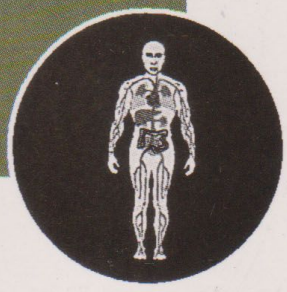
ISSN 0970 - 4086

āryavaidyan

लाभानां श्रेय आरोग्यम्

Of all the gifts,
the most precious is health



Vol XV., No. 2
November 2001 - January 2002

A QUARTERLY JOURNAL OF
THE ARYA VAIDYA SALA - KOTTAKKAL

āryavaidyan

A Quarterly Journal of
the Arya Vaidya Sala, Kottakkal.

Vol. XV., No. 2 | Regn. No. 55127/87 | November 2001 - January 2002

Aryavaidyan is intended to encourage scientific writing and intellectual interactions among scholars, academicians, practitioners and students of Ayurveda and allied subjects like Siddha, Unani, modern medicine, etc.

Vol. XV., No. 2, November 2001 - January 2002

CONTENTS

āryavaidyan

Quarterly journal of Arya Vaidya Sala

सततांध्ययनं, वादः परतन्त्रावलोकनम् ।
तद्विद्याचार्यसेवा च बुद्धिमेधाकरो गणः ॥

Constant study, mutual discussion,
learning other disciplines and
serving the preceptor-these factors
endow one with intelligence and memory

Subscription rates

Annual subscription	Rs. 120/-
Outside India	U. S. dollar 15 (Air surcharge extra)
Single copy	Rs. 35/-
Outside India	U. S. dollar 5 (Air surcharge extra)
Concessional rate for bonafide students of all systems of medicine	Rs. 100/-

Please address all enquiries and subscriptions to:

The Chief Editor,
Aryavaidyan
Arya Vaidya Sala,
KOTTAKKAL - 676 503
Malappuram District,
Kerala State, India.

Phone : 0493-742225
Fax : 742210, 742572
E-mail : kottakal@vsnl.com
kottakal@md3.vsnl.net.in

Aryavaidyan Vol. XV., No. 2, Nov. 2001. - Jan. 2002, Pages 67 - 74

FROM THE PAGES OF VAGBHATA – LVII

Varier, N.V.K.

Abstract: In this issue, a detailed description of different types of *gandoosha, kabala, pratisarana, mukhalepa* and *moordhataila* are discussed in detail.

अथातो गण्डूषादिविधिमध्यायं व्याख्यास्याम: ।

इति ह स्माहुरात्रेयादयो महर्षय: ।

(*Athato gandhooshadividhimadhyayam vyakhyasyamah*
Iti ha smahuratreyadayo . maharshayah)

Then here we are to explain, the chapter titled 'the order for performing *gandoosha* and others' so said the sages Athreya and others

Gandoosha means filling the mouth completely by liquids. Here the procedure for doing such filling is explained. When the mouth is completely filled, it is *gandoosha*, and if only partially, it is termed *kabala*. Since here the chapter is intended not to explain *gandoosha* alone, but *kabala, pratisarana, mukhalepa, moordhataila* and *karnapooranam*, the title given as *gandooshadi*. Here *adi* indicates that orders with other topics are also included in this chapter.

चतुष्प्रकारो गण्डूष: स्निग्ध: शमनशोधनौ ।

रोपणश्च.....

(*Chatushprakaro gandhooshah sngigdhah samanasodhanau ropanascha.....*)

Gandoosha is of four modes - *snigdha* (unctuous), *samana* (pacifying), *sodhana* (purifying) and *ropana* (healing).

.....त्रयस्तत्र त्रिषु योज्याश्चलादिषु ।। १ ।।

अन्त्यो व्रणघ्न:.....

(.....*trayastatra trishu yojyaschaladishu* ।। 1 ।।
Antyo vranaghnah.....)

Of these, the former three are applicable in three conditions due to *vata, pitta* and *kapha* vitiations and the last one is for healing wounds.

The first three - *snigdha, samana* and *sodhana* are for applications as per the *doshas*. *Snigdha* for *vata, samana* for *pitta* and *sodhana* for *kapha*. The last one *ropana* is meant for healing wounds, sores, etc.

Type of materials to be used for each purpose

.....स्निग्धोऽत्र स्वाद्वम्ळपटुसाधितै: ।

स्नेहै: .....

