ISSN 0976 – 3333

Available Online at www.ijpba.info

International Journal of Pharmaceutical & Biological Archives 2014; 5(3): 23 - 28

REVIEW ARTICLE

Review of Adaptogenic Drugs w.s.r. to *Madhuraskandha* (Charakasamhita)

Sushama B*[1], K Nishteswar[2]

[1]*PhD scholar, Department of Dravyaguna, I.P.G.T & R.A, GAU, Jamnagar, Gujarat, India*
[2]*HOD & Prof, Department of Dravyaguna, I.P.G.T&R.A, GAU, Jamnagar, Gujarat, India*

Received 13 Feb 2014; Revised 11 May 2014; Accepted 23 May 2014

ABSTRACT

Adaptogens are group of the drugs which increase the ability of an organism to adapt to environmental factors. In Ayurvedic perspectives, activities like *Balya*, *Jivaniya*, *Brihmaniya*, *Rasayana*, *Shukrala* and *Vrishya* may help to relieve the stress induced disorders like Alzheimer disease, Hypertension, Dementia etc. Such type of functions may be attributed to *Madhurarasa*. AcharyaCharaka classified a group of drugs basing on the *Rasa* (Taste) and mentioned that these drugs do possess not only *Madhurarasa*, but also *Madhuravipaka* and *Madhuraprabhava*. The review of this *Madhuraskandha* drugs shows that in total 12 drugs were reported for their adaptogenic activity.

Key words: Adaptogens, *Madhuraskandha.*

INTRODUCTION

Adaptogens are conceptualized as a “new class of metabolic regulators which increase the ability of an organism to adapt to environmental factors.”The actual word adaptogens was first used by a Soviet scientist, Dr. Nikolai Lazarev, who under grants from the military was researching substances which produced a "state of nonspecific resistance" (SNIR). The idea was to find ways to enhance the productivity and performance of soldiers, athletes, and workers without using dangerous stimulants. Much of the early research into adaptogens was done by Dr. I.I. Brekhmanwho, in the late 1950's, studied *Panaxginseng*. Looking for a less expensive and more available substitute, he changed his focus to a native Russian shrub, *Eleutherococcussenticosis*. His first monograph of this now popular herb (Eleuthero or Siberian Ginseng) was published in 1960.

In 1969 Brekhman and Dardymov defined the general pharmacological properties of adaptogenic substances. These include:a) the substance is relatively non-toxic to the recipient.b) An adaptogen has "non-specific" activity and acts by increasing resistance of the organism to a broad spectrum of adverse biological, chemical, and physical factors.c) These substances tend to help regulate or normalize organ and system function within the organism.

The adaptogenic drugs which help to adapt stress (Physical, psychological, environmental) fall under the spectrum of *Rasayana* activity. The drugs of *Madhurarasa* attributed mainly with *Balya*, *Jeevaniya*, *Preenana*, *Brimhaniya*, *Saptadhatuvardhana*, *Rasayana*activities which help to normalize the systemic function of the organism fall under adaptogenic pharmacological profile. Acharya Charaka had mentioned *Madhuraskandha* and included drugs having *Madhurarasa*, *Madhuravipaka*and *Madhuraprabhava* in it. Therefore in the present study total drugs belonging to *Madhuraskandha* was reviewed for their reported adaptogenic activity.

Mechanism of Action

In the present advance life style and modern world, stress is playing a vital, basic and effective role in the precipitation of diseases and degeneration of body system. Stressors have been put into 4 categories viz. Physical, Chemical, Biological and Emotional. Failure of adaptation to normalcy causes various diseases. Stress causes various effects on release of adrenaline and other hormone, corticoids release, cellular immunity, enzyme activity, SDH-ATP

***Corresponding Author:** Dr. Sushama B Bhuvad, **Email:** bsushama87@gmail.com

(Succinatedehydrogenase) and protein syntheses which can be possible sites of anti-stress drug action.

Brekhman and Dardymov's list of physiological actions of adaptogens states that adaptogens help to modulate system function and maintain homeostasis [1]. So all adaptogens act as broad spectrum amphoteric to living organisms, but they rarely have a pronounced effect on only one specific organ or system.

