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“The duty of an efficient Physician is to properly understand the causative factors and symptoms of a disease and to reduce the discomfort and pain through proper treatment. He is not someone who bestoves life”.

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Editor's Page



Indians are known rice-eaters, especially Keralites. An average Keralite eats 10-15 times more rice than a Gujarathi. Recent health reports show that incidence of Diabetes is increasing in Kerala. There is a definite relation between these two. Food articles as well as the life style have changed a lot since last 4-5 decades. In the past, villagers in Kerala processed the rice by themselves for consumption. Harvested paddy was cleaned and stored in large wooden boxes for six months to one year or more. Preparation of boiled rice was of two types; "Orupuzhukkan" and "Irupuzhukkan". Orupuzhukkan is one time boiled which is prepared by boiling pre soaked paddy in big containers till the husk breaks and excess water is drained out by keeping it in big bamboo baskets. This paddy is dried in sun and stored. Milling of this paddy was also done domestically by pounding it in wooden pounding mortars. After removal of the husk, that rice was partially made de bran or polished using same mortars using different pestles. It was assured that enough quantity of bran is left over the rice. In Irupuzukkan the paddy is boiled twice. Paddy is boiled for sometime and kept overnight and a part of the water in paddy is drained out. Fresh water is poured in to it if necessary and again processed as in Orupuzukkan. Rice from these processes will be full in shape and hard to break. What happens during this boiling process is not much scientifically studied. Anyhow starch level of boiled rice will be less than that of raw and there will be structural changes in the starch molecules.

Traditional way of cooking of rice again decreases the starch level. Rice is cooked in open vessels in 5-6 times water. It will take 30-40 minutes to get it well cooked. Lot of water will be left with rice which is drained out and the cooked rice is collected. This tradition has almost vanished. Mills equipped with sophisticated machines prepare boiled rice. Paddy is steamed and dried so that there is no draining of water; bran is left over the rice for name sake during milling. Method of rice cooking also has changed. Cooking using pressure cooker is not proper cooking. Keeping rice in boiled water for few hours at lower than boiling temperature makes the rice to feel like cooked. Cooked rice of these methods does not give the taste and flavor of the traditional method. The starch content in this rice will also be more.

Now, Kerala has become a consumer state where even curry leaf (Kariveppila/Kaidarya) comes from neighboring states. Major part of the rice comes from out of state and people prefer well polished white rice. Life pattern has changed. The principle of 'less work and more money' prevails every where. Hard manual works are done by people from out of state. People eat more and work less. This is the cause for increasing rate of Diabetes and Heart diseases. Scientific evaluation of traditional method and materials is necessary before giving way to the new trends. This is applicable in several aspects of the science of life – Ayurveda.

Thus comes the Renaissance.

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A COMPARATIVE PHYSICO-CHEMICAL ANALYSIS OF SHODHITA AND MARITA HINGULA

*Dr. Raghuveer, **Dr. P. P. Dindore, ***Dr. Archana Joshi

ABSTRACT:

Many of *Rasa* texts explained that the metals and minerals should be used in the form of *bhasma*. But for few minerals *bhasma* procedure has not been explained in classics and *Hingula* is one among them. We are getting only one reference for *Hingula bhasma*. In this study an effort has been made to prepare *Hingula bhasma* and compared with the *Shodhita Hingula*. The result reveals *Marita hingula* is safer than that of *shodhita*.

KEYWORDS: *Hingula Shodhana, Marana, Analysis.*

INTRODUCTION:

Hingula is one of the mineral ores of mercury, grouped under *Sadharana Rasa Varga*. In the formulations where *hingula* is used as an ingredient, *shodhita hingula* is being used. No references about *hingula bhasma* are seen except one in the classical text Yogartnakara¹. Here this study mainly deals with the analytical changes in each of the process i.e. *Shodhana* and *Marana*.

Materials & Methods:

Raw materials like *Hingula, Sudha churna, Haratala, Ardraka* and *Lavanga* were procured from the market and got certified by the experts in the subject.

METHODOLOGY:

Hingula bhasma is prepared according to the reference in the classical text Yogaratnakara¹,

Ingredients	Quantity	Equivalent
<i>Shuddha Hingula</i> ²	1 Karsha	12 g
<i>Shuddha Haratala</i> ²	3 Ratti	375 mg
<i>Lavanga churna</i>	1 Masha	1 g
<i>Ardraka Swarasa</i>	2 parts of <i>Hingula</i>	24 ml

PROCEDURE:

Measured quantities of all ingredients were taken. *Sharava* is cleaned properly and dried. First a fine powder of *shuddha haratala* is spread in *sharava*. Above this *shuddha hingula* is placed. *Ardraka swarasa* is then poured in such a way that the contents of *sharava* are completely immersed in *swarasa*. *Lavanga churna* is then sprinkled over the *swarasa* and is closed with another *sharava* and *sandhibandhana* is done. After complete drying, the *sharava* is subjected to fire in *madhyamagni*. To maintain the temperature, *valuka yantra* is used and a temperature of 250⁰ C for 3 hours is maintained. After *swangasheeta*, *sharava* is removed from *valuka yantra*, *sandhibandhana* is removed and the material inside the *sharava* is collected.

Thus prepared *bhasma* is subjected for *bhasma pareeksha* like *varitaratwa, rekhapurnatwa, unama, nirdhuma, niswadu* and *nishchandratwa*. Qualitative analysis was done as per the Pharmacopeial standards for Ayurvedic formulations³. For Quantitative study samples sent to a recognized well equipped laboratory.

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RESULT:

Table No 1. Shodhana of Hingula:

SL.No.	Hingula shodhana	Weight	Gain / Loss
01	Raw Hingula	1 Kg	——
02	1 st Bhavana	980 gm	Loss
03	2 nd Bhavana	940 gm	Loss
04	3 rd Bhavana	920 gm	Loss
05	4 th Bhavana	930 gm	Gain
06	5 th Bhavana	945 gm	Gain
07	6 th Bhavana	960 gm	Gain
08	7 th Bhavana	990 gm	Gain

Table No 2. Organoleptic characters of Shodhita & Marita Hingula:

Hingula	Colour	Touch	Taste	Smell
Shodhita	Dark Red	Soft	No	Ardrakavat
Marita	Rakta varna (Blood Red)	Soft	No	No

Table No 3. Hingula Bhasma:

SL.No.	Sample	Weight	Loss / Gain
01	Raw Material	12 gm	——
02	Bhasma	10 gm	Loss

Table No 4. Analytical Results:

Samples	Mercury	Sulphur	Copper	Iron	Potassium	Arsenic
Shu.Hingula	53.3%	13.74%	6.8ppm	180.7ppm	0.63ppm	——
Hingula Bhasma	55.5%	14.25%	0.0047%	0.020%	0.77%	30.0%

Table No 5. Analytical Results:

Samples	pH	Total Ash	AIA	Powder Fineness
Shu.Hingula	5.79	0.96%	0.15%	Fine powder
Hingula	6.75	1.44%	0.27%	Pass 180mm
Bhasma				Mesh

Discussion:

- There is a loss of Hingula in first 3 bhavana which is mainly due to change of *khalwa yantra*,

as it adheres to *khalwa yantra*. There is loss of 80 gm in weight. From 5th bhavana onwards the weight is increased which might be due to the addition of *ardraka swarasa* during each bhavana.

- A loss of 2 gms of *bhasma* is seen which might have lost during its collection from *sharava*.
- Percentage of mercury is increased in *bhasma*. No major changes observed in sulphur, percentage of copper, iron and potassium. Arsenic percentage is seen in the *bhasma*, because of addition of *haratala* in the preparation.
- pH value is increased in *bhasma* and ash value is also increased which might be because of the addition of *ardraka swarasa* and *lavanga churna*. Acid insoluble is also increased which might be due to addition of *haratala* and the powder fineness is also increased in *bhasma*, due to *agni samskara*.

CONCLUSION:

The result shows that, particle size of *bhasma* is lesser than that of *shudha hingula*, so it may increase absorption capacity. These changes may be due to addition of *haratala* and *lavanga churna* during the preparation of *bhasma*. Dose of the *bhasma* is less than that of *shodhita hingula*. Hence it can be said that *hingula bhasma* is better than *shuddha hingula*. Further studies can be conducted for *hingula bhasma* superiority by taking comparative study of *shodhita* and *marita hingula* in clinical trial.

REFERENCE:

- 1) Shastry lakshmi pati shree, Yogartnakara, Chaukamba Sanskrit samsthan, Varanasi, 8th edition.
- 2) Tripathi indradev, Rasaratna Samuchaya, Varanasi, Chaukambha Sanskrit Bhavan Varanasi 2nd edition.
- 3) Sharma Sadanand 'Rasa Tarangini' – Motilal Banarasidas 1994, Reprint.
- 4) Pharmacopoeial standards for Ayurvedic formulation.

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MANAGEMENT OF PELVIC RING FRACTURE BY AYURVEDIC MEDICAMENT WITH SPECIAL REFERENCE TO PUBIC RAMUS FRACTURES (BUTTERFLY FRACTURE)

* Dr. R. N. Tripathy, ** Dr. Mrutyunjaya Panda, *** Dr. S. P. Otta

Introduction

Fracture of the Pelvis are often not serious injury in themselves but may be so by the reason of their complications. They are usually caused by a direct injury or by violence transmitted longitudinally through femur. Fracture of pelvis is relatively uncommon and present problems in management only if they cause instability of the bony ring of the pelvis because, serious complications may arise from the damage to the pelvic content particularly the bladder, uterus or from severe bleeding from the underlying vessels. The incidents of pelvis fracture are on the rise following the increase in road traffic accidents. The management of pelvic ring fracture proceeds through stabilizing the patient, clinical and radiological assessment of type of injury and the treatment of fractures. The treatment of fractures in cases of minimal or no displacement which is otherwise known as stable fracture needs only bed rest and analgesics. Whereas in unstable fracture, where the displacement present needs closed reduction with external fixation or open reduction and internal fixation along with at least six weeks of bed rest.

With reference to Susruta Samhita, by the application of upward and downward traction the displaced bones from the joints and fragments of the fracture (open book fracture) may be setup in a proper position, then the treatment should be followed by administration of *Sneha basti* along with the medicines prescribed in the context. In this context evaluating the ancient Indian art of orthopaedic practice i.e., Ayurvedic approach or the traditional way of fracture

management is described with a conceptual analysis as a counter part of the modern surgical management.

Relevant Anatomy

The pelvis is a ring shaped structure joined in the front by the pubic symphysis and behind by the sacro-iliac joint. There are projecting iliac wings on either side which is a frequent site of fractures. The pelvic ring is formed, in the continuity from the front by pubic symphysis, pubic crest, pectineal line of pubis, arcuate line of the ilium and the ala and promontory of the sacrum. Fractures in the anterior half of the ring may have an associated injury to the posterior half. This makes the pelvic ring unstable.

The stability of the pelvic ring depends posteriorly on the sacro iliac joint and anteriorly on the symphysis pubic. The sacro iliac joint are bound in front and behind by the strong band like sacro iliac ligaments. The pubic symphysis is reinforced by ligamentous fibres above and below. Its accessory ligaments of the pelvis such as the ilio-lumbar ligament, sacro-lumbar ligament and sacro-spinous ligament give stability to the ring.

The obturator nerve and the sacral plexus pass over the ala of the sacrum and cross the pelvic brim. These are likely to suffer injury in fractures in these regions.

The fracture of the pelvis is classified into Isolated fracture and Fracture with disruption of the pelvic ring. Any part of the pelvis may be affected but the commonest fracture occurs through superior or inferior ischio - pubic ramus or through both the rami. In the absence of displacement it is known as isolated fracture, which means the alignment of the pelvic ring

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is not affected. The disruption of the ring can occur only if there are fracture or dislocation at two points approximately opposite to one another for example a fracture through both the ischio - pubic rami with separation or disruption of the pubic symphysis. The fracture through the superior and inferior ischio - pubic rami of both sides with or without disruption of the pubic symphysis is termed as Butterfly fracture. Further, Marvin Tile classifies the pelvis fractures on the basis of the stability of the pelvis as,

1. Minimally displaced stable fracture previously known as isolated fractures
2. Unstable fracture previously known as pelvic ring disruption.

The unstable fracture associated with displacement of the pubic symphysis is known as Open book injury. Ischio - pubic ramus fracture is a commonest type of fracture one or more ramus may be fractured on one or both sides, displacement is usually minimal, the fractures of the rami may extend in to the acetabulum there may be an associated injury to the bladder, which could be an antero posterior crushing, a compression from side to side or a vertical sharing force which may cause marked displacement of one half of the pelvis. We can classify this type of fracture in either types depending upon its displacement.

Diagnosis

The diagnosis is mainly clinical and radiological. Whenever a patient presents a history of crush injury, suspect that he may have fractured his pelvis. Look for bruising and local tenderness in his groin, perineum, pubic area and also posteriorly over the iliosacral joint.