(.....*snigdhoऽtra*
svadvamlapatusadhitaih ।
snehaih.....)

The unctuous one is to be done by *sneha*s prepared with materials which are sweet, sour and salty by taste.

.....संशमनस्तिक्तकषायमधुरौषधैः ।।२।।

(.....*samsamanastikta-*
kashayamadhuraushadhaih ।। 2 ।।)

Samsamana gandoosha is to be performed with materials, which are bitter, astringent or sweet by taste.

Here the *kashaya* for *gandoosha* is to be prepared with *patola* (*Trichosanthes lobata*), *nimba* (*Azadirachta indica*), *jamboo* (*Syzygium cumini*) and *madhuka* (*Glycyrrhiza glabra*) or sugared water or honey is intended.

शोधनस्तिक्तकट्वम्ळपटूष्णैः .....

(*Sodhnastiktakatvamla-*
patooshnaih.....)

Sodhana or purifying *gandoosha* is to be prepared with materials, which are bitter, pungent, sour, salty and hot.

.....रोपणः पुनः ।
कषायतिक्तकैः .....

(.....*ropanah puna* ।
kashayatiktakaih.....)

Ropana (healing) *gandoosha* is to be performed with substances, which are astringent and bitter.

.....तत्र स्नेहः क्षीरं मधूदकम् ।। ३ ।।
शुक्तं मद्यं रसो मूत्रं धान्याम्ळं च यथायथम् ।
कल्कैर्युक्तं विपक्वं वा यथास्पर्शं प्रयोजयेत् ।। ४ ।।

(.....*tatra*
snehah ksheeram madhoodakam ।। 3 ।।
Suktam madyam raso mootram
dhanyamlam cha yathayatham ।
kalkairyuktam vipakvam va
yathasparsam prayojayet ।। 4 ।।)

Here again suggestions are given regarding the types of articles and the way they are to be used in *gandoosha*. *Sneha*s (unctuous substances), milk, honey, water, *sukta* (a type of vinegar), *madya* (alcohol), animal soup, urine and *dhanyamla* (a medicated vinegar used for all *vata* diseases) are employed appropriately mixed with *kalka*s (pasted medical stuffs), cooked or uncooked with them, in hot or cold state as required.

दन्तहर्षे दन्तचाले मुखरोगे च वातिके ।
सुखोष्णमथवा शीतं तिलकल्कोदकं हितम् ।। ५ ।।
गण्डूषधारणे.....

(*Dantaharshe dantachale*
mukharoge cha vatike ।
sukhoshnamathava seetam
tilakalkodakam hitam ।। 5 ।।
Gandhooshadharane.....)

In *dantaharsha* (morbid sensitiveness of teeth), *dantachala* (looseness of the teeth) and *vatika mukharoga*s, tepid or cold *tilakalkodaka* (water in which pasted sesame is mixed) is good for *gandoosha.*

Dantaharsha and *dantachala* are studied in the context of the study of *mukharoga*s in *Uttarasthanam,* (Chapter 21, 22).

.....नित्यं तैलं मांसरसोऽथवा ।

(.....*nityam*
tailam mamsarasoऽthava)

For daily *gandoosha*, gingelly oil or meat soup is preferable.

ऊषादाहान्विते पाके क्षते चागन्तुसम्भवे ।। ६ ।।
विषे क्षाराग्निदग्धे च सर्पिर्धार्यं पयोऽथवा ।

(*ooshadahanvite pake*
kshate chagantusambhave ।।6।।
Vishe ksharagnidagdhe cha
sarpirdharyam payoऽthava ।)

In *mukhapaka* (inflammation of the mouth) with burning sensation, or in injury caused by out side agents, poisons or burnt conditions due to *kshara* (caustic alkalis) or fire, use ghee or milk for *gandhoosha.*

वैशद्यं जनयत्याशु सन्दधाति मुखे व्रणान् ।। ७ ।।
दाहतृष्णाप्रशमनं मधुगण्डूषधारणम् ।

(*vaisadyam janayatyasu*
sandadhati mukhe vranan ।।7।।
Dahatrishnaprasamanam
madhugandhooshadharanam ।)

Gandoosha with honey, creates clearness of the mouth, heals the wounds, pacifies burning sensation and thirst.