Later research by Panossian postulated that adaptogens work primarily by affecting the Hypothalamic-Pituitary-Adrenal (HPA) axis and the Sympatho-adrenal System (SAS). Thus, adaptogens modulate the response to stress (physical, environmental, or emotional) and help to regulate the interconnected endocrine, immune, and nervous systems. This re-regulation of a disordered or highly stressed system is achieved by metabolic regulators such as cytokines, catecholamine, glucocorticoids, cortisol, serotonin, nitric oxide (NO), cholecystokinin,corticotrophin-releasing factor (CRF) and sex hormones. This broad array of biochemical activators help to explain why many adaptogens also have anti-inflammatory, antioxidant, anxiolytic, antidepressant or nervine effects as well.

In more recent research by Panossian and Wikman (2009), clearly states that adaptogens work not only via the HPA axis and SAS but also atcellular level. They actually act a bit like a vaccine, priming cells to more effectively respond to stress. Herbs activate molecular chaperones such as heat shock proteins (Hsp70, Hsp16) which protect the mitochondria from stress-induced damage. FOXO, a fork-head protein, is also up-regulated. It stimulates the cell to produce proteins that help to resist stress and enhance longevity. They have also found that adaptogens can down-regulate a stress-activated protein kinase, known as c-Jun N-terminal protein kinase (JNK) that is responsible for increasing inflammatory and oxidative compounds and decreasing ATP generation. This is one of the reasons why adaptogens are often effective as part of a treatment protocol for diverse conditions like fatigue, muscle pain, inflammation and weakness, such as CFIDs (Chronic fatigue immune dysfunction), fibromyalgia and multiple sclerosis. [2]

Role of *Madhuraskandha*as adaptogens

AcharyaCharaka had given classification of *Rasaskandha* in the context of *Asthapanabasti*dravya (drug for corrective enema).Drugs of *Madhuraskandha* group possess *Madhurarasa*, *Madhuravipaka* 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 *Madhuravipaka*produce the effects similar to *Madhurarasa* or *Madhuravipaka* which is explained by *Madhuraprabhava*. The activities ascribed to either *Madhurarasa* or *Madhuravipaka* produced in the body by the drug which is devoid of these attributes should be considered as specific activities due to *Madhuraprabhava*. [3]

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. [4]

Those (medicines) which invigorate a healthy person are mostly classified under aphrodisiacs and rejuvenators. To some extent they also help in alleviating diseases. Similarly medicines that 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 *Ayushya* (longevity), *Smriti* (memory), *Medha* (intellect) freedom from disease, *Tarunavaya* (youth), and *Prabha* (excellence of luster), *Varna* (complexion), and *Svarya* (voice), excellent potentiality of the body and sense organ [5].

Therefore it can be interpreted as *Rasayana* drugs primarily should contain *Madhurarasa*, *Madhuravipaka* and *Madhuraprabhava* as they convey similar type of action.

Table 1: Showing *Rasapanchaka* of *Madhuraskandha* drugs

S. No	Drug	*Rasa*	*Veerya*	*Vipaka*	*Karma (Bha.Ni)*	Probable mode of action
1	*Shatavari*	*Tikta, Madhura*		*Madhura*	*Rasayani, Shukrastanyakari, Balya, Netrya*	*Rasa, Vipaka*
2	*Guduchi*	*Katu, Tikta, Kashaya*	*Ushna*	*Madhura*	*Rasayani, Balya, Deepaniya*	*Vipaka*
3	*Ashwagndha*	*Tikta, Kashaya*	*Ushna*	*Katu*	*Atishukrala, Balya, Rasayani*	*Prabhava*
4	*Vidari*	*Madhura*	*Sheeta*	*Madhura*	*Brimhani, Stanyashukrada, Mootrala, Jivaniya, Balavarnakara, Rasayani*	*Rasa, Vipaka*
5	*Bhumyamalaki*	*Tikta, Kashaya, Madhura*	*Ushna*	*Katu*	-	*Prabhava*
6	*Gokshura*	*Madhura*	*Sheeta*		*Deepana, Vrishya, Pushtida, Balya*	*Rasa, Vipaka*
7	*Kantakari*	*Tikta, Katu*	*Ushna*	*Katu*	*Deepana, Pachana*	*Prabhava*
8	*Saga*	*Kashaya*		*Katu*		*Prabhava*
9	*Priyala*	*Madhura, Kashaya*		*Madhura*	*Vrishya, Balya,*	*Vipaka*
10	*Punarnava*	*Katu, Kashaya*	*Ushna*	*Katu*	*Grahi*	*Prabhava*
11	*Bala*	*Madhura*	*Sheeta*	*Madhura*	*Grahi, Bala-kantikrit*	*Rasa, Vipaka*
12	*Atibala*	*Madhura*	*Sheeta*	*Madhura*	*Grahi, Bala-kantikrit*	*Rasa, Vipaka*

