



REVIEW ON VAYASTHAPAN FORMULATIONS AS DEPICTED IN BHARAT BHAISHAJYA RATNAKAR

Ayurveda

**Dr. Pallavi
Pardeshi**

MD Scholar, Dravyaguna Vigyana, Bharati Vidyapeeth Deemed to be University College of Ayurved, Pune, India-411043

**Dr. Manasi
Deshpande***

Professor and Head of Department, Dravyaguna Vigyana, Bharati Vidyapeeth Deemed to be University College of Ayurved, Pune, India-411043 *Corresponding Author

ABSTRACT

Age can be defined as the duration of time since birth to the present for a living individual. Life span is in three stages. Child, Young and old, there is dominance of *Kapha*, *Pitta* and *Vata* respectively. In old stage of age wrinkling of whole body, alopecia, cough, breathlessness are general symptoms and ultimately with the failure of all activities. Now days due to improper dietary habits, defective life style, excessive stress and lack of exercise the process of ageing starts very earlier and can be experienced by everybody.

Vayasthapan stands as preventing premature ageing and to solve the problems due to ageing; delays the degenerative process in the body. Herbs and formulations preventing the ageing process and maintain the youth is soul meaning of *Vayasthapan*. Many formulations have been explained in Ayurved classics to slower down the ageing process as well as to lead a comfortable life in old age. These formulations are combinations of various plant drugs, minerals, metals and animal originated and act by its specific action.

KEYWORDS

Vayasthapan, Formulations, Immunomodulatory, Anti- ageing

INTRODUCTION

Living healthy and happy youthful life is a wish of every individual. As age advances, several changes take place in external appearance, in the condition of *Dosha* [regulatory functional factors of the body], *Dhatu* [major structural components of the body], *Mala* [waste products], *Agni* [digestive/metabolic factors], *Oja* [essence of all seven *dhatu*] and as well as mental function. According to modern science ageing is the process of alteration of function of various organs; tissue in the body. In India last few decades have seen the influences of westernization on its new generation, like eating junk food, instant preservative food, lots of work with stressful environment, irregular time table of sleep and meal, exposure to ultra violet radiation, consumption of vegetables contaminated with pesticides and fertilizers. This may lead to early signs of ageing like *Khalitya* [Baldness], *Palitya* [Premature Graying of hairs], *Vali* [Wrinkles over face], *Smrutinasha* [diminished mental abilities], *Daurbalya* [weakness], *Kriya hinata* [Diminished physical activity] etc. *Ayurveda* stands as resolve to solve issue and provide healthful longevity and resistance against diseases.

In *Ayurveda* ageing concepts denotes under the heading of *Jara*-natural phenomenon¹, two types -*Kalaja Jara* [Natural ageing] occurs at 60 years of age or after that and *Akalaja Jara* [Premature ageing] occurs before 60 years of age and due to disturbed life style.

Literally the *Vayasthapan* is enhances the quality and longevity of life. Various compound formulations derived either from herbs, animal and mineral origin has been described in the *Bharat Bhaishajya Ratnakar*. This review aims at enlightening and summarized the *Vayasthapan* formulations mentioned in *Bharat Bhaishajya Ratnakar* [part I to 5], Hindi translation by Shree N Chhaganlal Shah, for understanding of the formulations².

CONCEPT OF VAYA [AGE]:^{3,4,5,6}

Vaya (age) can be defined as the duration of time since birth to the present for a living individual. Ayurved classical texts have divided life span in three stages as follow-

Table 1 Classification of Vaya in Bruhatrayi

Ayurved classical texts	Bala [childhood]	Madhya[young and middle age]	Vrudha[old age]
<i>Charak Samhita</i>	Birth to 30	30-60 yrs	>60 yrs
<i>Sushruta Samhita</i>	Birth to 16	16-70 yrs	>70 yrs
<i>Ashtang Hradaya</i>	Birth to 16	16-70 yrs	>70 yrs
<i>Ashtang Sangraha</i>	Birth to 16	16-60 yrs	>60 yrs

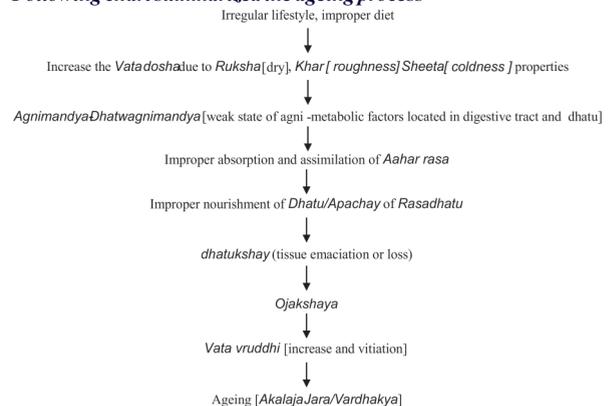
In *Balyavastha*, *Madhya avastha* and *Vrudhnavastha* there is dominance of *Kapha*, *Pitta* and *Vata* respectively.