धान्याम्ळमास्यवैरस्यमलदौर्गन्धनाशनम् ।। ८ ।।

(*dhanyamlamasyavairasya-*
maladaurgandhanasanam ।। 8 ।।)

Gandoosha with *dhanyamla* destroys insensitivity of the mouth, dirties and fetid smell.

तदेवालवणं शीतं मुखशोषहरं परम् ।

(*tadevalavanam seetam*
mukhasohaharam param ।)

The same, *dhanyamla*, if taken cold and with a little salt, is extremely good to remove the dryness of the mouth.

आशु क्षाराम्बुगण्डूषो भिनत्ति श्ळेष्मणश्चयम् ।। ९ ।।

(*asu ksharambugandhoosho*
bhinatti sleshmanaschayam ।। 9 ।।)

Gandoosha with alkaline water quickly destroys the accumulation of *kapha*.

सुखोष्णोदकगण्डूषैर्जायते वक्त्र लाघवम् ।

(*Sukhoshnodakagandhooshair-*
jayate vaktra laghavam ।)

Gandoosha with tepid water creates lightness of the mouth.

निवाते सातपे स्विन्नमृदितस्कन्धकन्धरः ।। १० ।।
गण्डूषमपिबन् किञ्चिदुन्नतास्यो विधारयेत् ।

(*nivate satape svinna-*
mriditaskandhakandharah ।। 10 ।।
Gandhooshamapiban kinchid-
unnatasyo vidharayet ।)

Seated in a place, not exposed to wind, but with affinity to sunlight, the shoulders and the neck are to be fomented at first and then massaged. Then the face a bit raised, retain the *gandoosha* without allowing to be swallowed.

कफपूर्णास्यता यावत्स्रवद्घ्राणाक्षताऽथवा ।। ११ ।।

(*kaphapoornasyata yavat-*
sravadghranakshataऽthava ।। 11 ।।)

Until the mouth is filled with phlegm, or the nose and eyes begin to discharge water, continue the *gandoosha*.

असञ्चार्यो मुखे पूर्णे गण्डूषः, कबलोऽन्यथा ।

(*Asancharyo mukhe poorne*
gandhooshah, kabaloऽnyatha ।)

When the mouth is completely filled with medicine so that no movement of the liquid is allowed, is a *gandoosha* whereas in *kabala*, the movement is required.

मन्याशिर: कर्णमुखाक्षिरोगा:
प्रसेककण्ठामयवक्त्रशोषा: ।
हृल्लासतन्द्रारुचिपीनसाश्च साध्या
विशेषात्कबलग्रहेण ।। १२ ।।

(*Manyasirah karnamukhakshirogah*
prasekakanthamayavaktrasoshah ।
hrillasatandraruchipeenasascha
sadhya viseshatkabalagrahena ।। 12 ।।)

Diseases pertaining to *manya*s (sides of the neck), head, ears, mouth and eyes, excessive salivation, diseases of the throat, dryness of the mouth, unpleasant throbbing sensations at the pectoral region, inertia, anorexia and rhinitis are manageable with *kabalagraha*.

कल्को रसक्रिया चूर्णस्त्रिविधं प्रतिसारणम् ।। १३ ।।

(*Kalko rasakriya choorna-*
strividham pratisaranam ।। 13 ।।)

Pratisarana (application of cleaning drugs) is of three modes - *kalka* (paste), *rasakriya* (solidified decoction) and *choorna* (powder).

युञ्ज्यात्तत् कफरोगेषु गण्डूषविहितौषधै: ।

(*Yunjyattat kapharogeshu*
gandhooshavihitaushadaih ।)

It should be done in diseases of *kapha* origin with the same drugs that are prescribed for *gandhoosha.*

Since it is in *kapha* diseases, the drugs prescribed for *sodhana gandhoosha*, are preferred. Ayurveda *rasayana* (Hemadri) prescribes *pratisarana* as rubbing with fingers. *Samgraha* says "तदभिष्यन्दाधिमन्थगळशुण्डिकादिषु युक्त्या प्रयोज्यम् । अतिप्रसारणादूषाशोषदाहक्ळेद-शोफादयो भवन्ति ।" It is to be used suitably in diseases like *abhishyanda, atimandha* (both eye diseases) and *galasundika* (a palate disease). Excessive *pratisarana* creates burning sensation, uneasiness, dryness, moistness, shelling and similar other troubles.