The drugs of *Madhuraskandha* having adaptogenic activity are listed below:

Bha.Ni- Bhavaprakashanighantu

Shatavari, Gokshura, Bala, Vidari and *Atibala* may act through *Madhurarasa* and *vipaka*; *Guduchi* and *Priyala* act through *Madhuravipaka;Ashwagandha, Bhumyamalaki, Kantakari, Saga* and *Punarnava* may act through *Madhuraprabhava*.

DISCUSSION

The drugs of *Madhuraskandha* proven for their adaptogenic activity along with their responsible phyto-constituent are described below.

1. ***Asperagusracemosus (Shatavari)***

Ethanolic extract of the roots of *A. racemosus* improved the stress tolerance in chemical writhing test and swimming endurance test at all the doses as compared to stress control group. Restraint stress induced elevation of blood glucose; triglyceride and cholesterol levels were significantly lowered by pretreatment with extract. Moreover, stress induced variations in levels of lipid peroxidation, nitric oxide, protein and glutathione content in mouse brain were significantly ameliorated by pretreatment with extract.[6]

2. *Tinosporacordifolia (Guduchi)*

Aqueous extract of the drug was shown to possess antioxidant activity. It inhibited lipid peroxidation and quenched superoxide and hydroxyl radical *in vitro* experiments. An arabinogalactanpolysaccharide has been identified as active constituent. It displayed good protection against iron mediated lipid peroxidation of rat brain homogenate.Cordioside, cordifolioside A and B, cordial compound isolated from *T.cordifolia* stem have been shown to possess immunopotentiating activity. Aqueous extract of the plant stem has been demonstrated to exhibit adaptogenic property. [7]

3. *Withaniasomnifera(Ashwagandha)*

The adaptogenic activity of a standardized extract of *Withaniasomnifera*(WS) roots was investigated against a rat model of chronic stress (CS). The stress procedure was mild, unpredictable foot shock, administered once daily for 21 days to adult male Wistar rats. CS induced significant hyperglycemia, glucose intolerance, and increase in plasma corticosterone levels, gastric ulcerations, male sexual dysfunction, cognitive deficits, immunosuppression and mental depression. These CS induced perturbations were attenuated by WS (25 and 50 mg/kg p.o.) and by PG (100 mg/kg po), administered 1 hr before foot shock for 21 days. The results indicate that WS, like PG, has significant anti-stress adaptogenic activity, confirming the clinical use of the plant in Ayurveda. [8]

4. *Puerariatuberosa*(*Vidari*)

Adaptogenic activity of aqueous and chloroform extracts of roots of *Puerariatuberosa*was carried out in albinomice and rats. Animals were subjected to anorexia stress tolerance test, cold restraint stress and immobilization stress methods. In anorexia stress tolerance test, the two extract of *Puerariatuberosa*were found to increase the mean duration of anorexia tolerance test time when compared to control group. [9]

5. *Phyllanthusniruri(Tamalaki)*

70% ethanolic extract was evaluated for adaptogenic activity by using swim endurance and cold stress models. The petroleum ether (40-60^{0}C), ethyl acetate extract of whole plant of

*Phyllanthusniruri*is highly significant in increasing active swim time, whereas 70% ethanol is moderately significant in increasing active swim time. In cold stress model ethyl acetate extract was found to be more effective and highly significant in lowering elevated blood glucose level, total cholesterol levels, HDL-cholesterol levels, BUN levels, total leucocyte count, differential count and increases total triglyceride levels and restores organ weights in stress induced rats as that of normal. [10]

6. ***Tribulusterrestris(Gokshura)***

Concomitant treatment with ethanolic extract at 100, 300 and 500 mg/kg showed marked increase in anoxia stress tolerance time and swimming endurance time as compared to control group in anoxia stress tolerance and swimming endurance tests. Similarly, concomitant treatment with ethanolic extract at different doses showed marked decrease in blood glucose, cholesterol, triglycerides and BUN level as compared to stress control in both immobilization stress and cold stress models. Weight of the liver and adrenal gland are markedly decreased but no weight changes were observed in spleen and testes in both the stress models. [11]