Grasp his pelvis firmly with the thumbs over the anterior superior iliac spine. Compress from side to side and then pull them apart for movement or crepitus between the two parts. This procedure may cause a great pain if there is a fractured pelvic ring. Then press over the pubic symphysis if the pelvis is fractural local tenderness will be felt or he may feel pain over the sacro iliac joint. Severe supra pubic tenderness suggests of urogenital damage. In the open book injury, a gap may be felt in the pubic symphysis. Palpate the anterior superior iliac spine and entire iliac

crest for tenderness, irregularity and crepitus; palpate the pubic bone in his genital crucial fold. Examine per rectum / per vaginum to feel the bony fragments and along with the injury to the pelvic wall particularly in cases of pubic rami fractures clinically the patient present with pain and tenderness over the fracture site and positive pelvic compression test. Radiologically X-rays taken on AP and lateral view, ischio - pubic rami fracture can be detected and one must carefully rule out other associated fractures so that the diagnosis of the pubic rami fracture can be made.

Management of Butterfly Fracture

A severe shock is often a feature of pelvic fracture and it may demand a resuscitative measure. It is important that the displacement should be fully reduced and the position stabilization without delay because the urethra may be ruptured or compressed. While the general condition of the patient becomes stable, we can proceed to the assessment regarding the nature of injury by suitable X-ray examination and further treatment of pelvic fracture depends upon the type of fracture. In the fracture of pubic ramus the plan of management includes immediate resuscitation when the general condition of the patient becomes stable. Then reduction via pins in one iliac crest may be attempted and if successful maintained by connecting them in pins (Schanz pins) on the other sides firming an external fixator usually for 6-8 weeks. The pubic symphysis disruption may be reduced by internal fixation method (Open reduction and internal fixation method). During the period of rest, the exercise for lower limbs should be carried out daily to keep the joints mobile and muscles active.

Critical review of patients with pelvic fractures has shown that the present trend of fracture treatment plan is very expensive and after the entire sequel of treatment it is often seen that a persistent pain, patient unable to stand, retention of urine, localized tenderness, painful movement and partly anesthetic leg are also evidenced. This type of complication can be avoided by the conservative management described in Ayurvedic classics.

Ayurvedic Approach

The management of fracture proceeds through three basic principles Reduction, Immobilization & Rehabilitation. Our ancient authors emphasize on these three basic principles along with medicinal treatment to enhance the healing of fracture.

Reduction is done by manual pressure on two iliac wings with patient rolled on to his unaffected side. So as to close the pelvis, the assessment of opposition is confirmed by per rectal/per vaginal examination. The displacement of the pubic ramus can also be reduced by bimanual pressure from the pubic symphysis and by introducing the index finger per rectum.

For immobilization, a complete bed rest will be maintained with a canvas splint specially designed with iron bars associated with 2.5 kg traction from the centre of the pelvis. The leg should be kept in 45 degrees angle (Su. Chi. III. 26, 27, 28). To avoid the upward displacement of half of the pelvis the patient should be kept in continuous traction for 6 - 8 weeks and after that a pelvis belt is advised and the patient may be allowed to get up and walk with support.

Medicinal Treatment

After immediate resuscitation when the patient becomes stable, all the vital signs should be examined every day, and the progress should be noted. Treatment should be given for associated complaints like a Folly's catheter for urine retention.

The treatment for union of fracture can be adopted as:

- *Lakshadi Guggul* 2 gm , b.i.d. with milk
- *Abha Guggul* 2 gm t.d.s. with milk
- *Gandha Taila* 10 drops bed time internally

The patient can be given *Avipattikara Churna* one t.s.f. b.i.d. and *Rasayanas* like *Chyavanprasha rasayana* one t.s.f. three times daily with milk.

Milk as a diet and as *Anupana* should be promoted to meet the calcium demand.

Conclusion

The suggested management is a conservative approach which simulates the basic fracture management procedure to deal with pubic ramus

fracture. In lieu of open reduction, internal fixation and external fixation, the management was substituted by only canvas splint traction. To prove this type of management successful, a case was treated in G. A. M. Puri (Orissa), female ward bed no. 51 I. R. No. 281.

Sori Sahu, Hindu, Female and Age 50 was admitted in the hospital on 09.05.2002 and discharged on 20.6.2002. At the time of discharge she was comfortable and mobile in condition with external walking aid. The patient was advised to report in each 2 months up to 2 years for the evidence of any complication. Further it was observed that she was able to walk without any external aid after 6 month of rehabilitation. But as the study on this type of management was conducted only on a single patient it may not be claimed as final. More detailed studies should be conducted in this regard.

We suggest this conservative line of treatment may be adopted as an option in the management of Butterfly fracture or Pelvic ring fracture.

References

1. Despande P. J & Sharma B. N. - Bhagna Chikitsa: First Edition: Ayurvedic and Tibbi Academy U. P. Lakhnow - 1976
2. Fakuda et.al. - Dynamic callus and electric callus - J. B. B. S. 37 - 1292 - 1955
3. Fakuda et.al. - Piezo Electric Properties of Organic Polymer - National Academy of Science - 1974
4. Mahasweri J. - Essential Orthopaedics: Second Edition: Inter print A - 16, Naraina, New Delhi - 28 - 2000
5. Paul S. N. - Clinical Study on Transvers Fracture of Tibial shaft by Skeletal traction and Intramedullary nailing - 1977
6. Reynolds D. A. - Growth changes in fractured long bone - Journal of Bone and Joint Surgery 63B: 83 - 1981
7. Rokkenen P. et.al - Open reduction and internal fixation - 1969
8. Sashtri L. P. - Yoga Ratnakar, Vidyotini Hindi Commentry - 21st Edition, Choukhamba, Sanskrit Series, Varanasi - 1 - 1973
9. Sashtri A. D. - Vaisagya Ratnabali, Vidyotini Hindi Bakhya - 11th Edition - Choukhamba, Sanskrit Series, Varanasi - 1 - 1993
10. Sashtri A. D - Sushruta Samhita, Ayurveda Tatwa Sandipika, Hindi Commentry - 8th Edition - Choukhamba, Sanskrit Series, Varanasi - 1 - 1993

ROLE OF RASAYANA THERAPY IN DIFFERENT AGE GROUPS - AN OVERVIEW

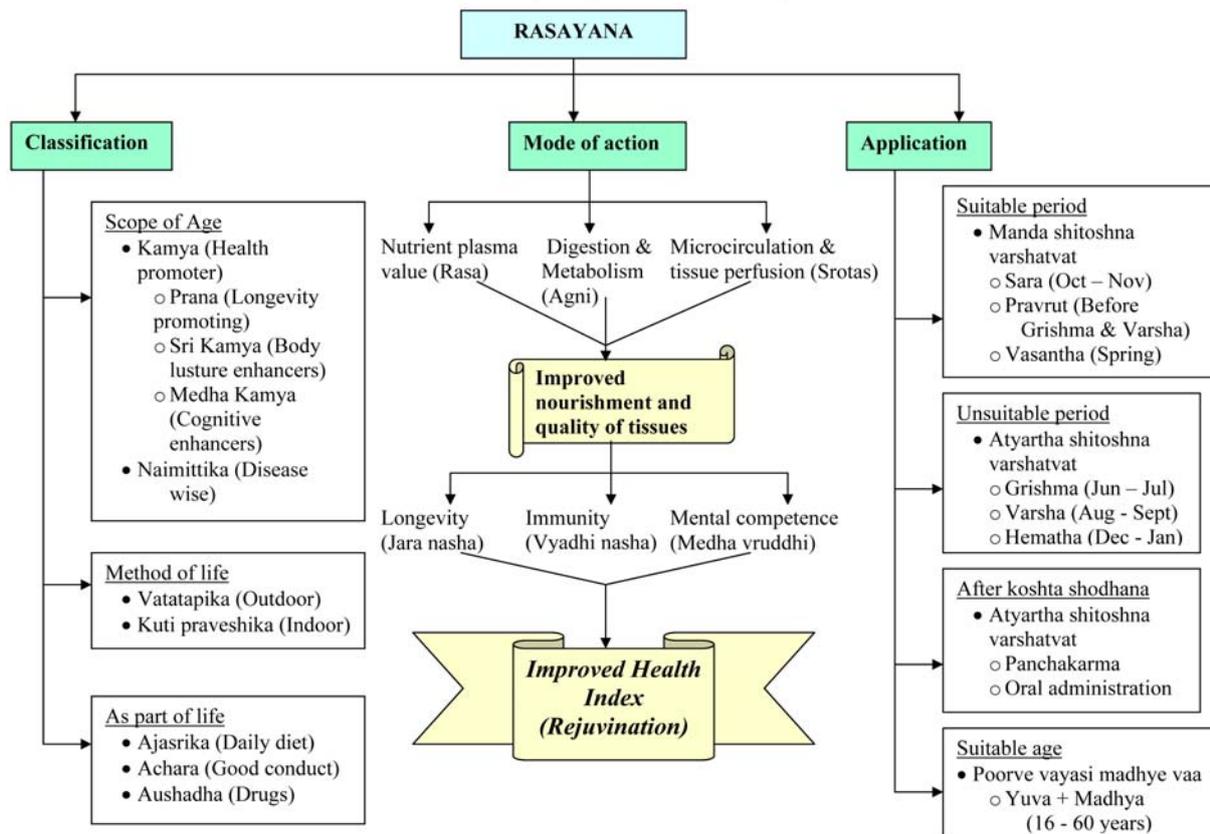
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Introduction¹

Among the major branches of ancient system of medicines of our motherland is the Rasayan Therapy. This noble branch possesses mechanisms through which a person can achieve *Deha Dhridikaranam* (strengthening the body) *Indriya Dhridikaranam* (strengthening the cognitive faculties), *Danta Dhridikaranam* (strengthening the teeth), *Vali nasana* (dermotropic), *Palitha nasana* (preservation of scalp hair), *Bala-kanti prada* (bestowing excellence of strength and complexion), *Smruti prada* (improving memory), *Medha prada* (improving

intellect), *Arogya prada* (excellence of health), *Tarunata prada* (anti-ageing) and as a whole, it possesses *Jara vyadhi nasana* (avoiding ageing and diseases) effect. Hence rasayana becomes the prime need of all age groups. Precise meaning of rasayana is 'Rasa' + 'Ayana' which mean proper nourishment to all the tissues of the body through their respective channels. Of late, meaning of *Rasayana* has been implied as mere vitamins, antioxidants or immunomodulators. It is not just that but, basically designed to serve two purposes viz, anti-ageing as well as anti-disease. Generally the aim of Rasayana therapy is to prevent ageing problem but, in this paper

Flow Chart Depicting Dimensions of Rasayana



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**DIFFERENT STAGES OF AGE ACCORDING TO SAMHITAS,
ASHRAMA DHARMA AND MODERN**

Avastha (Stage)	Kashyapa	Charaka	Sushrutha	Haritha	Ashrama dharma	Modern
GARBHA	Intrauterine life till delivery	-	-	-	-	Pre-Natal Ovum: 0-14 d Embryo: 14 d-9 wk Fetus: 9 wk-birth Péri-Natal (WHO 1988) 22wk gest.: 7d after birth
BALYA	<i>Kshirapa:</i> Upto 1 y <i>Kshiranada:</i> 1-16 y	<u>1-30y</u> <i>Aparipakva</i> 1-16 <i>Vivardhamana</i> (<i>Mano</i> <i>asthirata</i>): 16-30	<u>1-16y</u> <i>Kshirapa:</i> Upto 1 <i>Kshirannada:</i> 1-2 <i>Annada:</i> 2-16	1-16 y	Brahmacharya: 1-21 y or 1-25 y (Studenthood)	Péri-Natal Post natal Newborn: 4wk afterbirth Infancy: 1 st y Toddler: 1-3 y Preschool: 3-6 y School: 6-10 y (G); 6-12 y (B)
YUVA	<i>Vardhamana</i> <i>avastha:</i> 16-34 y	-	-	Vardha mana: 16-25 y	-	Adolescence: 10-19y Youth: 15-24 y Young age: 10-24 y (WHO 1988)
MADHYA	<i>Vardhamana</i> <i>avastha:</i> 16-34 y	<i>Sampurnata:</i> 30-60 y	<u>16-70 y</u> <i>Vridhhi:</i> 16-20 <i>Youvvana:</i> 21-30 <i>Sampurnata:</i> 31-40 <i>Hani:</i> 41-70	25-70 y Uttama taruna: 25-50 y	Grihastha (Household): 21-42 y or 25-50 y Vanaprastha (Hermitage): 42-63 y or 52-75 y	-
VRIDDHA	<i>Dhatuksheena</i> & <i>Mandaatma</i> 70+ to death	<i>Hiyamanda:</i> 60-100 or more	<i>Ksheenamana</i> dhatu: 70 y>	<i>Hinabala:</i> 70-80 <i>Hinatama:</i> 80>	Sanyasa (Renunciation): 63-84 or 74-100 y	-

we propose and stress the utility of specific *Rasayanas* as a choice in respective age groups with regards to the physiological and pathological changes in the body system with functions ranging widely from nutrition to elimination.

Key points

- Classification of Rasayana
- Mode of action

- Application
- Different stages of age according to samhita
- Non medical literature [*Ashrama dharma* (AD)]
- Physiological and pathological changes in the following avasthas
 - *Balya, Madhya, Vridhha*
- Choice of *rasayana*.