JARA [AGEING]

Ayurved has defined *Jara* as the phenomenon of becoming old by the act of wearing out. *Vrudhnavastha* or *Jirnavastha* is the last phase of life and natural, inevitable process of life. Other terms that may be correlated with old age are *Jiran*, *jirna*, *jaran*, *vrddhata*. Ageing is defined as process of growing old, accumulating damage to cells, tissue and organ with the passage of time.

The increase *Vatadosha* in old age causes depletion in reserves of *Ras Dhatu*, this affects the synthesis of other *dhatu*s and impaired nourishment of successive *dhatu*s, and thus *Ojas* [essence of all seven *dhatu*] is affected.

Following chart summarized the ageing process-



CONCEPT OF VAYASTHAPAN

Vayasthapan means “preventing the effects of age”. It is derived from the words *vaja* or *vajas*, both translating to “age”, *sthapan*, translating to “maintaining” or “preserving”. Though there are very few scattered references of *Vayasthapan* mentioned in **Table 2**

Classical texts	Interpretation
<i>Charak samhita Chakrapani</i>	Age sustaining i.e. which stabilizes the youthful age, prevents senility. ⁷
<i>Sushruta Samhita</i>	<i>Vayasthapan</i> under the term of <i>Rasayana</i> as living up to 100 years while <i>Ayushkar</i> means living more than 100 years, <i>Jatapaharan</i> i.e. maintaining longer youthful life. ⁸
<i>Ashtang Hridaya</i>	<i>Vayasthapan</i> concept mention in benefits of <i>rasayana</i> ⁵
<i>Kaiyadeva Nighantu</i>	The <i>dravyas</i> preventing <i>Vrudhnavastha</i> and stabilizing age followed by healthy and strong life ¹⁰

<i>Bhavaprakash</i>	<i>Rasayana</i> that which stabilizes the lifespan, strength and vigour and fortifies them. ¹¹
<i>Yogaratanakar</i>	<i>Tarunavaya</i> under the category of <i>Rasayana</i> ¹²

Vayasthapana are the drugs which remove derangement of vitiated *dosha* in body and bring back it to the normal state also inhibit tissue derangement and stop the further damage.

CLASSICAL FORMULATIONS AS VAYASTHAPAN

A number of classical and significant formulations in the various dosage forms are mentioned in *Bharat Bhaishhya Ratnakar* for different pharmacological actions. A total of about 31 compound formulations are described as *Vayasthapana*. The list of these formulations and actions for which they are used are presented in Table 3.

The list of formulations and their various actions mentioned in *Vayasthapana* formulations as *Shatayu*, *Dirghayu*, *Ayurvedhak*, *Aayushyakar*- Promote Longevity, *Vayasthapana*, *Sthirvaya*, *Vayasthiratva*, *Sthirayu*-Age sustaining/Maintain youth, *Medhya*-Brain tonic, *Jaraha*, *Jaranashak*, *Rasayana*-Rejuvenating, *Balya*-Strength, *Sarvavyadhihar*- Eradicate disease, *Dhatuwardhak*-Improve quality and quantity of tissues, *Valipalitahar*- Remove wrinkled skin and Graying hair.

