous), *Guru* (heavy to digest), *Sheeta* (cold) properties. *Madhuravipaka* aggravates *Kapha*, *Shukrala* (promotes semen) and helps in the proper elimination of stool and urine.^[77]

Drugs of *Madhuraskandha* group possess *Madhura* rasa, *Madhura* vipaka and *Madhuraprabhava*. The drugs included in it, possess other *Rasas* and different *Vipakas*. Certain drugs included in this group though not possessing either *Madhura* rasa or *Madhura* vipaka but produce the effects similar to *Madhurarasa* or *Madhuravipaka* which is interpreted under *Madhuraprabhava*. The activities ascribed

to either *Madhura* rasa or *Madhuravipaka* produced in the body by the drug which are devoid of these attributes should be considered as specific activities due to *Madhuraprabhava*. According to Ayurvedic pharmacology, *Prabhava* is inexplicable attribute (*Achintyashakti*). It may be possible to explain specific activities ascribed to *Prabhava* by certain phytochemical constituents.

E.g. *Ashwagandha* possess *Tikta*, *Kashayarasa* and *Katuvipaka*. But the activities like the *Atishukrala*, *Rasayana* karmas are usually due to *Madhurarasa* and *Madhuravipaka*. The causative factors for initiation of such action may identified through its phytochemical-constituents. Chemical analysis of *Ashwagandha* shows its main constituents as alkaloids and steroidal lactones. Among the various alkaloids, Withanine is the main constituent. Certain withanolides have been demonstrated to possess significant anti-oxidant and immunomodulatory activity, while some of the simple withanolides have immunosuppressive activity and some glycowithanolides display immunostimulation.^{1[78]}

◆ **CONCLUSION:**

Majority of drugs incorporated in *Madhuraskandha* possess anti-oxidant activity. *Madhuraskandha* contains drugs having *Madhurarasa*, *Madhuravipaka* and *Prabhava*. The anti-oxidant agent decreases free radicals and promotes cell longevity which falls under the spectrum of *Rasayana* activity and encompasses *Saptadhatuwardhana*, *Balya*, *Brimhaniya*, *Jivaniyalike* Karmas. Therefore these drugs serve the purpose of their incorporation in *Madhuraskandha* by certain action like *RasayanaKarma* attributed to *Madhurarasa* and *Madhuravipaka*.

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