7. *Solanumxanthocarpum (Kantakari)*

The adaptogenic effects of *Solanumxanthocarpum* (Sx) and *Solanumnigrum* (Sn) whole plant extracts (Aqueous-methanol) and of their steroidal saponins in forced swimming test (FST) and cold restraint stress (CRS) models were investigated in Swiss albino mice. In FST model, administration of Sx and Sn total extracts and steroidal saponins thereof, at doses of 100mg/kg and 200 mg/kg x 7 days p.o, prior to FST, significantly and dose dependently improved the immobility time compared to that of the vehicle treated Swiss albino mice. In CRS model, Sx and Sn total extracts and steroidal saponins thereof, at doses of 100mg/kg and 200 mg/kg x 12 days p.o, significantly improved altered stress-induced changes in plasma corticosterone level, blood glucose, WBC count, weight of the organs (liver and spleen), MDA levels, plasma antioxidant profile (ABTS and FRAP), and lipid profile. The adaptogenic effects of steroidal saponins were found to be better than those of the total extracts. [12]

8. *Tectonagrandis (Saga)*

Various extracts of *Tectonagrandis* Linn. barkwas screened for anti-asthmatic activity by using different *in-vivo* animal models like clonidine induced catalepsy in mice, haloperidol induced catalepsy in mice, and milk induced leukocytosis and eosinophilia. The observation of this study indicated that the *Tectonagrandis* bark having antihistaminic activity inhibited clonidine-induced catalepsy in mice and not inhibited haloperidol-induced catalepsy in mice. The results of these studies indicated that ethyl acetate extract of *Tectonagrandis* Linn. bark showed significant ($p< 0.001$) anti-asthmatic activity at the dose of 100 mg/kg. The anti-asthmatic activity of ethyl acetate extract can be attributed to antihistaminic (H1-antagonist), anti-muscarinic, anti-allergic, anti-inflammatory and adaptogenic activity suggestive of its potential in management of asthma. [13]

9. *Buchananialanzan*(*Priyala*)

Adaptogenic activity of the methanolic extract of *Buchananialanzan* leaves using the swim endurance model in all groups under normal and stressed conditions. Urinary vanillyimandelic acid (VMA) and ascorbic acid were selected as non-invasive biomarker to evaluate the anti-stress activity. Daily administration of the extract at doses of 10,20,30,40 and 50 mg/kg body weight prior to induction of stress inhibited stress-induced urinary biochemical changes in a dose-dependent manner without altering the levels in normal control groups. The methanolic extract exhibited significant anti-stress activity.[14]

10. *Boehaviadiffusa*(*Punarnava*)

Roots were extracted with solvents alcohol and chloroform. For both extracts LD50 was found to be 2000mg/Kg. The alcohol and chloroform extracts reduced the stress induced elevated levels of glucose, cholesterol, triglycerides and BUN. The elevated blood cell count was decreased, reduction in the weight of Liver, Adrenal gland where increase in weight of spleen was reduced after treatment with extract. This present investigation reveals that *Boerhaaviadiffusa* exhibits adaptogenic activity not only by stabilizing biochemical parameters but also ameliorating cell defense mechanism. [15]

11. *Sidacordifolia (Bala)*

A sitoindoside, isolated from the plant, has been reported to exhibit adaptogenic and immunostimulatory activities[16]. Mice pretreated with extract of *Sidacordifolia* showed significant improvement in the swim duration and reduced the elevated WBC, blood glucose and plasma cortisone.[17]

12. *Abutilon indicum (Atibala)*

Effect of ethanolic extract of *Abutilonindicum* on swimming endurance test and cold induced stress in albino rats was assessed by swimming survival

time and estimation of various biochemical parameters like glucose, cholesterol, triglycerides, blood cell count and BUN. In cold stress by determining the ulcer index and weight of organs such as liver, spleen, testes and adrenal gland at a dose of 400mg/kg body weight per oral. It was found that ethanolic extract significantly increases the swimming time and showed significant decrease in blood glucose, cholesterol, triglycerides, BUN and plasma cortisol levels. A significant decrease in WBC count, polymorphs, monocytes, lymphocytes and eosinophilwere observed. In cold stress significant decrease in ulcer index, protection against increase in pH of gastric juice, weight of organ was observed to control group. [18]

CONCLUSION

There are in total 12 drugs which possess adaptogenic activity. The adaptogens help to reduce the stress-induced disorders which fall under the broad spectrum term called as *Rasayana*activity which encompasses activities like *Balya, Brihmaniya, Shukrala, Vrishya* etc. *Madhuraskandha* drugs act through their *Madhurarasa, Madhuravipaka* and *Madhuraprabhava*. According to modern phytochemistry, some of the phyto-constituents are responsible for their adaptogenic activity.