Table 3 total number of formulations as Vayasthapana

S N	Formulations	1	2	3	4	5	6	7	8
GHRUT-04									
1	<i>Aamalakghrutam</i>		✓						
2	<i>Dhatryadighrutam</i>	✓	✓						
3	<i>Bramhighrutam</i>	✓	✓						
4	<i>Bhaskara-dyamghrutam</i>	✓	✓						✓
AVALEHA-7									
5	<i>Aamalakirasayan 1</i>		✓						
6	<i>Aamalakirasayan 2</i>	✓	✓		✓				
7	<i>Aamalakirasayan 3</i>	✓	✓		✓				
8	<i>Shunthikhanda</i>	✓	✓			✓			
9	<i>Saubhagy shunthyavale</i>		✓			✓			✓
10	<i>Ghrutadadyadiyog</i>		✓						
11	<i>Shitodakadiyog</i>		✓						
TAILA-3									
12	<i>Balatailam 4</i>		✓						
13	<i>Mehamihir Tailam</i>		✓			✓			
14	<i>Shyamadyi Tailam</i>		✓						
CHURNA-4									
15	<i>Dhatryadichurnam</i>		✓						
16	<i>Aamalakyog</i>		✓			✓			✓
17	<i>Aamalakyog</i>		✓			✓			✓
18	<i>Aamalakyog</i>		✓			✓			✓
GUTI-1									
19	<i>Triyphaladigitika</i>	✓	✓						✓
AASAVA-1									
20	<i>Tambulaasava</i>		✓						
KASHAY-3									
21	<i>Bhallatakkshiram</i>	✓	✓						
22	<i>Bhallatakkshiram</i>	✓	✓						
23	<i>Vaya-sthapanakashayad ashak</i>		✓						
RASAKALPA-08									
24	<i>Chandrodayoras</i>		✓		✓				✓
25	<i>Vangeshwaradivati</i>		✓			✓	✓		✓
26	<i>Shrungarabhram 2</i>		✓			✓	✓		
27	<i>Savitritatak</i>	✓	✓			✓			
28	<i>Sindurras</i>		✓	✓			✓		
29	<i>Surasundarigutika</i>		✓	✓					✓
30	<i>Abhrak sattva</i>		✓		✓				
31	<i>Abhrakmaranam 9</i>	✓	✓		✓	✓			✓

Above table provided information of 31 formulations used in various conditions as *vayasthapana*. It is also observed that some formulations are specific to only particular action where as other covers broad range of various conditions. The specificity of formulations in the treatment

is due to unique properties of individual plant drugs. Among the formulations, maximum dosages form are of *Raskalpa*[Metal & mineral preparation]-08, *Avaleha* [electuary]-07, *Churna* (powder)-04, *Kashay* [decoction] and *Taila* [oil] - 03 each, *Asava* [alcoholic preparation] and *guti*[tablet]-1-1 each.

The formulations enlisted in table 2 were evaluated for individual component. A total of 123 plant drugs have been used in the preparation of 31 formulations compiled.