**PHYSIOLOGICAL AND PATHOLOGICAL CHANGES IN
BALYAVASTHA AND CHOICE OF RASAYANA**

<i>Avastha (Stage)</i>	<i>Physiological changes</i>	<i>Rasayana</i>	<i>Pathological changes</i>	<i>Rasayana</i>
BALYA (1-16 y)	Ayurveda <i>Aparipakva dhatu</i> <i>Dehapramana vrudhi</i> <i>Kapha pradhanyata</i> <i>Alpa krodhavastha</i> Modern General body growth Fine & Gross motor development, Language, Psychological & Cognitive development	Jata Day1: <i>Ghrita madhu yukta svarna bhasma</i> Day 2&3: <i>Lakshmanasiddha ghrita, Apamarga ghrita</i> Kshirapa: <i>Siddharthakadi ghrita</i> Kshirannada: <i>Madhukadi ghrita</i> Annada: <i>Dvipanchamooladi ghrita, Chyavanaprasha (Balaanga vrudhi)</i>	<i>Balagraha</i>	<i>Astavarga ghrita</i>
			<i>Shishukrandana</i>	<i>Pippalyadi churna+ Madhu+Ghrita (M+G)</i>
			<i>Karshya</i>	<i>Ashwagandha Ghrita</i>
			<i>Shwasa, Kasa</i>	<i>Drakshadi ch. + M+G, Chyavanaprasha</i>
			<i>Dantodbheda</i>	<i>Amalaki swarasa (Pratisarana)</i>
			<i>Jwaradibalatiara, Udara roga</i>	<i>Mudga rasa</i>
			<i>Krimi roga, Jwaraatisara</i>	<i>Rasa karpura, Chaturbhadra rasa</i>
16-30 y (Charaka)	<i>Vivardhamana dhathu avastha (Manoasthirata)</i>	<i>Brahmirusayana, Guduchyadi yoga, Medhya, Achara ajasrika</i>		
1-10 y (Sharangadhara)	<i>Balyahrasa (Competence)</i>	<i>Vacha, Kashmari</i>		
11-20 y (Sharangadhara)	<i>Vruddhihrasa (Growth)</i>	<i>Vruddhihrasa (Growth) Bala, Ashwagandha</i>		
21-30 y (Sharangadhara)	<i>Chavihrasa (Lustre)</i>	<i>Amalaki</i>		
BRAHMACHARYA (Ashrama Dharma)	Moral restraint, Devotion to meditation	<i>Medhya rasayana, Brahma rasayana, Saraswathaghrita, Chyavanaprasha</i>		
ADOLESCENCE, YOUTH AND YOUNG (W.H.O.)	Onset of puberty (Biological); Emergence of more advanced cognitive abilities (Cognitive); Self-image, Intimacy, Relations with adult (Emotional); Transition to new rules into society (Social)	<i>Acharya (Rejuvenating conduct)</i>	Obesity	<i>Navaka guggulu</i>
			Eating disorders	<i>Madeephala rasayana</i>
			Disorders of Mood & Sexual development	<i>Medhya & Acharya</i>

**PHYSIOLOGICAL AND PATHOLOGICAL CHANGES IN
MADHYMAVASTHA & CHOICE OF RASAYANA**

<i>Avastha</i> (Stage)	Physiological changes	<i>Rasayana</i>	Pathological changes (<i>Srotovikruti</i>)	<i>Rasayana</i>
16-20 y	<i>Vruddhi</i> (Growth)	<i>Chyavanaprasha</i> , <i>Shatavaryadi yoga</i>	<i>Pranavaha</i>	<i>Chyavanaprasha</i> , <i>Agasthya rasayana</i>
20-30 y	<i>Youvvana</i> (Adolescence)	<i>Ashwagandha</i>	<i>Udakavaha</i>	<i>Pippali</i>
		<i>Punarnava</i>	<i>Annavaha</i>	<i>Vardhamana pippali</i> , <i>Panchamrita parpati</i>
		<i>Bhringaraja</i> with <i>dugdha</i>	<i>Rasavaha</i>	<i>Amalaki</i> , <i>Ashwagandha</i>
30-40 y	<i>Sampurnata</i> (Adulthood)	<i>Sitodaka</i> +water+ <i>dugdha</i> + <i>Ghrita</i>	<i>Raktavaha</i>	<i>Bhallataka ghrita</i> <i>Bola parpati</i> , <i>Amalaki</i>
		<i>Rutu haritaki</i>	<i>Mamsavaha</i>	<i>Makaradhwaja</i> , <i>Ashwagandha</i> . <i>Bala</i>
		<i>Vardhamana pippali</i>	<i>Medovaha</i>	<i>Sameerapannaga rasa</i> , <i>Guggulu</i> , <i>Shilajathu</i>
40-70 y	<i>Hani</i> (geriatrics)	<i>Siddha</i> (<i>Vamshalochana</i> , <i>Pippali</i> , <i>S. lavana</i> , <i>Honey</i>)	<i>Asthivaha</i>	<i>Guduchi</i> <i>Rasa parpati</i>
		<i>Ashwagandha</i>	<i>Majjavaha</i>	<i>Vijaya parpati</i>
		<i>Shilajathu</i>		<i>Panchamrita parpati</i>
25-70 y (<i>Harita</i>)	<i>Pathashranthi</i> & <i>Parishrama Ksheena</i>	<i>Triphala</i> , <i>Ashwagandha</i> & <i>Vidangavaleha</i>	<i>Shukravaha</i>	<i>Amalakyadi yoga</i> , <i>Atmagupta</i> , <i>Ashwagandha</i> , <i>Shatavari</i>
31-40 y (SD)	<i>Medha hani</i>	<i>Shankhapushpi</i> , <i>Jyotishmati</i>	<i>Purishavaha</i>	<i>Rasa parpati</i>
41-50 y (SD)	<i>Twak hani</i>	<i>Bhringaraja</i> , <i>Somaraji</i>	<i>Mutravaha</i>	<i>Shilajathu</i>
51-60 y (SD)	<i>Drushti hani</i> (Vision)	<i>Jyotishmati</i> , <i>Saptamruta loha</i>	<i>Swedovaha</i>	<i>Loha parpati</i>
<i>Grihasta</i> (AD)	Seeking <i>Artha</i> and <i>Kama</i>	<i>Bhringaraja</i> , <i>Amalaki</i> <i>ghrita</i> , <i>Chyavanaprasha</i>		
<i>Vanaprastha</i>	Spiritual practice, Meditation	<i>Saraswatha avalehya</i> , <i>Medhya</i>		

**PHYSIOLOGICAL AND PATHOLOGICAL CHANGES IN VRUDDHAVASTHA
& CHOICE OF RASAYANA**

Avastha (Stage)	Physiological changes	Rasayana	Pathological changes (System/organ wise)	Rasayana
60-80y	<i>Hina bala, Hiyamanadhathu, Manda atma</i>	Rasayana therapy is not much effective	General: Body fat (Obesity- <i>Sthoulya</i>) Total body water (Anorexia- <i>Aruchi</i>) Eye/ear : Presbyopia, Lens opacity (blindness), Deafness: Freq. activity R.S.: Lung elasticity Chest wall stiffness (Dyspnoea- <i>Shwasa</i>) C.V.S.: Atrial compliance, Systolic B.P., S.A. node automaticity (Heart failure, Syncope) GIT: Hepatic function, Acidity, Colonic motility, Anorectal functions (Cirrhosis- <i>Vakrudalyudara</i> , Osteoporosis, Fecal incontinence & impaction) Hematological/immune system: Bone marrow reserve, T cells, Autoantibodies (Anemia- <i>pandu</i> & Autoimmune) Genitourinary system: Vaginal/ Urethral mucosal atropy, B.P.H. (Dyspareunia, UTI, Urinary incontinence- <i>Mutraghata</i>) Musculoskeletal system: Mean body mass & bone density (Osteopenia, Hip #- <i>Sandhivata</i>) Nervous system (Vatavyadhi): Brain atrophy, Catechol synthesis, Dopamine (Dementia Delerium, depression, Parkinson's- <i>Manasa roga</i>)	<i>Navaka guggulu, Matulunga Rasayana, Triphala, Vijayasara, Jyotishmati, Shatavari Amalaki, Yastimadhu Bharngyadi, Punarnava, Agasthya, Shirisha, Haridra Abhaya modaka, Kameshwara lehya, Guggulukalpa, Pushkaramoola, Arjuna, Lashuna kalpa, Sarpagandha</i> <i>Jeerakadi lehya, Changeryadi rasayana</i> <i>Chyavanaprasha, Pippalyadi, Gandhaka rasayana, Kameshwara lehya</i> <i>Shilajathu, Dashamoola haritaki, Methi, Haridra,</i> <i>Lashuna, Shallaki, Guggulu, Ashwagandha, Shunti, Vijaya parpati, Panchamruta parpati</i> <i>Lashuna, Guggulu kalpa, Rutu haritaki, Ashwagandha, Bola, Kapikacchu, Brahma, Jyotishmati, Tagara</i>
81>	<i>Hina atma, Sanyasa (Renunciation)</i>			
<i>Siddha</i>	<i>Process of decay & repair</i>	<i>Kayakalpa</i>		
60-70y (Sha sam)	<i>Shukra hani (Libido)</i>	<i>Atmagupta, Ashwagandha</i>		
71-80y SD	<i>Vikrama hani (Physical strength)</i>	Rasayana therapy is not much effective		
81-90y SD	<i>Buddi hani (Wisdom)</i>			
91-100y SD	<i>Karmendriya hani (Locomotor)</i>			
Modern	Increased Free radical, Body fat, Risk of heart ailments & BP Decreased Muscle mass, Strength, BMR, Aerobic capacity, Glucose tolerance, Total cholesterol, HDL, Bone density, Body temp regulation			

TABLE SHOWING BIOLOGICAL ACTION OF SOME SELECTIVE RASAYANA HERBS

Name of the drug	Part used	Botanical name	Chemical constituent	Selective action	Biological action
<i>Ashwagandha</i>	Root & Stem	<i>Withania Somnifera</i>	Anaferin, Anahygrine	Nervous system	Antioxidant (Small dose) Aphrodisiac (High dose), Adaptogenic
<i>Guduchi</i>	Root & Stem	<i>Tinospora cordifolia</i>	Berberine, Giloin	Digestive system	Stimulant Carminative, Immuno-modulatory, Antiox.
<i>Amalaki</i>	Fruits	<i>Embelica officinalis</i>	Vit. C, Calcium	Overall	Nutritive tonic, Antiox
<i>Yastimadhu</i>	Root & Stem	<i>Glycerrhiza glabra</i>	Glycerrhizin	Respiratory system	Expectorant, Antitussive
<i>Bala</i>	Root & Stem	<i>Sida cordifolia</i>	Ephdrine	Cardiovascular	Vasodilator, Cardiotonic
<i>Shatavari</i>	Root & Stem	<i>Asperagus racemosus</i>	Saponin	NeuromuscularSystem	Muscle relaxant, Anti-inflammatory, Analgesic
<i>Punarnava</i>	Root & Stem	<i>Boherravia diffusa</i>	Punarnavine	Urinary system	Diuretic, Laxative, Antihelminthic

CONCLUSION

The concept of Rasayana is to keep a man fit till a very late age. Selective Ayurvedic *Rasayana* drugs according to age will be of immense useful and thus helps in prevention and cure of various diseases by its immuno modulator and anti-oxidant properties. Hence there is a need to identify such potent *Rasayana* drugs which are commonly available and easily affordable and also necessary to validate those drugs with the help of Ayurvedic classical literature and modern parameters will definitely solve immeasurable obstinate ailments.

REFERENCES:

1. Bhashagcharya Satyapal, 2006: Kashyapasamhita khilasthana 3⁷²⁻⁷³ 2nd Edition, Choukhambha Sanskrit Sansthan, Varanasi
2. Sastry Satyanarayana 1984 Charaka samhita, Vol.I & II Vimana sthana 8/12, Chikista sthana 1/1, 2nd Edn, Choukhambha Bharati Academy,

Varanasi

3. Sastry Ambika Datta, 1989, Susrutha samhita, Vol.1&2, Sutrasthana 35/34-36, Chikitsa 27/3, Sarira 10/72-74 7th Edn. Choukhambha Sanskrit Sansthan, Varanasi.
4. Sastri Brahma Sankar, 2005, Yogaratnakar, Bala rogadhikar, 2nd Edn. Choukhambha Sanskrit Sansthan, Varanasi
5. Sharma Shiv Prasad and Prof. Jyothir Mitra, 2008, Astanga sangraha, Uttara tantra 1/70-71 2nd Edn. Choukhambha Sanskrit Series Office, Varanasi.
6. Tripathy Brahmananda, 1990, Sarangadhara samhita, Prathama khanda, 1st Edn. Choukhambha Surabharati Prakashan, Varanasi.
7. Mishra Brahmashankar, 2005, Bhavaprakasha, Vol.II, Balarogadhikar, 71/151, 73/8, 9th Edn. Choukhambha Sanskrit Bhavan, Varanasi.
8. Ghai O.P, 2004, Essential of Paeditrics, 6th Edn. Chapter2-3
9. J. R. A. S. Vol. xxviii No.4, Oct-Dec.2007, pp. 1-19.