मुखालेपस्त्रिधा दोषविषहा वर्णकृच्च स: ।। १४ ।।
उष्णो वातकफे शस्त:, शेषेष्वत्यर्थशीतल: ।

(*mukhalepastridha dosha-*
vishaha varnakricha sah ।। 14 ।।
Ushno vatakaphe sastah,
sesheshvatyarthaseetalah ।)

Mukhalepa (anointing the face) is of three modes - that which pacifies *doshas*, removes poison and renders colour and complexion. In *vata* and *kapha*, it is better to use warm and in others, it should be very cold.

त्रिप्रमाणश्चतुर्भागत्रिभागार्द्धाङ्गुलोन्नति: ।। १५ ।।

(*tripramanaschaturbhaga-*
tribhagardhamgulonnatih ।। 15 ।।)

The three measurements of its thickness are one fourth, one third and half *angula* (finger's breadth).

अशुष्कस्य स्थितिस्तस्य, शुष्को दूषयतिच्छविम् ।
तमार्द्रयित्वाऽपनयेत्तदन्तेऽभ्यङ्गमाचरेत् ।। १६ ।।

(*Asushkasya sthitistasya,*
sushko dooshayaticchavim ।

tamardrayitvaऽ panayet-
tadanteऽbhyangamacharet ।। 16 ।।)

It should be allowed to remain there as long as possible. Before drying it should be removed. If it dries, it vitiates the complexion. When removing make it wet.And after that, inunct with oil.

विवर्जयेद्दिवास्वप्नभाष्याग्न्यातपशुक्क्रुध: ।

(*Vivarjayeddivasvapna-*
bhashyagnyatapasukkrudhah ।)

Avoid day-sleep, over-talking, exposure to fire, heat of the sun, sorrow and anger.

न योज्य: पीनसेऽजीर्णे दत्तनस्ये हनुग्रहे ।। १७ ।।
अरोचके जागरिते .....

(*na yojyah peenaseऽ jeerne*
dattanasye hanugrahe ।। 17 ।।
Arochake jagarite.....)

Mukhalepa is contra-indicated to persons suffering from rhinitis, indigestion, after performing *nasya*, in cases of lockjaw, anorexia and after a sleepless night.

.....स तु हन्ति सुयोजित: ।
अकालपलितव्यङ्गवलीतिमिरनीलिका: ।। १८ ।।

(.....*sa tu hanti suyojitah* ।
akalapalitavyanga-
valeetimiraneelikah ।। 18 ।।)

If applied properly, it heals premature graying of hair, dark patches on the face, wrinkles, cataract and blackish discolouration of the skin.

कोलमज्जा वृषामूलं शाबरं गौरसर्षपा: ।
सिंहीमूलं तिला: कृष्णा दार्वीत्वङ्निस्तुषा
यवा: ।। १९ ।।

दर्भमूलहिमोशीरशिरीषमिशितण्डुला: ।
कुमुदोत्पलकल्हारदूर्वामधुकचन्दनम् ।। २० ।।
कालीयकतिलोशीरमांसीतगरपद्मकम् ।
तालीसगुन्द्रापुण्ड्राह्वयष्टीकाशनतागुरु ।। २१ ।।
इत्यर्द्धार्द्धोदिता लेपा हेमन्तादिषु षट् स्मृता: ।

(*Kolamajja vrishamoolam*
sabaram gaurasarshapah ।
simheemoolam tilah krishna
darveetvangnistusha yavah ।। 19 ।।
Darbhamoolahimoseera-
sireeshamisitandhulah ।
kumudotpalakalhara-
doorvamadhukachandanam ।। 20 ।।
Kaleeyakatiloseera-
mamseetagarapadmakam ।
taleesagundrapundhrahva-
yashteekasanataguru ।। 21 ।।
Ityardhardhodita lepa
hemantadishu shat smritah ।)

The following six *yoga*s mentioned in each half verse are meant for the six seasons commencing from *hemanta* onwards.

1. *Kolamajja* (Kernel of *Ziziphus jujuba*), *Vrishamoola* (Root of *Adathoda beddomei*), *Sabara* (Bark of *Symplocos racemosa*) and *Gaurasarsapa* (Seed of *Brassica alba*).

2. *Simheemoola* (Root of *Solanum indicum*), *Krishna tila* (Seed of *Sesamum indicum*), *Darveetvak* (Bark of *Coscinium fenestratum*) and *Yava* (*Hordeum vulgare*).