Table 4 List of plant drugs listed in formulations

S. N.	Dravya name	Botanical name	Times used in formulations
1	<i>Aamalaki</i>	<i>Emblica officinalis Gaertn.</i>	13
2	<i>Bala</i>	<i>Sida cordifolia Linn</i>	8
3	<i>Pippali</i>	<i>Piper longum Linn.</i>	8
4	<i>Vidang</i>	<i>Embelia ribes Burmf.</i>	5
5	<i>Guduchi</i>	<i>Tinospora cordifolia Willd</i>	5
6	<i>Til</i>	<i>Sesamum indicum Linn.</i>	4
7	<i>Shatavari</i>	<i>Asparagus racemosus Willd</i>	4
8	<i>Punarnava</i>	<i>Boerhavia diffusa Linn.</i>	4
9	<i>Musta</i>	<i>Cyperus rotundus Linn.</i>	4
10	<i>Jatiphal</i>	<i>Myristica fragrans Houltt.</i>	4
11	<i>Haritaki</i>	<i>Terminalia chebula Retz.</i>	4
12	<i>Chitrak</i>	<i>Plumbago zeylanica Linn.</i>	4
13	<i>Chavya</i>	<i>Piper retrofractum Vahl.</i>	4
14	<i>Bhrunga-raj</i>	<i>Eclipta alba Hassk.</i>	3
15	<i>Devadaru</i>	<i>Cedrus devadaru Rixb.</i>	3
16	<i>Tambul</i>	<i>Piper betel Linn.</i>	3
17	<i>Vidari-kanda</i>	<i>Pueraria tuberosa DC</i>	3
18	<i>Shunthi</i>	<i>Zingiber officinale Roxb.</i>	3
19	<i>Yavani</i>	<i>Trachyspermum ammi Linn.</i>	2
20	<i>Yashti-madhu</i>	<i>Glycyrrhiza glabra Linn.</i>	2
21	<i>Vansha-lochan</i>	<i>Bambusa arundinacea Willd</i>	2
22	<i>Vacha</i>	<i>Acorus calamus Linn</i>	2
23	<i>Trivrutta</i>	<i>Operculina turpethum Linn.</i>	2
24	<i>Shati</i>	<i>Hedychium spicatum Ham.</i>	2
25	<i>Satavha</i>	<i>Anthum sowa Kurz.</i>	2
26	<i>Shalamali</i>	<i>Salmalia malabarica Schott</i>	2
27	<i>Rasna</i>	<i>Pluchea lanceolata Oliver</i>	2
28	<i>Patra</i>	<i>Cinnamomum tamala Nees</i>	2
29	<i>Maricha</i>	<i>Piper nigrum Linn.</i>	2
30	<i>Khadir</i>	<i>Acacia catechu Willd</i>	2
31	<i>Kumkum</i>	<i>Crocus sativus Linn.</i>	2
32	<i>Karpoor</i>	<i>Cinnamomum camphora Nees</i>	2
33	<i>Kankol</i>	<i>Piper cubeba Linn.</i>	2
34	<i>Jeerak</i>	<i>Cuminum cyminum Linn.</i>	2
35	<i>Gokshur</i>	<i>Tribulus terrestris Linn.</i>	2
36	<i>Draksha</i>	<i>Vitis vinifera Linn.</i>	2
37	<i>Chandan</i>	<i>Santalum album Linn</i>	2
38	<i>Bibhitak</i>	<i>Terminalia bellirica Roxb</i>	2
39	<i>Bhallatak</i>	<i>Semicarpus anacardium Linn.</i>	2
40	<i>Ashwagandha</i>	<i>Withania somnifera Linn.</i>	2
41	<i>Agaru</i>	<i>Aquilaria agallocha Roxb.</i>	2
42	<i>Aakarkarabha</i>	<i>Anacyclus pyrethrum D.C</i>	1
43	<i>Aamra</i>	<i>Mangifera indica Linn.</i>	1
44	<i>Ankol</i>	<i>Alangium salvifolium Linn.</i>	1
45	<i>Ahiphen</i>	<i>Papaver somniferum Linn.</i>	1
46	<i>Asana</i>	<i>Pterocarpus marsupium Roxb.</i>	1
47	<i>Atibala</i>	<i>Abutilon indicum Linn.</i>	1
48	<i>Ativisha</i>	<i>Aconitum heterophyllum Wall</i>	1
49	<i>Bakuchi</i>	<i>Psoralea corylifolia Linn</i>	1
50	<i>Vijaya</i>	<i>Cannabis sativa Linn.</i>	1
51	<i>Bharangi</i>	<i>Clerodendrum serratum Linn.</i>	1
52	<i>Bhunimba</i>	<i>Andrographis paniculata</i>	1
53	<i>Bilva</i>	<i>Aegle marmelos Corr.</i>	1
54	<i>Bramhi</i>	<i>Bacopa monnieri Linn.</i>	1
55	<i>Tandulaja</i>	<i>Amaranthus spinosus Linn</i>	1
56	<i>Chorak</i>	<i>Angelica archangelica</i>	1
57	<i>Dadim</i>	<i>Punica granatum Linn.</i>	1
58	<i>Danti</i>	<i>Baliospermum montanum Muell.Arg</i>	1