A CRITICAL REVIEW ON ARDHAVABHEDAKA SHIRAHSULA (MIGRAINE HEADACHE)

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BACKGROUND

The disease *Ardhavabhedaka*, a variety of *shirahsula* was described about 2000 years back. The Acharyas had attempted to study the *shirahsula* on *dosha* basis and included this disease under the heading of *shiroroga*. According to *Shareera tantra*, the human body is broadly divided in to six parts, which includes *siras*, the *chatuskas* and *madhyamanga*. Among these six *angas*, *siras* has been considered as the *pradhananga* or *uttamanga* as it is the seat of many vital organs. The *nasa*, *karna*, *netra*, *jihwa*, *oshta*, etc., are considered as *upangas* of *siras*.

Majority of our Acharyas have described *shiroroga* in relation to “*Shiras*” rather than the *rogas* related to *nasadi upangas* and they classified *Shirorogas* under different headings. This type of classification is beneficial in ascertaining the *adhistana* and also useful in *chikitsa yojana*.

In the present era, few of us are spared the experience of head-pain, as many as 90% of individuals have at least one attack of headache every year. Several disabling headaches are reported to occur at least annually by 40% of individuals worldwide. Headache is usually a benign symptom, but occasionally it is the manifestation of a serious illness such as brain tumor, subarachnoid hemorrhage, meningitis, or giant cell arteritis. In emergency settings, approximately 5% of patients with headache are found to have a serious underlying neurological disorder. Therefore, it is imperative that the serious causes of headache be diagnosed rapidly and accurately.

INTRODUCTION

Ardhavabhedaka, named after its classical symptom, the severe pain in the half of the frontal region, due to various similarities in the clinical features is usually compared with Migraine headache.

Migraine, the most common cause of vascular headache, affects approximately 15% of women and 6% of men. A useful definition of migraine is ‘a benign and recurrent syndrome of headache, nausea, vomiting, and/or other symptoms of neurologic dysfunction in varying admixtures’. Migraine can often be recognized by its activators (red wine, menses, hunger, lack of sleep, glare, estrogen, worry, perfumes, let-down periods) and its deactivators (sleep, pregnancy, exhilaration, sumatriptan).

Severe headache attacks, regardless of cause are more likely to be described as throbbing and associated with vomiting and scalp tenderness. Milder headaches tend to be nondescript - tight, band like discomfort often involving the entire head – the profile of tension-type headache.

THE ETIOPATHOGENESIS OF ARDHAVABHEDAKA (MIGRAINE HEADACHE)

Nidana & Samprapti

Aaharaja - *Ruksha annasevana, ati bhojana, adhyasana*

Viharaja - *Poorva vayu sevana, ati maithuna, vega dharana, atisrama & vyayama*

These features aggravates *vayu* alone or along with *kapha* will gives rise to “*ardhavabhedaka*” after the *adhistana* of aggravated *doshas* being the *siras*.

Predominant doshas in Ardhavabhedaka according to different Acharyas

Acharya Charaka mentioned the cause as the vitiation of *vata* or *vata-kapha*. Acharya Vagbhata opines it is due to the vitiation of *vata* alone. Acharya Sushruta considered this disease as due to the vitiation of *tridosha* because, when *prakopita vayu* is obstructed by the *kapha*, the *vata dosha* dries

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the *kapha* present in the cervical, supra orbital, temporal & frontal regions and produces a penetrating kind of pain in the head. Here as the combination of *pitta dosha* is necessary to bring about the dryness of *kapha*, Acharya Sushruta mentioned it as a *tridoshatmaka* disease.

Samprapti Ghatakas of Ardhavabhedaka

Pathological factors Factors

- | | |
|-------------------------|---------------------------------|
| 1. <i>Dosha</i> | <i>Vata kapha</i> |
| 2. <i>Dushya</i> | <i>Majja</i> |
| 3. <i>Adhistana</i> | <i>Shiras (ardha mastishka)</i> |
| 4. <i>Srotas</i> | <i>Majjavaha srotas</i> |
| 5. <i>Dusti prakara</i> | <i>Sanga (obstruction)</i> |

Genetic basis of migraine

Migraine has a definite genetic predisposition. Specific mutations leading to rare causes of vascular headache have been identified.

paresthesia, hemianopic visual field disturbances, dysphasia and variable degree of drowsiness, confusion, and/or coma. In severe attacks, these symptoms can be quite prolonged and persists for days or weeks, but characteristically they last for only 30 to 60 min and are followed by a unilateral throbbing headache. Approximately 50% of cases of FHM appear to be caused by mutations within the CACNL1A4 gene on chromosome 19, which encodes a P/Q type calcium channel subunit expressed only in the central nervous system. The gene is very large (>300kb in length) and consists of 47 exons. Four distinct point mutations have been identified within the gene (in five different families) that co segregates with the clinical diagnosis of FHM. Analysis of haplotypes in the two families with the same mutation suggests that each mutation arose independently rather than representing a founder

Gene (Locus)	Function of Gene	Clinical Syndrome	Comment
tRNA ^{Leu(UUR)} (Mitochondrial)	Unknown	MELAS syndrome	Extremely rare
CACNL1A4 Mutation (19p13)	P/Q calcium channel regulating neurotransmitter release	Familial hemiplegic	Accounts for approximately 50% of FHM cases
DRD2 (11q23)	G protein – coupled D2 association		Positive receptor for dopamine

For example, the MELAS syndrome consists of a mitochondrial encephalomyopathy, lactic acidosis, and stroke-like episodes and is caused by an A→G point mutation in the mitochondrial gene encoding for tRNA^{Leu(UUR)} at nucleotide position 3243. Episodic migraine-like headache is another common clinical feature of this syndrome, especially early in the course of the disease. The genetic pattern of mitochondrial disorders is unique, since only mothers transmit mitochondrial DNA. Thus, all children of mothers with MELAS syndrome are affected with the disorder.

Familial hemiplegic migraine (FHM) is characterized by episodes of recurrent hemiparesis or hemiplegia during the aura phase of a migraine headache. Other associated symptoms may include hemianesthesia or

effect. Thus certain subtypes of FHM are caused by mutations in the CACNL1A4 gene. The function of the CACNL1A4 gene remains unknown, but it is likely to play a role in calcium-induced neurotransmitter release and/or contraction of smooth muscle. Different mutations within this gene are the cause of another neurogenetic disorder, episodic ataxia type 2.

In a genetic association study, a Neo I polymorphism in the gene encoding the D₂ dopamine receptor (DRD2) was over represented in a population of patients with migraine with aura compared to a control group of non migraineurs, suggesting that susceptibility to migraine with aura is modified by certain DRD2 alleles. In a Sardinian population, an association between different DRD2 alleles and

migraine also demonstrated. Therefore, these initial studies suggest that variations in dopamine receptor regulation and/or function may alter susceptibility to migraine since molecular variations within the DRD2 gene have been associated with variations in dopaminergic function. However, since not all individuals with certain DRD2 genotypes suffer from migraine with aura, additional genes or factors must also be involved. Migraine is likely to be a complex disorder with polygenic inheritance and a strong environmental component.

The Vascular Theory of Migraine

It was widely held for many years that the headache phase of migraine attacks was caused by extra cranial vasodilatation and that the neurologic symptoms were produced by intracranial vasoconstriction (i.e., the “vascular” hypothesis of migraine). Regional cerebral blood flow studies have shown that in patients with classic migraine there is during attacks, a modest cortical hypo-perfusion that begins in the visual cortex and spreads forward at a rate of 2 to 3 mm/min. The decrease in blood flow averages 25 to 30% (insufficient to explain symptoms on the basis of ischemia) and progresses anteriorly in a wave like fashion independent of the topography of cerebral arteries. The wave of hypo-perfusion persists for 4 to 6 hrs, appears to follow the convulsions of the cortex, and does not cross the central or lateral sulcus, progressing to the frontal lobe via the insula. Perfusion of subcortical structures is normal. Contralateral neurologic symptoms appear during temporoparietal hypo-perfusion; at times, hypo-perfusion persists in these regions after symptoms cease. More often, frontal spread continues as the headache phase begins. A few patients with classic migraine show no flow abnormalities; an occasional patient has developed focal ischemia sufficient to cause symptoms. However, focal ischemia does not appear to be necessary for focal symptoms to occur.

The ability of these changes to induce the symptoms of migraine has been questioned. Primarily, the decrease in blood flow that is observed does not appear to be significant enough to cause focal neurologic symptoms. Second, the increase in blood flow per se is not painful, and vasodilatation alone

cannot account for the local edema and focal tenderness often observed in migraine. Moreover, in migraine without aura, no flow abnormalities are usually seen. Thus, it is unlikely that simple vasoconstriction and vasodilatation are the fundamental pathophysiologic abnormalities in migraine. However, it is clear that cerebral blood flow is altered during certain migraine attacks, and these changes may explain some, but clearly not all, of the clinical syndrome of migraine.

The Neuronal Theory of Migraine

In 1941, the Psychologist K. S. Lashley charted his own fortification spectrum, which is a migraine aura characterized by a slowly enlarging visual scotoma with luminous edges. He was able to estimate that the evaluation of his own - scotoma proceeded across the occipital cortex at a rate of 3mm/min. He speculated that a wave front of intense excitation followed by a wave of complete inhibition of activity was propagated across the visual cortex. In 1944, the phenomenon that has come to be known as spreading depression was described by the Brazilian Physiologist, Leao, in the cerebral cortex of laboratory animals. It is a slowly moving (2to3 mm/min), potassium-liberating depression of cortical activity, preceded by a wave front of increased metabolic activity that can be produced by a variety of experimental stimuli, including hypoxia, mechanical trauma, and the topical application of potassium. These observations suggest that neuronal abnormalities, most likely initiated in the brainstem, could be the cause of a migraine attack. More recently, both cortical and brainstem changes have been observed in Positron Emission Tomography (PET) scan studies of migraine. Thus, the existence of a specific ‘brainstem generator’ for migraine remains an intriguing possibility that might represent the pathophysiologic basis of migraine.

The Trigeminovascular system in Migraine

Activation of cells in the trigeminal nucleus caudalis in the medulla (a pain-processing center for head and face region) results in the release of vasoactive neuropeptides, including substance P and Calcitonin Gene-related Peptide (CGRP), at vascular

terminations of the trigeminal nerve. These peptide neurotransmitters have been proposed to induce a sterile inflammation that activates trigeminal nociceptive afferents originating on the vessel wall, further contributing to the production of pain. This mechanism also provides a potential mechanism for the soft tissue swelling and tenderness of blood vessels that attend migraine attacks. However, numerous pharmacologic agents that are effective in preventing or reducing inflammation in this animal model (e.g., selective 5-HT_{1D} agonists, NK-1 antagonists, endothelin antagonists) have failed to demonstrate any clinical efficacy in recent migraine trials.

5-Hydroxytryptamine in migraine

Pharmacologic and other data points to the involvement of the neurotransmitter 5-hydroxytryptamine (5-Ht; also known as serotonin) in migraine. Approximately 40 years ago, methysergide was found to antagonize certain peripheral actions of 5-HT and was introduced as the first drug capable of preventing migraine attacks. Subsequently it was found that platelet levels of 5-HT fall consistently at the onset of headache and that drugs that cause 5-HT to be released may trigger migrainous episodes. Such changes in circulating 5-HT levels proved to be pharmacologically trivial, however, and interest in the humoral role of 5-HT in migraine declined.

More recently, interest in the role of 5-HT in migraine has been renewed due to the introduction of the triptan class of antimigraine drugs. The triptans are designed to stimulate selectively a particular subpopulation of 5-HT receptors. Molecular cloning studies have demonstrated that at least 14 specific 5-HT receptors exist in humans. The triptans (e.g., naratriptan, rizatriptan, sumatriptan and Zolmitriptan) are potent agonists of 5-HT_{1B}, 5-HT_{1D}, and 5-HT_{1F} receptors and are less potent at 5-HT_{1A} and 5-HT_{1E} receptors. A growing body of data indicates that the antimigraine efficacy of the triptans related to their ability to stimulate 5-HT_{1B} receptors, which are located both on blood vessels and nerve terminals. Selective 5-HT_{1D} receptor agonists have, thus far, failed to demonstrate clinical efficacy in migraine.

Triptans that are weak 5-HT_{1F} agonists are also effective in migraine; however, only 5-HT_{1B} efficacy is currently thought to be essential for anti-migraine efficacy.

Physiologically, electrical stimulation near dorsal raphe neurons can result in migraine like headaches. Blood flow in the pons and midbrain increases focally during migraine headache episodes; this alteration probably results from increased activity of cells in the dorsal raphe and locus coeruleus. There are projections from the dorsal raphe that terminate on cerebral arteries and alter cerebral blood flow. There are also major projections from the dorsal raphe to important visual centers, including the lateral geniculate body, superior colliculus, retina, and visual cortex. These various serotonergic projections may represent the neural substrate for the circulatory and visual characteristics of migraine. The dorsal raphe cells stop firing during deep sleep, and sleep is known to ameliorate migraine; the anti-migraine prophylactic drugs also inhibit activity of the dorsal raphe cells through a direct or indirect agonist effect.

Recent PET scan studies have demonstrated that midbrain structures near the dorsal raphe are differentially activated during a migraine attack. In one study of acute migraine, an injection of sumatriptan relieved the headache, but did not alter the brainstem changes noted on the PET scan. These data suggests that a 'brain stem generator' may be cause of migraine and that certain antimigraine medications may not interfere with the underlying pathologic process in migraine.