3. *Darbhamoola* (Root of *Desmostachya bipinnata*), *Hima* (*Santalum album*), *Useera* (*Vetiveria zizanioides*), *Sirisha* (*Albizia lebbeck*), *Misi* (*Anethum graveolens*) and *Tandulah* (*Oryza sativa*).

4. *Kumuda* (*Nymphaea alba*), *Utpala* (*Nymphaea* ssp.), *Kalhara* (*Nymphaea nouchali*), *Doorva* (*Cynodon dactylon*), *Madhuka* (*Glycyrrhiza glabra*) and *Chandana* (*Santalum album*).

5. *Kaleeyaka* [*Santalum album* (substitute)], *Tila* (*Sesamum indicum*), *Useera* (*Vetiveria zizanioides*), *Mamsi* (*Nardostachys grandiflora*), *Tagara* (*Valeriana jatamansi*) and *Padmakam* (*Prunus cerasoides*).

6. *Taleesa* (*Abies spectabilis*), *Gundra* (*Typha elephantina*), *Pundareeka* [*Nelumbo nucifera*) white var.)], *Yashti* (*Glycyrrhiza glabra*), *Kasa* (*Saccharum spontaneum*), *Nata* (*Valeriana jatamansi*) and *Agaru* (*Aquilaria agallocha*).

मुखालेपनशीलानां दृढं भवति दर्शनम् ।। २२ ।।
वदनं चापरिम्ळानं श्ळक्ष्णं तामरसोपमम् ।

(*Mukhalepanaseelanam*
dridham bhavati darsanam ।। 22 ।।
vadanam chaparimlanam
slakshnam tamarasopamam ।)

Those who practice *mukhalepa* daily, gets their eyesight improved, face becomes clear and glowing as a lotus flower.

Then we proceed to *moordhataila* – application of oil on the head.

अभ्यङ्गसेकपिचवो वस्तिश्चेति चतुर्विधम् ।। २३ ।।
मूर्द्धतैलम् बहुगुणं तद्विद्यादुत्तरोत्तरम् ।
तत्राभ्यङ्गः प्रयोक्तव्यो रौक्ष्यकण्डूमलादिषु ।। २४ ।।
आरूंषिकाशिरस्तोददाहपाकव्रणेषु तु ।
परिषेकः पिचुः केशशातस्पुटनधूपने ।। २४ ।।
नेत्रस्तम्भे च वस्तिस्तु प्रसुपत्यर्दितजागरे ।
नासास्यशोषे तिमिरे शिरोरोगे च दारुणे ।। २६ ।।

(*Abhyangasekapichavo*
vastischeti chaturvidham ।।23।।
moordhatailam bahugunam
tadvidyaduttarottaram ।
Tatrabhyangah prayoktavyo
raukshyakandhoomaladishu ।।24।।
Aroomshikasirastoda-
dahapakavraneshu tu ।
parishekah pichuh kesa-
satasputanadhoopane ।।25।।
netrastambhe cha vastistu
prasuptyarditajagare ।
nasasyasoshe timire
siroroge cha darune ।।26।।)

Application of oil on the head is of four modes – *abhyanga* (smearing the oil on the head), *seka* (*dhara* or irrigation), *pichu* (keeping oil soaked cloth on the head) and *vasti* (retaining oil on the head for a definite time). Each succeeding mode is more effective than the previous one, as per the order presented here.

Here, *abhyanga* is prescribed in cases of roughness, itching and impurities. *Pariseka* or *seka* is preferred in *aroomshika*, headache, burning sensation, inflammation and wounds. [*Aroomshika* is described in *Sirorogavijnana* in *Uttarasthanam* - कपाले क्ळेदबहुळाः पित्तासृक्-श्ळेष्मजन्तुभिः कङ्गुसिद्धार्थकनिभाः पिटकाः स्युरूंषिकाः *Aroomshika*s are eruptions on the skull with excessive wetness, resembling *kangu* and *siddharthaka* (millet and mustard seeds) caused by *pitta*, *rakta*, *kapha* and worms.]

Pichu is prescribed in weakness and splitting of the hair, cracking of the skin, burning sensation and stiffness of the eyes. *Vasti* is preferred in numbness, facial paralysis,

sleeplessness, dryness of nose and mouth, cataract and severe diseases of the head.