59	<i>Daruharidra</i>	<i>Berberis aristata DC</i>	1
60	<i>Dhattur</i>	<i>Dhatura metel Linn.</i>	1
61	<i>Dhanyak</i>	<i>Coriandrum sativum Linn.</i>	1
62	<i>Dhataki</i>	<i>Woodfordia fruticosa Kurz.</i>	1
63	<i>Ekshu</i>	<i>Saccharum officinarum Linn.</i>	1
64	<i>Ela</i>	<i>Elettaria cardamomum Moton.</i>	1
65	<i>Gaja-pippali</i>	<i>Scindapsus officinalis Schott</i>	1
66	<i>Guggula</i>	<i>Commiphora mukul Hook.</i>	1
67	<i>Haridra</i>	<i>Curcuma longa Linn.</i>	1
68	<i>Hastikarna</i>	<i>Leea macrophylla Horn.</i>	1
69	<i>Hijjal</i>	<i>Barringtonia acutangula Gaertn.</i>	1
70	<i>Hingu</i>	<i>Ferula narthex Bioss.</i>	1
71	<i>Jambu</i>	<i>Syzygium cuminii Linn.</i>	1
72	<i>Jatamansi</i>	<i>Nardostachys jatamansi DC</i>	1
73	<i>Jeevanti</i>	<i>Ledatadenia reticulata W.A.</i>	1
74	<i>Kadali</i>	<i>Musa sapientum Linn.</i>	1
75	<i>Kapikacchu</i>	<i>Mucuna prurita Hook.</i>	1
76	<i>Karpas</i>	<i>Gossypicum herbaccum Linn.</i>	1
77	<i>Kataphal</i>	<i>Myrica esculenta Buch.Ham.</i>	1
78	<i>Kirat Tikta</i>	<i>Swertia chirayita Roxb.</i>	1
79	<i>Kola</i>	<i>Zizyphus jujuba Lam.</i>	1
80	<i>Kshir-Vidari</i>	<i>Ipomoea digitata Linn.</i>	1
81	<i>Kulatha</i>	<i>Dolichos biflorus Linn</i>	1
82	<i>Kumari</i>	<i>Aloe vera Toum</i>	1
83	<i>Kushtha</i>	<i>Desmostachya bipinnata Stapf</i>	1
84	<i>Kutaj</i>	<i>Holarrhena antidysenterica Linn.</i>	1
85	<i>Kutaki</i>	<i>Picrorhiza kurroa Royle ex</i>	1
86	<i>Langali</i>	<i>Gloriosa superba Linn</i>	1
87	<i>Mandukaparni</i>	<i>Centella asiatica Linn.</i>	1
88	<i>Manjishta</i>	<i>Rubia cordifolia Linn.</i>	1
89	<i>Mastaki</i>	<i>Pistacia lentiscus Linn.</i>	1
90	<i>Minakshi</i>	<i>Alternanthera sessilis Linn</i>	1
91	<i>Musali</i>	<i>Asparagus adscendens Roxb.</i>	1
92	<i>Naga-Keshar</i>	<i>Mesua ferrea Linn.</i>	1
93	<i>Palasha</i>	<i>Butea monosperma Lam.</i>	1
94	<i>Pashanbheda</i>	<i>Bergenia ligulata Wall.</i>	1
95	<i>Renuka</i>	<i>Vitex agnus-castus Linn</i>	1
96	<i>Samudra-shosha</i>	<i>Salvia plebeia R.Br.</i>	1
97	<i>Sariva</i>	<i>Hemidesmus indicus R.Br.</i>	1
98	<i>Sarjaras</i>	<i>Shorea robusta Gaertn.</i>	1
99	<i>Shalaparni</i>	<i>Desmodium gangeticum DC</i>	1
100	<i>Tagar</i>	<i>Valeriana wallichii DC.</i>	1
101	<i>Talisa-patra</i>	<i>Abies webbiana Lindle</i>	1
102	<i>Yava</i>	<i>Hordeum sativum Pers</i>	1
103	<i>Twak</i>	<i>Cinnamum zeylanicum Breyn.</i>	1

They are rich in flavonoids, saponins and tannins. Few plants out of these have been extensively investigated and possessed for multiple medicinal properties.

DISCUSSION

Tridoshas play as important role in maintenance of good health as well as in prevention from diseases. These *doshas* exists in body all the time but their individual dominance will vary as per age. *Vata Dosh* is predominance in old age and most important factor in the Pathophysiology of ageing. Properties of *Vata Dosh* are described as *dry, cold, rough*. So by its nature, decreases luster of skin, reduces body strength, dries and decays the body and hastens ageing proves that the process of ageing. Listed drugs act as *Kapha-Vataghna* so it reverse all the ageing process and act as Anti-ageing. Agni plays a vital role in ageing process. Most of the single drugs are bitter, pungent, hot act as appetizer, digestive, and nourish the Dhatu. All of these dravyas having capability to stable the process ageing and protect body from ageing. *Guduchi*^{15,16}, *Amalaki*¹⁷, *Bala*^{18,19}, *Haritaki*^{20,21} are having Antioxidant, Immuno-Modulatory, Neuroprotective action, its neutralize reactive oxygen species by free radical scavenging activity, enhancing immune response, prevented lipid peroxidation, oxidative damage.

The possible mechanisms can be interpreted as immunomodulatory

action-prevents recurrent infection, expelling the damaged cells, adaptogenic action-maintains the balance between mind and body, anti-ageing action rejuvanitive drugs, supports the building and strengthening of tissues countering degeneration associated with ageing, decrease the catabolic process encourages the growth of new cells.

CONCLUSION

Currently increases problem of early ageing due to changing lifestyle, importance of *Vayasthapan* formulations has been increased. The sole meaning of *Vayasthapan* is sustaining the youth stage and preventing the ageing process. It is achieved by *rasayana karma*, antioxidant, adaptogenic, immuno-modulatory action proven by different researchers on modern parameters. A combination of single herbs and formulations may be solutions to treat different early ageing problems. It is recommended that, there is a wide scope of research on Ayurvedic *Vayasthapan* drugs to prove their efficacy in Geriatrics.