Dopamine in Migraine

A growing body of biologic, pharmacologic and genetic data supports a role for dopamine in pathophysiology of certain subtypes of migraine. Most migraine symptoms can be induced by dopaminergic stimulation. Moreover, there is dopaminergic hypersensitivity in migraineurs, as demonstrated by the induction of yawning, nausea, vomiting, hypotension and other symptoms of a migraine attack by dopaminergic agonists at doses that do not affect nonmigraineurs. Conversely, dopamine receptor antagonists are effective therapeutic agents in migraine, especially when given

parenterally or concurrently with other anti-migraine agents. As noted above, recent genetic data also suggest that molecular variations within dopamine receptor genes play a modifying role in the pathophysiology of migraine with aura. Therefore, modulation of dopaminergic neurotransmission should be considered in the therapeutic management of migraine.

The Sympathetic Nervous System in Migraine

Biochemical changes occur within the sympathetic nervous system (SNS) of migraineurs before, during, and between migraine attacks. Factors that activate the SNS are all trigger factors for migraine. Specific examples include environmental changes (e.g., stress, sleep patterns, hormonal shifts, and hypoglycemia) and agents that cause release and a secondary depletion of peripheral catecholamines (e.g., tyramine, phenylethylamine, fenfluramine, m-chlorophenylpiperazine (mCPP) and reserpine). By contrast, effective therapeutic approaches to migraine share an ability to mimic and/or enhance

the effects of norepinephrine in the peripheral SNS. For example, norepinephrine itself, sympathomimetics (e.g. isomethaptene), monoamine oxidase inhibitors (MAOIs) and reuptake blockers alleviate migraine. Dopamine antagonists, prostaglandin synthesis inhibitors, and adenosine antagonists are pharmacologic agents effective in the acute treatment of migraine. These drugs block the negative feedback inhibition or norepinephrine release induced by endogenous dopamine, prostaglandins, and adenosine. Therefore, migraine susceptibility may relate to genetically based variations in the ability to maintain adequate concentrations of certain neurotransmitters within postganglionic sympathetic nerve terminals. This hypothesis has been called the 'Empty neuron theory' of migraine.

CLINICAL FEATURES OF ARDHAVABHEDAKA

Based on different Ayurvedic classics the clinical features of *Ardhavabhedaka* are as in the table below

Sl.No.	LAKSHNAS	CS	SS	AS	AH	MN
1.	Severe pain in the cervical region	+	+	+	-	-
2.	Severe pain in supra orbital region	+	+	-	-	+
3.	Severe pain in the temporal region	+	+	-	-	+
4.	Ear ache	+	+	-	-	+
5.	Paining of the eyes	+	+	-	-	+
6.	Severe pain in the half of the frontal region	+	+	-	-	+
7.	Pain in the temporal region	+	-	-	-	+
8.	Manthana vat pida	-	-	-	-	+
9.	Burning pain	+	-	-	-	+
10.	Netrandriya nasha	+	-	+	+	+
11.	Karendriya nasha	+	-	+	+	+
12.	Penetrating pain the half region of the cranium	-	+	-	-	-
13.	Bhrama	-	+	-	-	-
14.	Pakshatah akarmanyam	-	+	-	+	-
15.	Swayam pida shamanam	-	-	-	+	-

Clinical features

Migraine without aura (common migraine): In this syndrome no focal neurologic disturbance precedes the recurrent headaches. Migraine without aura is by far the more frequent type of vascular headache. The International Headache Society criteria for migraine include moderate to severe head

pain, pulsating quality, unilateral location, aggravation by walking stairs or similar routine activity, attendant nausea and/or vomiting, photophobia & phonophobia, and multiple attacks, each lasting 4 to 72 hours.

Migraine with aura (classic migraine): In this syndrome headache is associated with characteristic

premonitory sensory, motor or visual symptoms. Focal neurologic disturbances are more common during headache attacks than as prodromal symptoms. Focal neurologic disturbances without headache or vomiting have come to be known as migraine equivalents or migraine accompaniments and appear to occur more commonly in patients between the ages of 40 and 70 years. The term 'complicated migraine' has generally been used to describe migraine with dramatic transient focal neurologic features or a migraine attack that leaves a persisting residual neurological deficit.

The most common premonitory symptoms reported by migraineurs are visual, arising from dysfunction of occipital lobe neurons. Scotomas and/or hallucinations occur in about one-third of migraineurs and usually appear in the central portions of the visual fields. A highly characteristic syndrome occurs in about 10% of patients; it usually begins as a small paracentral scotoma, which slowly expands in to a "C" shape. Luminous angles appear at the enlarging outer edge, becoming colored as the scintillating scotoma expands and moves towards the periphery of the involved half of the visual field, eventually disappearing over the horizon of peripheral vision. The entire process lasts 20 to 25 min. This phenomenon is pathognomonic for migraine, and has never been described in association with a cerebral structural anomaly. It is commonly referred to as a 'fortification spectrum' because the serrated edges of the hallucinated "C" seemed to resemble a 'fortified town with bastions all round it'. 'Spectrum' is used in the sense of an apparition or specter.

Basilar migraine: Symptoms referable to a disturbance in brain stem function, such as vertigo, dysarthria, or diplopia, occur as the only neurologic symptoms of the attack in about 25% of the patients. A dramatic form of basilar migraine (Bickerstaff's migraine) occurs primarily in adolescent females. Episodes begin with total blindness accompanied or followed by admixtures of vertigo, ataxia, dysarthria, tinnitus, and distal and perioral paresthesia. In about one quarter of patients, a confusion state supervenes. The neurologic symptoms usually persist for 20 to 30 min. and are generally followed by a throbbing occipital headache. This basilar migraine syndrome is now known also to occur in children and in adults

over age 50. An altered sensorium may persist for as long as 5 days and may take the form of state of confusion superficially resembling psychotic reactions. Full recovery after the episode is the rule.

Carotidynia: The Carotidynia syndrome, sometimes called lower half headache or facial migraine, is most common among older patients, with the incidence peaking in the fourth through sixth decades. Pain is usually located at the jaw or neck, although sometimes periorbital or maxillary pain occurs; it may be continuous, deep, dull, and aching, and it becomes pounding or throbbing episodically. There are often superimposed sharp, ice pick-like jabs. Attacks occur one to several times per week, each lasting several minutes to hours. Tenderness and prominent pulsations of the cervical carotid artery and soft tissue swelling overlying the carotid are usually present ipsilateral to the pain; many patients also report throbbing ipsilateral headache concurrent with Carotidynia attacks as well as between attacks. Dental trauma is a common precipitant of this syndrome. Carotid artery involvement also appears to be common in the more traditional forms of migraine; over 50% of patients with frequent migraine attacks are found to have carotid tenderness at several points on the side most often involved during hemicranial migraine attacks.

Symptoms Accompanying Severe Migraine Attacks (in a group of 500 Patients)

SOURCE: From Raskin, 1988.

Symptom	Patients Affected (in %)
Nausea	87
Photophobia	82
Light headedness	72
Scalp tenderness	65
Vomiting	56
Visual disturbances	
Photopsia	26
Fortification spectra	10
Paresthesias	33
Vertigo	33
Alteration of consciousness	
Syncope	10
Seizure	04
Confusional state	04
Diarrhoea	16

AYURVEDIC MANAGEMENT OF ARDHAVABHEDAKA

According to Acharya Vagbhata, the line of treatment of *Ardhavabhedaka* must be done same as the treatment of *vataja shirashula* and also the treatment of *suryavarta* is preferred in this.

Acharya Charaka and some others have mentioned the following remedies for *Ardhavabhedaka*.

Chikitsa krama – Line of treatment

Charaka	Susruta	Vagbhata	Yogaratanakara
<i>Snehapana</i>	<i>Nasya</i>	<i>Nasya</i>	<i>Snehapana</i>
<i>Kaayavirechana</i>	<i>Jangal mamsa</i>	<i>Lepa</i>	<i>Swedana</i>
<i>Naadisweda</i>	<i>Kshir vikara</i>	<i>Snehana</i>	<i>Virechana</i>
<i>Puranaghrita</i>	<i>Ghritapaan</i>	<i>Swedana</i>	<i>Nasya</i>
<i>Vasti (Niruha)</i>			<i>Astapana</i>
<i>Upanaha</i>			<i>Anuvasana</i>
<i>Shirovasti</i>			<i>Dhumapana</i>
<i>Agnidaha</i>			Oily and hot food
			<i>Lepa</i>

Snehana: *Snehanam* is the very best treatment mentioned in *Ardhavabhedaka*. The symptoms are disappeared by consuming *Ghrita* every day, because the *rookshata* (dryness) in the intracranial region decreases due to *snehapana*. For *snehana*, *Gunja taila*, *Devadarvyadi ghrita*, *Rudra taila*, etc. are used.

Swedana: *Swedana* is done after *snehana*. *Naadi sweda* or *Upanaha sweda* is used. Doshas are then expelled by *virechana* or by *shirovirechana*.

Nasyakarma: *Bhrumhana nasya* is mainly used in *Ardhavabhedaka*. Some combinations are as follows:

- *Bid lavan* + *shirisha* seed + *apamarga* roots
- *Nirgundi swarasa* + *ghrita* + *saindhav*
- Roots of *shirish* + seed of *shirish* + *kalka* as *avapidana nasya*
- *Vamshamul* + *karpoor* + water are together prepared into *kalka* as *avapidana nasya*
- *Vacha* + *pippalichurna* as *pradhaman nasya*
- *Arkapatraswarasa nasya*

- *Madhukadi avapida nasya* (*Yastimadhuka* and *Madhuka* used together)
- *Madhuradi nasya* (*Kalka* and decoction of the *dravyas* of *kakolyadi gana* are cooked in *ghrita* as *avapida nasya*)
- *Vidangadi nasya* (*Vidanga*, *Krishna taila* and *ajadugda* are pounded together)
- *Katphaladi nasya* (*Katphal*, *elachurna*, *shaileya* and *shunti churna* together)
- *Ksheerini* seeds are pounded in water and this mixture is inhaled by the opposite nostril of the side with pain, before sunrise
- *Manashiladi avapida nasya* (*Manashila* and *chandan* are pounded, added to water)

Basti: After purification of head by *nasya*, *asthapana* and *anuvasana bastis* are used. After the purification of whole body for the appeasement of *vatakaphadi doshas* of nasal and oral cavity *dhumapaan* is done.

Lepa: Different combinations are used as follows:

- *Chakramarda* with *kanji* as *kalka* used on head as *lepa*
- *Sariva*, *kamala*, *kusta*, *vacha*, *yastimadhu*, *pippali*, oil and *kanji* are pounded
- *Sariva*, *kamal*, *kusta*, *yastimadhu* are pounded in *kanji* and *ghrita* or *taila* added to it
- *Vidanga* with *krishna tila* as *kalka* in *ajadugda* and applied warm
- *Ajadugdha* treatment – A strip of *ajadugda* is placed on the head relieves head ache
- *Krishnatiladi lepa* – *Krishna tila*, *jatamamsi* and *saindhava* made *kalka* and added with honey
- *Panchamulaka taila* is used as *lepa*
- *Thymol*, *camphor*, *peppermint*, *clove oil*, *dalchini taila* are equally mixed and inhaled and is used as *lepa* on the head
- *Chandanadi lepa* – *Sweta chandan* 1.5 gms, *Kushmanda* seeds 5 gms, *Raktachandan* 1 gm, *Babul niryas* 50 gm, *Ajamoda* 5 gm, *Rasanjan* 3 gm, *Ahiphena* 3 gm and *Keshar* 3 gm. All drugs are mixed together and *bhavana*

in *kakamachi swaras* or *dhanyakadi hima* are given and strip is prepared. This strip is levigated as necessary and is placed on head in form of *lepa*

Rasoushadi Chikitsa:

- *Godanti bhasma* 250 mg taken along with sugar and *ghrita* early in the morning
- *Tribhuvanakirti* 125 mg, *Sutashekar* 125 mg and *Vatavidwamsa rasa* 125 mg taken twice or thrice a day along with *goghrita* and sugar
- *Sarpagandha churna* 250 mg and *Vasantamalati rasa* 125 mg taken twice a day with *ghrita* as *anupana*
- *Chintamani rasa* 250 mg, *Kamadudha ras* 250 mg twice or thrice a day with *badam pak*
- *Ustakhuddus* (Unani drug) 10 gm taken twice a day with *shankapushpi* as *anupan*
- *Saptamrita louha* 250 mg, *Laghu suta shekara*, 125 mg and *Godanti bhasma* 125 mg taken twice or thrice a day with *Bhakllataka avaleha*
- For consumption and *anupana* in *Ardhavabheda – Chinnadi kwatha* (*Brihat bhaishajya ratnavali*), *Devadarvyadi kwata*, *Dhatryadikwatha*, *Bhallatakaksheera* and *Pathyadi shadanga kwatha* are used

Summary on Ardhavabhedaka Chikitsa

Shodana upakram - Snehana, virechana, vasti, nasya, upanaha, dhumapan and *lepa*

Single drug used for *shamana - Sirisha, vacha, pippali, nirgundi, arka, gairika, milk, chandan, manshila, vidanga, sariva, godanti, yastimadhu, sarpagandha, bhallataka, and devadaru.*