REFERENCE

1. http://realitysandwich.com/171189/adaptogens_herbs/Adaptogens: Herbs for strength, stamina and stress relief.
2. http://realitysandwich.com/171189/adaptogens_herbs/Adaptogens: Herbs for strength, stamina and stress relief.
3. Vimansthana.8/138, Cakrapanidatta, commentator, the Ayurvedadipika commentary, CarakaSamhita, of Agnivesha elaborated by Caraka and Dridhabala, Edited by Vd.YadavajiTrikamajiAcharya, 1st Edition reprint, ChaukhambhaSurbharati Prakashana Varanasi, 2009, 788.
4. Sutrasthana 26/61-62, Cakrapanidatta, commentator, the Ayurvedadipika commentary, CarakaSamhita, of Agnivesha elaborated by Caraka and Dridhabala, Edited by Vd.YadavajiTrikamajiAcharya, 1st Edition reprint, ChaukhambhaSurbharati Prakashana Varanasi, 2009, 512.
5. Chikitsasthana 1/1/5-8, Cakrapanidatta, commentator, the Ayurvedadipika commentary, CarakaSamhita, of Agnivesha elaborated by Caraka and Dridhabala, Edited by Vd.YadavajiTrikamaji Acharya, 1st Edition reprint,; ChaukhambhaSurbharati Prakashana Varanasi, 2009, 376.
6. Joshi T *et al*, Anti-stress activity of ethanolic extract of *Asparagusracemosus*Willd roots in mice, Indian J Exp Biol. 2012 Jun;50(6):419-24.
7. SukhDev, A selection of Prime Ayurvedic Plant Drug, First edition, Anamaya production,420.
8. Bhattacharya S K *et al*, Adaptogenic activity of *Withaniasomnifera*: an experimental study using a rat model of chronic stress, PharmacolBiochemBehav. 2003 Jun; 75(3):547-55.
9. P.Veereshbabu, A study on adaptogenic activity of tuber extract of *Puerariatuberosa*, M.pharmain pharmacology, Rajiv Gandhi University of Health Science, Karnataka, Bangalore, 2005.
10. PoornimaHosamath, Phytochemical investigation and pharmacological evaluation of *Phyllanthusniruri* Linn for adaptogenic activity, M Pharma in Pharmacology, Department of Pharmacognosy and Photochemistry, K.L.E.Society's College of Pharmacy, Vidyanagar, Hubali, Feb 2010.
11. H Shivakumar et al, Adaptogenic activity of ethanolic extract of *Tribulusterrestris* L, Journal of Natural remedies, 2006, Vol 6(1),87-95.
12. Gupta Amartyakumar *et al*, Adaptogenic effect of total extract and steroidal saponins of *Solanumxanthocarpum* and *Solanumnigrum*, Journal of Pharmacy Research; Aug 2009, Vol. 2(8), 1249.
13. NehaKhera *et al*, Phytochemical and Pharmacological evaluation of *Tectonagrandis* Linn, International Journal of Pharmacy and Pharmaceutical Sciences, 2013, Vol 5(3), 923-927.
14. ShaliniKapoor Mehta *et al*, Adaptogenic activity of methanolic extract of *Buchananialanzan* leaves an experimental study in rat model, Pelagia Research Library, 2011, 2(3), 107-112.
15. B. Krupavaram, A study on adaptogenic activity of root extract of *Boerhaviadiffusa* (Linn), M Pharma in Pharmacology, Dept

of Pharmacology, V.L.College of Pharmacy, Raichur, 2005.
16. CPkhare, Indian Medicinal Plant, Springer-Verlag Berlin/Heidelberg, first edition, 604.
17. MeeraSumanth *et al*, Anti-stress, Adaptogenic Activity of *Sidacordifolia* Roots in Mice, Indian J Pharm Sci. 2009 May-Jun; 71(3): 323–324.
18. Roshan S *et al*, Phytochemical investigation and effect of *Abutilonindicum* on various biochemical parameters on stress induced albino rats, International Journal of Current Pharmaceutical review and research, Aug-Oct 2010, Vol. 1 (2), 17-26.