REFERENCES

- Susruta Samhita with Ayurveda tatva sandipika Hindi Commentary edited by Kaviraj Ambikadutt Shastri, Sutra Sthana 24/8, Chaukhamba Sanskrit Sansthan, Varanasi, reprint edition; 2007. p. 101.
- Bharat Bhaishajya Ratnakar, 1-5 parts Hindi translation compiled by Shree Nagindas Chhaganlal Shah, Rasavaidya, B. Jain Publishers edition 1923.
- Charaka Samhita, with Ayurveda Dipika Commentary of Cakrapanidutta, edited by YT Acharya, Vimana Sthana 8/122 Chaukhamba Sanskrit Samsthan: Varanasi; edition 2010, p.280.
- Susruta Samhita with Ayurveda tatva sandipika Hindi Commentary edited by Kaviraj Ambikadutt Shastri, Sutra Sthana 35/34, Chaukhamba Sanskrit Sansthan, Varanasi, reprint edition; 2007. p. 134,135.
- Sartha Vagbhat, Marathi translation edited by Dr.Ganesh Krushna Gadre.Sutra sthan Adhyay 1, PuneVidyapeeth, 2009.p.2.
- Vruddha Vabhata,Ashtang Samgraha with Shashilekha Sanskrit commentary, edited by Dr.Shivaprasad Sharma, Varanasi Chaukhamba Sanskrit Series office, edition 2nd 2008.Sha.8/24.p.330.
- Charaka Samhita, with Ayurveda Dipika Commentary of Cakrapanidutta, edited by Yadavji Trikamji Acharya, Sutra Sthana 4/8 Chaukhamba Sanskrit Samsthan: Varanasi; reprint edition 2008, p.62.
- Susruta Samhita with Ayurveda tatva sandipika Hindi Commentary edited by Kaviraj Ambikadutt Shastri, Sutra Sthana 35/34, Chaukhamba Sanskrit Sansthan, Varanasi, reprint edition; 2007. p.4
- Sartha Vagbhat, Marathi translation edited by Dr.Ganesh Krushna Gadre.Uttartantra Adhyay 39, Pune Vidyapeeth, 2009.p.544.
- P.V.Sharma, Kaiyadeva Nighantu of Kaiyadeva Pandit, Chaukhamba publication, 2nd edition Varanasi.
- Murthy, Srikantha KR, Bhavaprakash of Bhavamishra, Krishnadas academy, Varanasi, Edition 2000.
- Vaidyaraj Datto Ballal Borakar, Sartha Yoga Ratnakar, Part 2, Marathi translation, Gajanan book depo Prakashan, 2009. p.1984.
- P.V.Sharma Dravyaguna Vigyana Vol 2nd Chaukhamba Bharati Academy Varanasi 17th edition 19.
- Dr.K.C.Chunekar, Bhavaprakash Nighantu of Bhavamishra, Chaukhamba Bharati Academy, Varanasi, reprint 2006
- Rajani J et al. Immunomodulatory activity of Āmalaki Rasāyana: An experimental evaluation. Anc Sci Life. 2012;32(2):93-98. doi:10.4103/0257-7941.118546
- Bhattacharya S Ket.al., Effect of bioactive tannoid principles of Emblica officinalis on ischemia reperfusion induced oxidative stress in rat heart, Phytomedicine, 9(2), 2002, 171-4.
- Purandare H et al., Immunomodulatory role of Tinospora cordifolia as an adjuvant in surgical treatment of diabetic foot ulcers: A prospective randomized controlled study. Indian J Med Sci. 2007; 61; (6): 347-55
- Rajesh Singh Pawa et al., In Vitro Studies on Sida cordifolia Linn for Anthelmintic and Antioxidant Properties Pharmacognosy and Phytochemistry Division, Faculty of Pharmacy, Chinese Medicine, 2011, 2, 47-52.
- Sumanth Meera et al., Antistress and Adoptogenic Activity of Sida cordifolia Roots in Mice, Ind J Pharm Sci. 2009 May-Jun; 71(3): 323-324.
- Lee HS et al. Antioxidant effects of aqueous extract of Terminalia chebula in vivo and in vitro. Biol Pharm Bull. 2005; 28:1639-44.
- Suchalatha S et al. Antioxidant activity of ethanolic extract of Terminalia chebula fruit against isoproterenol-induced oxidative stress in rats. Indian J Biochem Biophy. 2005; 42:246-9. [PubMed]