Compounds for *shamana - Rudra taila, devadarvyadi kwata, dipika taila, vasantamalati rasa, shadbindu taila, saribadi lepa, dhatryadi kwata, laghusutashekara, sutashekara, saptamrita louha, kamadudha rasa, vatavidwamsa rasa, chintamani rasa, avipattikara churna, vatavidwamsa rasa, badam milk, chinnadi kwatha, nirgundi taila, tribhuvan kriti rasa, gunja taila* and *godanti bhasma*

Pathya -Hot, oily, sweet meals, coconut water,

ghritapakwa kundalika, milk, sugar, jangal mamsa, ghritapan, dugdapana and *Shavasana* to be done in the morning

Apathya - Langanam and *aatapa sevanam*

REFERENCES

- 1) *Astanga Hridaya Uttara Tantra (Hemadri)*
- 2) *Astanga Sangraha Sutra, Nidana, Uttara Sthana*
- 3) *Ayurveda seminar (Text book on) XXVII, 1991. Published by AryaVaidyasala.*
- 4) *Bhavaprakash Madhyama khanda*
- 5) *BRESLAU N: Psychiatric co morbidity in migraine. Cephalgia 18(Suppl 22); 56, 1998*
- 6) *Charaka Sutra, Nidana, Siddhi, Chikitsa Sthana*
- 7) *GERVIL et al: The relative role of genetic and environmental factors in migraine without aura. Neurology 53:995, 1999*
- 8) *GOADSBY PJ: Serotonin 5-HT 1B/1D receptor agonists in migraine. CNS Drugs 10:271, 1998*
- 9) *Harita samhita*
- 10) *LANCE JW, GOADSBY PJ: Mechanism and Management of Headache, 6th ed. London, Butterworth Scientific; 1998*
- 11) *MASKOWITZ MA, COUTRER FM: Attacking migraine headache from beginning to end. Neurology 49:1193, 1997*
- 12) *OLESEN C et al: Pregnancy outcome following prescription for sumatriptan, Headache 40:20, 2000*
- 13) *OLESEN J: Headache classification committee of the International Headache Society. Classification and diagnostic criteria for headache disorders, cranial neuralgia, and facial pain. Cephalgia 8(Suppl 7): 1, 1988*
- 14) *OPHOFF RA et al: Familial hemiplegic migraine and episodic ataxia type-2 are caused by mutations in the Ca²⁺ channel gene CACNL1A4, Cell 87:543, 1996*
- 15) *PEROUTKA SJ: Dopamine and migraine, Neurology 49:650. 1997*
- 16) *RASKIN NH: Headache, 2d ed. New York, Churchill Livingstone, 1988*
- 17) *Shabda Kalpadruma*
- 18) *Shabdastoma Mahanidhi*
- 19) *Shalyaka Tantra by Shri Ramanath Dwivedi*
- 20) *Sharangadhara Uttara Khanda*
- 21) *Sushruta Samhita Sutra, Chikitsa, Uttara Tantara (Dalhanacharya)*
- 22) *Yogaraynakar-Shirorogadhikara.*

SHWETHA KUTAJA – WRIGHTIA TINCTORIA (Roxb.) R. BR FOR PSORIASIS AND SKIN DISORDERS

*Baby Joseph, **Sophy Paul

Malayalam Name	:	Danthapala, Vitpala, Neelampala
Sanskrit Name	:	Shvethakutaja
English Name	:	Ivory wood
Trade Name	:	Indrajaou
Hindi Name	:	Mitandrajau
Family	:	Apocyanaceae

Wrightia tinctoria belongs to family apocynaceae commonly called as 'Jaundice curative tree' in South India. The juice of the tender leaves is used efficaciously in jaundice and skin disorders. Crushed fresh leaves when filled in the cavity of decayed tooth relieve toothache. In Siddha system of medicine it is used for psoriasis and other skin diseases. From a distance, the white flowers may appear like snowflakes on a tree. The leaves of this tree yield a blue dye called Pala indigo. Wrightia tinctoria is called *Dhudi* in Hindi because of its preservative nature. Supposedly, a few drops of its sap in milk prevent curdling and enhance its shelf life, without the need to refrigerate.

Distribution & Habitat:

Wrightia tinctoria is a small beautiful deciduous tree which grows up to 10 meters and seen throughout India.

Habit and General features:

It is grown well in deciduous forest. Leaves are opposite up to 8-15 cm long and lanceolate. Bark is smooth and ivory coloured. Flowers are usually seen in the tip of branches, scattered in the inflorescence and whitish with fragrance. Fruits are pendulous, long paired dark follicles joined at their tips long upto 50 cm. Seeds are 1-2 cm long with white hairs. All parts are having white latex.

Part used: Leaves, Seeds and Bark

Chemical constituents: Wrightial, cycloartenone, cycloeucaenol, indigotin, indirubin, tryptanthrin, isatin rutin, β - sitosterol, β - amyryn, wrightiadione, wrightin, lupeol, triacontanol and tryptanthrin.

Actions and Uses: Shvetakutaja pacify vitiated *tridoshas*, fever, stomach ache, diarrhea and skin diseases especially psoriasis.

The leaves are acrid, thermogenic, anodyne, hypotensive, useful in odontalgia, vitiated conditions of vata and hypertension. The bark and seeds are bitter astringent, acrid, thermogenic, carminative, digestive, stomachic, constipating, depurative, anthelmintic, aphrodisiac and febrifuge. They are useful in vitiated conditions of pitha and kapha, dyspepsia, flatulence, colic, diarrhoea, leprosy, psoriasis, haemorrhoids, dipsia, helminthiasis, fever, burning sensation and dropsy. The leaves are used in various skin disorders including herpes. It has astringent and anti-inflammatory activities and is used as an antibacterial in several skin disorders. It has antidandruff activity and is used in the treatment of various scalp and skin disorders. Tribes used latex for coagulating and solidifying milk. In Nepal, the milky juice is used to stop bleeding.

The therapeutic properties of extract of the Wrightia tinctoria include rapid restoration of normal skin. It

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brings down active inflammation. It is also having antifungal and antiulcer properties.

Different extracts of leaf parts of *Wrightia tinctoria* and fruit powder of *Morinda citrifolia* have been studied against replication of HIV –I (Selvan et.al, 2009). The ethanol extract of bark is used in wound healing in rats (Veerapur et.al, 2004). The leaf extracts showed the antibacterial activity against skin micro organisms (Kannan & Shanmugavadivu, 2006). The plant is used in Ayurveda, Unani and Siddha medicines as astringent, febrifuge and tonic. The seeds are said to possess antipyretic, analgesic and anti-inflammatory activity.

In folk medicine, the dried and powdered roots of *Wrightia tinctoria* along with *Phyllanthus niruri* and *Vitex negundo* is mixed with milk and orally administered to women for improving fertility. The bark and seeds are effective against psoriasis and non-specific dermatitis.

Phyllosticta tabernaemontana, a leafspot fungus isolated from the diseased leaves of *Wrightia tinctoria*, showed the production of taxol, an anticancer drug. The presence of taxol was confirmed by spectroscopic and chromatographic methods of analysis.

Latest studies reveals *Wrightia tinctoria* having effective action against psoriasis, skin disorders and dandruff. Leaves mixed with any vegetable oil and keep in 4-5 days on sunlight (surya paka) when oil turned purple colour remove the leaves and this oil is much useful in skin diseases. Its medicinal property formed by UV radiation from sunlight.

Ayurvedic Properties:

<i>Rasa</i>	-	<i>Thiktha, Kashaya</i>
<i>Guna</i>	-	<i>Ruksha</i>
<i>Veerya</i>	-	<i>Sheetha</i>
<i>Vipaka</i>	-	<i>Katu</i>

Cultivation and Collection:

Hilly areas and valleys are best suited for cultivation of *Wrightia tinctoria* as it requires good sunlight and drainage. Thin seeds are used as the planting material. The selected seeda are soaked in water for 12 ant

planted on bed with proper irrigation. Within 7 days the raised seedlings are transplanted to polybags and are then planted on pits with the onset of Monsoon. Organic manure is used every year to ensure better growth. After the 4th year, leaves can be collected frequently. The saplings start to flower and fruit when they are 5-8 years old. Leaf shedding is in winter and new leaves appear in spring. In India, the flowering occurs from February to April, while peak fruiting is in June. Seeds are wind dispersed.

PHARMACOGNOSY

Materials & Methods

Plant materials were collected from different parts of Kerala and Nagarjuna Herbal Garden. For Macroscopic characters Stereomicroscope is used and for Microscopic studies, the Compound microscope. For physical constants rotary shaker, muffle furnace, UV – cabinet and moisture balance were used. The physico-chemical characters such as moisture content, total ash, acid insoluble ash and extractive values in alcohol and water of the dried leaf powder were calculated in terms of air-dried sample. Ash values are indicating the purity of drug, extractive values are representing the presence of polar or non-polar compounds and loss on drying value indicates that drug is safe regarding any growth of bacteria, fungi and yeast.

RESULTS AND DISCUSSIONS

Macroscopic features:

Leaves are large up to 10 cm long by 5 cm wide, simple, opposite, decussate and glabrous. Young leaves are bluish with reddish nerves.

Microscopic features:

In transverse section petiole appears more or less cylindrical. Adaxial surface is flat and slightly shallow in the middle having hairy and even surface. The epidermis is made up of small thick cuticle on the outer walls. The ground tissue is differentiated into outer 5 or 7 layers of collenchyma and inner parenchyma. Calcium oxalate crystals are seen which are solitary in the cells of parenchymatous ground tissue. Vascular strands of the petiole occur as a large median arc with two adaxial lateral traces. An arc shaped central vascular strand, where xylem is

surrounded by upper and lower side of phloem. The midrib is broadly hemispherical on the abaxial side with short lump on the adaxial side. The epidermis is followed by 5 to 7 layers of compact angular collenchyma cells on the both sides of midrib. The ground tissue is parenchymatous and compact. The epidermal cells of the lamina are square shaped with outer convex wall and thin cuticle. Palisade tissue is single layered, cylindrical and compact. The spongy parenchyma cells are lobed and loosely arranged. Stomata occur on both epidermis. Trichomes are 3-7 celled, thick walled and uniseriate.

PHYSICAL CONSTANT VALUES

No	Parameters	Values
1	Foreign matter	Max 2 %
2	Total Ash	Max 14 %
3	Acid Insoluble Ash	Max 1%
4	Alcohol Soluble Extractive	Min 10%
5	Water Soluble Extractive	Min 25%
6	Moisture	Max 25%

Thin Layer Chromatography

Powder - 5 gm
 Extract - Ethyl alcohol
 Solvent system - Toluene: Chloroform: Ethanol
 - 14.5:28.5:7.5

Rf values	Colour in UV rays
0.18	Brown
0.28	Red
0.29	Red
0.53	Blue
0.60	Blue
0.62	Violet
0.69	Yellow

References:

1. Dr. K. M Nadkarni - Indian Materia Medica - Vol I, Page 1296-1297
2. P. K Warriar, V. P. K Nambiar, C. Ramankutty - Indian Medicinal Plants - Vol V, Page 211-212
3. Orwa C., Mutua A., Kindt R., Jamnadass R., Simons A., 2009 - Agroforestry Database: A tree reference and selection guide
4. S. G Joshi - Medicinal Plants, Oxford and IBH publishing Co. Pvt Ltd, New Delhi 2000, 51-52
5. Harborne J. B, Phytochemical methods, Chapman Hall, London, 1984, 100-101
6. Anonymous - The Wealth of India: A Dictionary of Indian Raw Materials and Industrial products, Vol. IX, Publications and Information directorate, CSIR, New Delhi, 2003, 588.
7. Kishan A. R, Ajitha and Royanarayana K. - Indian Drugs, 2000, 37, 130.
8. Kirtikar K. R and Basu B. D. - Indian Medicinal Plants, 2nd edition, Vol. IV, India International Book distributors, Dehradun, 1999, 2159
9. Prajapathi D., S. Purohit, S. S. Sharma, A. K Kumar T. - Handbook of Medicinal Plants, Complete source book, Agrobios, Jodhpur, 2001, 548

WE CONGRATULATE THE PROUD ACHIEVERS



Dr. Susheela Saji - the Senior Consultant Physician of Nagarjuna Herbal Concentrates Ltd., was selected as 'the Best Ayurvedic Physician of Kerala' and has been awarded with the prestigious 'Dr. K. V. Seethalakshmi Memorial Bhishakrathna Award'

instituted by the Ayurvedic Medical Association of India. Dr. Susheela is reputed for her successful treatment of Cancer, and is also the Project Research Officer of 'Ayurgram' project, targeting control of 'Sickle Cell Anaemia', among the tribals of Wayanadu in North Kerala



Dr. V. Madhavachandran, the Manager (R&D) and Head of the Animal Study Unit of Nagarjuna Herbal Concentrates Ltd., has been elected as the Joint Secretary of the National Executive Committee of I.A.B.M.S. - the Indian Association of Bio Medical

Scientists, thus becoming the First Ayurvedic Physician to get to this coveted position. Dr. Madhavachandran is one of the rarest Experimental Pharmacologist in the Ayurveda industry and has scores of study reports published in many renowned scientific journals to his credit.

TOTAL PHENOLIC CONTENT AND SCREENING OF ANTIOXIDANT ACTIVITY OF SELECTED AYURVEDIC MEDICINAL PLANTS

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Running title: *In vitro* antioxidant activity of medicinal plants

ABSTRACT

Medicinal plants constitute the main source of new pharmaceuticals and healthcare products, including medications for ethno veterinary medicine. Recently, interest in plant-derived active constituents has grown mainly due to several draw backs in synthetic antioxidants. In the present study, methanolic extract of medicinal plants were assessed for their total polyphenolic content, and antioxidant (1,1-diphenyl-2-picrylhydrazyl radical-scavenging and total radical scavenging capacity of the stable 2,2'-azinobis-(3-ethyl-benzothiazoline-6-sulfonic acid) activities. The content of total polyphenols in the extracts was determined spectrophotometrically according to the Folin-Ciocalteu procedure and calculated as Gallic Acid Equivalents (GAE). Among the 25 medicinal plants we studied, *Terminalia bellirica*, *Emblica officinalis*, *Ficus racemosa*, *Ficus glomerata*, *Saraca asoca*, *Nymphaea stellata* and *Ficus religiosa* have remarkably high antioxidant activity and high total polyphenolic content. The other medicinal plants have moderate antioxidant and total polyphenolic content but *Bambusa arundinacea*, *Evolvulus alsinoides*, *Thevetia nerifolia* and *Boswellia serrata* contain very low antioxidant and total polyphenolic content.

KEY WORDS: Total polyphenols; Antioxidant; DPPH; ABTS; Medicinal plants

INTRODUCTION

Ayurveda arguably is the oldest medical system in the world, providing innumerable leads to find active and therapeutically useful compounds from plants. The health promoting, disease preventing and rejuvenating approach available in the Indian systems of medicine like 'Ayurveda' is gaining greater attention and popularity in many regions of the world. Medicinal plants constitute the main source of new pharmaceuticals and healthcare products, including medications for ethno veterinary medicine.

Polyphenols and flavonoids of herbs and their components which are the products from secondary metabolism of a plant, have many applications in folk medicine, food flavoring and preservation as well as in the perfumery and pharmaceutical industries. Potential sources of antioxidant compound have been searched in several types of plant materials such as vegetables, fruits, leaves, oil seeds, cereal crops, barks and roots, spices and herbs, and crude plant drugs. Flavonoids and other plant phenols, such as phenolic acid, stilbenes, tannins, lignans, and lignin, are especially common in leaves; flowering tissues and woody parts such as stem and bark. The antioxidant activity of phenols is mainly due to their redox properties, which allow them to act as reducing agents, hydrogen donors, and singlet oxygen quenchers. Antioxidants inhibiting the oxidation of organic molecules are very important, not only for food preservation, but also for the defence of living systems against oxidative stress.

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Many studies have shown that natural antioxidants in plants are closely related to their bio functionalities such as anti-carcinogenic, anti-mutagenic, anti-inflammatory, neuro protective, cardioprotective, hepatoprotective, etc., and inhibition of pathogenic bacterial growth are often associated with the termination of free radical propagation in biological systems. Thus, antioxidant capacity is widely used as a parameter to characterize medicinal plants and their bioactive components. In this view, the present study was carried out to screen the total phenolic content and antioxidant activity of the methanolic extract obtained from various parts of the 25 medicinal plants listed in Table 1, which are commonly used in Ayurvedic system.

MATERIALS AND METHODS

Chemicals

L-ascorbic acid, 2,2- diphenyl- picrylhydrazyl (DPPH), Folin-Ciocalteu reagent and 2,2'-azinobis-(3-ethyl-benzothiazoline-6-sulfonic acid) diammonium salt (ABTS) were purchased from Sigma Chemical Co. (St. Louis, Mo, USA). Sodium carbonate, Potassium persulfate (di-potassium peroxodisulfate) and the other chemicals and reagents were purchased from Merck (Darmstadt, Germany). All solvents used were of analytical grade.

Plant materials and preparation of extract

All the plant materials were collected from Thodupuzha, Kerala, India in the month of May and June. The specimens were identified and voucher specimens of plants were deposited in the Herbarium in the Department of Pharmacognosy, Nagarjuna Herbal Concentrates Ltd, Kerala, India. The different plant materials (Table 1) were cut into small pieces, dried at 40-50°C shade for one week and powdered. Extraction was performed by 10g of each plant powder was soaked with methanol for 24 hours at room temperature. After filtration the residue was extracted twice in the same conditions. The methanol was completely evaporated at 40°C using a rotary vacuum evaporator. The yield of extract was given in the Table 1.

Determination of Total Polyphenols

The amount of total phenolic contents in extracts was determined by using Folin-Ciocalteu procedure. In this method, the samples (100 µg/ml) were introduced into test tubes; 1ml of Folin-Ciocalteu's reagent and 0.8 ml of sodium carbonate (7.5%) were added. The tubes were mixed and allowed to stand for 30 min. Absorbance at 765 nm was measured using Chemito 2600 UV/visible Spectrophotometer (Nasik, India). The total phenolic content was expressed as gallic acid equivalents (GAE) in milligrams per gram of dry weight (DW). The values were obtained from three different experiments performed in duplication.

Determination of Radical Scavenging Activity by Using DPPH assay

The hydrogen atom or electron donation abilities of the corresponding extracts were measured from the bleaching of the purple-coloured methanol solution of 1,1-Diphenyl-2-picrylhydrazyl (DPPH). 1 ml of various concentrations of the extracts in methanol was added to 4 ml of 0.004% methanol solution of DPPH. After a 30 min incubation in dark at room temperature, the absorbance was read against a blank at 517 nm using Chemito 2600 UV/visible Spectrophotometer (Nasik, India). Inhibition of free radical by DPPH in percent (I%) was calculated in following way:

$$I (\%) = [(A_{\text{blank}} - A_{\text{sample}}) / A_{\text{blank}}] \times 100$$

Where A_{blank} is the absorbance of the control reaction (containing all reagents except the test compound), and A_{sample} is the absorbance of the test compound. The extract concentration providing 50% inhibition (IC₅₀) was calculated from the plot of inhibition (%) against extract concentration. Test was performed in three different experiments with duplication. Ascorbic acid standard was used for comparison.

Determination of Total Antioxidant Potential (ABTS assay)

The total radical scavenging capacity based on the ability of a compound to scavenge the stable 2,2'-azinobis-(3-ethyl-benzothiazoline-6-sulfonic acid)

(ABTS) radical in 6 min. For the total antioxidant assay, ABTS was dissolved in de-ionised water to a 7 mM concentration. The ABTS radical cation (ABTS⁺) was produced by reacting ABTS stock solution with a 2.45 mM potassium persulfate (final concentration) and incubating the solution in the dark at room temperature for 12–16 h before use. The radical stock solution was diluted with a 5 mM solution of phosphate-buffered saline (PBS; pH 7.4) to obtain a spectrophotometric absorbance value of 0.700 at 734 nm.

Ascorbic acid standard was prepared in deionised water over the range 11–88 µg/ml. Extracts were prepared in different concentrations (50–200 µg/ml) in methanol. To 40 µl of extract/standard solution, 1.96 ml of ABTS⁺ solution was added and the tubes were kept in dark for 6 min and read at 734 nm using Chemito 2600 UV/visible Spectrophotometer (Nasik, India). This was compared to a control where 40 µl of the solvent was added to 1.96 ml of ABTS⁺ solution. The assay was performed in three different experiments with duplication. Antioxidant activity was expressed as the % of ABTS radical reduction. Radical scavenging activity was expressed as the inhibition percentage and was calculated as % radical scavenging activity = [(control OD - sample OD)/control OD] × 100. Extract concentration providing 50% inhibition (IC₅₀) was calculated from the plot of inhibition (%) against extract concentration.

RESULTS

Total polyphenolic contents

The amount of total polyphenolics varied widely in medicinal plant materials and ranged from 4.2 to 322.8 mg GAE per gram of dry weight (Table 2). A very high amount of total polyphenolic contents (322 mg GAE/g extract) was found in *Terminalia bellirica* fruit. The leaf extract of *Emblica officinalis* and *Ficus racemosa* stem bark had equal amount of polyphenolic contents (188 mg GAE/g extract). The stem bark of *Ficus glomerata* and *Ficus religiosa* as well as the flower extract of *Saraca asoca* and *Nymphaea stellata* also contained polyphenolic contents more than 100 mg GAE/g

extract. Moderate levels were found in *Curculigo orchioides* rhizome and *Leucas aspera* whole plant. The other medicinal plants had the polyphenolic contents below 50 mg GAE/g extract. The *Boswellia serrata* resin found with the least amount of polyphenolic contents (4.2 mg GAE/g extract).

Antioxidant activity

The radical scavenging and antioxidant capacity of methanolic extract of medicinal plants are shown in Table 2. The data obtained by the DPPH assay were substantially conformed by the ABTS method. All the medicinal plants extract contain significant level of antioxidant activity. IC₅₀ values ranges from 89.2 to 1126.1 µg/ml in DPPH method and 76.2 to 475.3 µg/ml in ABTS method, respectively. Ascorbic acid was tested as reference. The free radical scavenging activity of plant extract against DPPH assay is in the following order: *Terminalia bellirica* (fruit), *Emblica officinalis* (leaf), *Nymphaea stellata* (flower), *Curculigo orchioides* (rhizome), *Saraca asoca* (flower), *Biophytum sensitivum* (whole plant), *Ficus glomerata* (stem bark). These extracts contain the IC₅₀ values are below 100 µg/ml and the extracts of *Leucas aspera*, *Butea monosperma*, *Vernonia cinerea*, *Eclipta alba*, *Ipomoea sepiaria*, *Tabernaemontana divaricate*, *Ficus religiosa*, *Ficus racemosa*, *Nelumbium speciosum* and *Ficus religiosa* contain the IC₅₀ values between the range of 100–150 µg/ml. The IC₅₀ values of other plant extracts is more than 150 µg/ml. The extract of *Boswellia serrata* having very low free radical scavenging activity as indicated by 1126.1 µg/ml of IC₅₀ value in DPPH assay.

The free radical scavenging activity of medicinal plants extract against ABTS radical is in the following order: *Terminalia bellirica*, *Nymphaea stellate*, *Saraca asoca*, *Ficus racemosa*, *Emblica officinalis*, *Ficus glomerata*, *Curculigo orchioides*, *Leucas aspera*, *Ficus religiosa* (stem bark), *Biophytum sensitivum*, *Butea monosperma*, *Eclipta alba*, *Vernonia cinerea* and *Tabernaemontana divaricata* these extracts contain the IC₅₀ value below 100 µg/ml but the other medicinal plant extracts having the IC₅₀ values more than 100 µg/ml.

DISCUSSION

Phytochemicals and antioxidant constituents in plant material have raised interest among scientists, food manufacturers and consumers for their roles in the maintenance of human health. The plant phenolics constitute one of the major groups of compounds, acting as primary antioxidants or free radical terminators; therefore it is reasonable to determine their total amount in the selected plant extracts. The phenolic compounds containing at least one aromatic ring with hydroxyl groups encompass, among others, the tannins, coumarins, flavonoids (including isoflavonoids, anthocyanins, catechins, chalcones, flavones and flavonols) and lignins. Our study showed that the extracts of plants containing a considerable amount of phenolic compounds and widely vary in their range, which could be responsible for the variation in their therapeutic activities.

Numerous reports reveal that the extracts from plants, which contribute health benefits to consumers, arising from protection of free radical-mediated deteriorations, and cause retardation of lipid oxidation, which had a stronger antioxidant activity than that of synthetic antioxidants. Previous studies found that there was a direct relationship between antioxidant activity and total phenolic content in herbs, vegetables and fruits. The antioxidant activity of phenolics is mainly due to their redox properties, which allow them to act as reducing agents, hydrogen donors, singlet oxygen quenchers, and metal chelators.

Total antioxidant capacity assay, such as the ABTS and DPPH methods, is most common for antioxidant activity for large-scale examination. DPPH radical is a stable free radical, and any molecule that can donate an electron or hydrogen to DPPH can react with it and thereby bleach the DPPH absorption. The substances, which are able to perform this reaction can be considered as antioxidants and therefore radical scavengers. Among the plants tested for the DPPH scavenging ability, *Terminalia bellirica*, *Emblica officinalis*, *Nymphaea stellata*, *Curculigo orchoides*, *Saraca asoca*, *Biophytum sensitivum* and *Ficus glomerata* showed high

activity but less than the activity of ascorbic acid, which has the IC₅₀ value of 35.7. Phenolic compounds have been reported to function as antioxidants by virtue of their ability to donate hydrogen to stabilize reactive and unstable free radicals.

The ABTS is being the simple, fast, reliable, inexpensive method to assess the total antioxidant capacity of the medicinal herb extracts on a large scale, which is also very adaptable to both hydrophilic and lipophilic antioxidants/systems. This effective and efficient method can be used for systematic screening of medicinal herbs and dietary plants for their relative antioxidant content. Among the 25 plants studied, the fruit extract of *Terminalia bellirica* and flower of *Nymphaea stellata* showed more antioxidant activity while the extracts of *Bambusa arundinacea* (Leaf) *Boswellia serrata* (resin) showed lowest antioxidant activity in ABTS method. The degree of variation in ABTS radical scavenging activity could be due to the concentration of phenolic constituents. The scavenging effects may result from the action of the cocktail of antioxidants present in corresponding medicinal plants. In addition, the free radical scavenging and antioxidant activity of phenolics (e.g. flavonoids, phenolic acids) mainly depends on the number and position of hydrogen-donating hydroxyl groups on the aromatic ring of the phenolic molecules, and is also affected by other factors, such as glycosylation of aglycones, other H-donating groups (-NH, -SH), etc.. This could also be responsible for the degree of variation in the scavenging activity of extracts. Indeed, our results indicate that phenolic compounds may make a major contribution to the antioxidant capacity of the extracts examined. The extract of the above plants is particularly active in tests of total antioxidant activity.

CONCLUSION

In conclusion, our results support the view that some medicinal plants are promising sources of natural antioxidants and possess health beneficial effects. Total phenol content and total antioxidant capacity differs significantly among twenty four medicinal plants. There was significant linear correlation between phenolics concentration and antioxidant

activity, which indicates the phenolic of medicinal plants plays a major role in alleviation of free radical mediated pathological disorders. Although the active principles responsible for the antioxidant activity of the most of the tested extracts have not yet been

identified, we suggest that these extracts could be a good source to obtain compounds that would help to increase the overall antioxidant capacity of an organism.

Table 1. Characterization of the Plant Material and Extraction Yield for Methanolic Extracts

Table 1. Characterization of the Plant Material and Extraction Yield for Methanolic Extracts

Botanical Name	Botanical Family	Common name	Part used	Yield of extract (%)	Medicinal use
<i>Bambusa arundinacea</i>	Poaceae	Thorny bamboo	Leaf	15.3	Skin disease, fever, and anti-inflammatory.
<i>Biophytum sensitivum</i>	Oxalidaceae	Siker pud	Whole plant	16.7	Fever, snakebite and wound healing.
<i>Boswellia serrata</i>	Burseraceae	Olibanum tree	Resin	36	Antipyretic, convulsions, jaundice and arthritis.
<i>Butea monosperma</i>	Fabaceae	Bastard teak	Stem bark	9.7	Tumour, diabetic and anti-inflammatory.
<i>Clitoria ternatea</i>	Fabaceae	Clitoria	Flower	14.5	Anti-inflammatory, pulmonary tuberculosis and elephantiasis.
<i>Curculigo orchiooides</i>	Amaryllidaceae	Golden eye-grass	Rhizome	6.82	Skin disease, antipyretic and jaundice.
<i>Eclipta alba</i>	Asteraceae	Trailing eclipta	Whole plant	18.3	Anti-inflammatory, skin disease, wound healing and jaundice.
<i>Emblica officinalis</i>	Euphorbiaceae	Gooseberry	Leaf	35.26	Jaundice and anti-inflammatory.
<i>Evolvulus alsinoides</i>	Convolvulaceae	Dwart morning-glory	Whole plant	2.36	Aphrodisiac and diarrhoea.
<i>Ficus glomerata</i>	Moraceae	Gular	Stem bark	7.2	Analgesic, diabetic and antifungal.
<i>Ficus racemosa</i>	Moraceae	Gular fig, cluster fig,	Stem bark	9.55	Diabetic and wound healing.
<i>Ficus religiosa</i>	Moraceae	Sacred fig	Stem bark,	8.83	Antibacterial, anti-inflammatory, wound healing and skin disease.
<i>Ficus religiosa</i>	Moraceae	Sacred fig	Leaf	11.43	Cardio tonic, skin disease, fever and obesity.
<i>Gardenia gummifera</i>	Rubiaceae	Cumbi-gum tree	Flower	24.5	Aphrodisiac and laxative.
<i>Ipomoea sepiaria</i>	Convolvulaceae	Corriola	Whole plant	12.4	Skin disease, fever and galactorrhoea.
<i>Jasminum sambac</i>	Oleaceae	Jasmine	Flower	12.13	Anti-inflammatory, antipyretic and psoriasis.

<i>Leucas aspera</i>	Lamiaceae	Thumba	Whole plant	14.3	Arthritis, fever and hypoglycaemic.
<i>Nelumbium speciosum</i>	Nymphaeaceae	Sacred lotus	Flower	10.25	Cardio tonic, hepato protective and fever.
<i>Nymphaea stellata</i>	Nymphaeaceae	Blue lotus	Flower	17.11	Skin disease and anti-inflammatory.
<i>Plumeria alba</i>	Apocynaceae	White frangipani	Flower	25.59	Wound healing and arthritis.
<i>Saraca asoca</i>	Caesalpiniaceae	Ashoka	Flower	25.3	Fever, anti-inflammatory, anti-diabetic.
<i>Tabernaemontana divaricate</i>	Apocynaceae	Rosebay	Flower	35.75	Anti-inflammatory and wound healing.
<i>Terminalia bellirica</i>	Combretaceae	Belliric myrobalan	Fruit	43.46	Anti-inflammatory, antipyretic and skin disease.
<i>Thevetia nerifolia</i>	Apocynaceae	Yellow oleander	Flower	22.03	Cardio tonic.
<i>Vernonia cinerea</i>	Asteraceae	Ash coloured fleabane	Whole plant	20.62	Anti-inflammatory, antibacterial, antifungal, antiviral and skin disease.

Table 2. The Levels of Total Polyphenolic Content and Antioxidant Activity of Herbal Extracts Using the DPPH and ABTS Method

Plant name	Total phenol (mg gallic acid equivalents/g dry weight)	DPPH radical scavenging assay (IC 50) (µg /ml)	ABTS radical scavenging assay (IC 50) (µg /ml)
Ascorbic acid		35.7 ± 1.1	17.4 ± 0.8
<i>Bambusa arundinacea</i>	16.3 ± 3.5	301.6 ± 1.6	175.0 ± 1.2
<i>Biophytum sensitivum</i>	45.9 ± 2.8	95.7 ± 2.4	83.1 ± 1.8
<i>Boswellia serrata</i>	4.2 ± 2.4	1126.1 ± 6.5	475.3 ± 2.1
<i>Butea monosperma</i>	47.7 ± 2.8	101.3 ± 1.1	85.7 ± 1.5
<i>Clitoria ternatea</i>	19.8 ± 2.4	264.4 ± 2.2	108.5 ± 2.4
<i>Curculigo orchioides</i>	79.9 ± 1.6	92.1 ± 1.8	78.6 ± 2.3
<i>Eclipta alba</i>	45.4 ± 2.6	103.0 ± 1.4	87.6 ± 1.8
<i>Emblica officinalis</i>	188.4 ± 2.1	89.8 ± 1.4	76.8 ± 1.4
<i>Evolvulus alsinoides</i>	17.5 ± 1.3	323.8 ± 2.6	162.5 ± 2.6

<i>Ficus glomerata</i>	146.5 ± 1.0	97.8 ± 1.4	77.0 ± 1.5
<i>Ficus racemosa</i>	188.2 ± 2.7	112.8 ± 1.7	76.4 ± 1.2
<i>Ficus religiosa</i> (stem bark)	101.9 ± 2.4	110.8 ± 2.4	79.7 ± 1.3
<i>Ficus religiosa</i> (leaf)	20.5 ± 3.4	142.0 ± 1.1	168.1 ± 2.8
<i>Gardenia gummifera</i>	21.9 ± 1.3	183.3 ± 2.6	171.6 ± 1.1
<i>Ipomoea sepiaria</i>	19.2 ± 1.7	105.8 ± 1.1	104.5 ± 2.1
<i>Jasminum sambac</i>	25.4 ± 2.5	204.0 ± 1.4	120.2 ± 1.6
<i>Leucas aspera</i>	73.5 ± 1.5	101.0 ± 2.8	79.2 ± 1.4
<i>Nelumbium speciosum</i>	22.3 ± 2.2	134.2 ± 1.4	103.4 ± 1.8
<i>Nymphaea stellata</i>	127.4 ± 1.7	91.8 ± 2.1	76.3 ± 1.4
<i>Plumeria alba</i>	20.5 ± 1.5	155.0 ± 1.2	127.1 ± 2.1
<i>Saraca asoca</i>	142.6 ± 3.7	92.3 ± 1.2	76.4 ± 1.2
<i>Tabernaemontana divaricata</i>	32.9 ± 2.8	106.3 ± 1.8	99.6 ± 1.3
<i>Terminalia bellerica</i>	322.8 ± 3.5	89.2 ± 1.6	76.2 ± 1.4
<i>Thevetia nerifolia</i>	14.0 ± 1.5	522.5 ± 1.2	129.7 ± 2.4
<i>Vernonia cinerea</i>	28.9 ± 2.8	102.7 ± 1.4	91.3 ± 1.6

Values are mean ± SD. The values were obtained from three different experiments performed in duplication.

REFERENCE

- Govindarajan, R.; Vijayakumar, M.; Pushpangadan, P. Antioxidant approach to disease management and the role of 'Rasayana' herbs of Ayurveda. *J. Ethnopharmacol.* **2005**, 99, 165–178.
- Larson, R. A. The antioxidants of higher plants. *Phytochemistry* **1988**, 27, 969–978.
- Zhu, Q. Y.; Hackman, R. M.; Ensunsa, J. L.; Holt, R. R.; Keen, C. L. Antioxidative activities of oolong tea. *J. Agric. Food Chem.* **2002**, 50, 6929–6934.
- Vaidyaratnam P S Varier's. Indian medicinal plant; Orient longman limited, **1994**, Vol- 1-5.
- Burits, M.; Bucar, F. Antioxidant activity of Nigella sativa essential oil. *Phytother. Res.* **2000**, 14, 323–328.
- Agrawal, P. K. Carbon-13 NMR of flavonoids. New York: Elsevier. 1989.
- Strack, D. Phenolic metabolism. In: Dey, P.M., Harborne, J.B. (Eds.), *Plant Biochemistry*. Academic Press, New York, 1997; p 387–437.
- Zheng, W.; Wang, S.Y. Antioxidant activity and phenolic compounds in selected herbs. *J. Agric. Food Chem.* **2001**, 49, 5165–5170.
- Rice-Evans, C. A.; Sampson, J.; Bramley, P. M.; Holloway, D. E. Why do we expect carotenoid to be antioxidants in vivo? *Free Radic. Res.* **1997**, 26, 381–398.
- Morel, I.; Lescoat, G.; Cillard, P.; Cillard, J. Role of flavonoids and iron chelation in antioxidant action. *Methods Enzymol.* **1994**, 234, 437–443.

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BOOK REVIEW

TITLES:

Speaking of Ayurveda for Women

&

Speaking of Ayurveda for Healthy Living

Author: Prof. Dr. T. L. Devaraj

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Speaking of Ayurveda for Women

Ayurveda, the Indian art of healing is a holistic approach for keeping a healthy person healthy and bringing back health to a diseased person. The contemporary women in the present civilised world are trekking through a lot of stress and strain, with increasing anxiety and tension, apart from the sensitive natural rhythms and cycles.

The author has followed the basic concept of Ayurveda, by beginning with health and maintenance of health through daily and seasonal regimens, thus giving a feel of the pattern followed by the major texts of Ayurveda. The simplified explanations about the *Doshas* are plausible and the author is clear in his understanding and practical too, for e.g. the way he explained the pregnancy, related heads and the complications. The vast array of diseases and symptoms covers all the major aspects faced by woman. This also fulfils the author's attempt of examining the ailments of a woman.

Speaking of Ayurveda for Healthy Living

The general public today are subjected to air, water and food pollution resulting in many diseases. The author who has already helped for the cause of getting over from these hazards through many of his previous books on Ayurveda including Allied sciences of medicine and Allopathy for the welfare of the people attempts to improve the health of body and mind through this book, based on Ayurveda.

The process of detoxification is a proven way of bringing one back to health after exposure to a lot of toxins, be it internal or external. Moreover the holistic approach of Ayurveda ensures a no nonsense

approach. The *Samshodhana* therapy or *Panchakarma* postulated by Ayurveda is a classical approach through simplified language absorbable for the common man thus serving the purpose. This book is a useful guide for readers to keep their physical and mental fitness necessary for discharging their day to day duties.

Prof. Dr. T. L. Devaraj, hailing from Bangalore is a great author, researcher & scholar in the field of Ayurveda. He is an acclaimed Ayurveda consultant and has been offering free Ayurvedic consultation to poor people for years. He received the National award from the Hon'ble President of India, Smt. Pratibha Tai Patil, given away to felicitate the outstanding scholars of Ayurveda in memory of the legendary Ayurveda expert "Late Pandit Ram Narayan Sharma", by Pt. Ram Narayan Sharma Research Trust for developing Ayurvedic literature & ethics which he did in year 2007. He is the first person to receive the award from Karnataka. He is the author of more than 40 books in Ayurveda including *Speaking of Ayurvedic Herbal Cures*, *Speaking of Ayurvedic Remedies*, etc. His books are translated to different languages and are exported all over the world. He is the first Professor to write *Panchakarma*, *Health and Family Welfare* and the *Handbook of Ayurveda Medicine*, in three languages viz. English, Hindi and Kannada. He worked as Professor and Principal of Government Ayurveda College, Bangalore and retired as Deputy Director of Ayush.

Health is complete only through Physical, Mental and Social wellbeing, and Prof. Dr. T. L. Devaraj had kept that in mind all throughout his books.

Dr. Nishanth Gopinath