विधिस्तस्य निषण्णस्य पीठे जानुसमे मृदौ ।
शुद्धाक्तस्विन्नदेहस्य दिनान्ते गव्यमाहिषम् ।। २७ ।।
द्वादशाङ्गुलविस्तीर्णं चर्मपट्टं शिरःसमम् ।
आकर्णबन्धनस्थानं ललाटे वस्त्रवेष्टिते ।। २८ ।।
चैलवेणिकया बध्वा माषकल्केन लेपयेत् ।
ततो यथाव्याधि शृतं स्नेहं कोष्णं निषेचयेत् ।। २९।।
ऊर्ध्वं केशभुवो यावदङ्गुलम् धारयेच्च तम् ।
आवक्त्रनासिकोत्क्लेदाद्दशाष्टौ षट् चलादिषु ।।३०।।
मात्रासहस्राण्यरुजे त्वेकं स्कन्धादि मर्दयेत् ।
मुक्तस्नेहस्य परमं सप्ताहं तस्य सेवनम् ।। ३१ ।।

(*Vidhistasya nishannasya*
peedhe janusame mridau ।
sudhaktasvinnadehasya dinante
gavyamahisham ।।27।।
Dvadasangulavisteernam
charmapattam sirassamam ।
Akarnabandhanasthanam lalate
vastraveshtite ।।28।।
chailavenikaya badhva
mashakalkena lepayet ।
Tato yathavyadhisritam
sneham koshnam nishechayet ।।29।।
Oordhvam kesabhuvo yava-
dangulam dharayecha tam ।
avaktranasikotkledad-
dasashtau shat chaladishu ।।30।।
Matrasahasranyaruje
tvekam skandhadi mardayet ।
Muktasnehasya paramam
saptaham tasya sevanam ।।31।।)

Its procedure: First of all, let the patient get purified with emesis and purgation, etc. Then having regained the normal state, on an auspicious day, in the evening, anoint his body with oil and give a mild fomentation. Then make him sit on a soft seat and that the height of which is up to his knee. Smear with the paste of *masha* on a long piece of cloth (about two fingers' wide) and tie it around his head above the ears. Over this, put a twelve *angula*s* wide strap made of the leather of cow or buffalo. When it is properly fitted, another piece of cloth (*vartti*) is to be tied over it. The gaps are to be closed with *masha* paste. Then the oil, medicated as per the disease condition, is poured slowly over the head in lukewarm state. The level of oil is destined to be one finger above the hair-surface. The stipulated time for holding the oil is until fluid secretion appears in the mouth and nose, or for a period of ten, eight and six *matra*s for *vata, pitta* and *kapha* respectively. But in the case of a healthy person, it is for one thousand *matra*s. After the stipulated time, remove the oil, strap and do massage on the shoulders, neck, ears and face. The maximum period for *sirovasti* is seven days.

धारयेत्पूरणं कर्णे कर्णमूलं विमर्दयन् ।
रुजः स्यान्मार्दवं यावन्मात्राशतमवेदने ।। ३२ ।।

(*Dharayetpooranam*
karne karnamoolam vimardayan ।
rujah syanmardavam yavan-
matrasatamavedane ।।32।।)

Fill the ears with medicated oil and do

*1 *angula* = a finger's breadth (of the patient)

massage at the base of the ears until the pain subsides. If there is no pain, it is to be done for a period of one hundred *matra*s.

यावत्पर्येति हस्ताग्रं दक्षिणं जानुमण्डलम् ।
निमेषोन्मेषकालेन समं मात्रा तु सा स्मृता ।। ३३।।

(*Yavatparyeti hastagram*
dakshinam janumandalam ।
nimeshonmeshakalena
samam matra tu sa smrita ।।33।।)

Matra is defined as the time required for moving the right hand around the right knee once, or closing and opening of the eyelids once.

कचशतनसितत्वपिञ्जरत्वं
परिपुटनं शिरसः समीररोगान् ।
जयति, जनयतीन्द्रियप्रसादं
स्वरहनुमूर्द्धबलं च मूर्द्धतैलम् ।। ३४ ।।

(*Kachasatanasitatvapinjaratvam*
pariputanam sirasah sameerarogan ।
jayati, janayateendriyaprasadam
svarahanumoordhabalam cha
moordhatailam ।।34।।)

Application of oil over the head alleviate falling of hair, graying, other discolourations, cracking of the hair and all other *vata* diseases of the head. It also bestows liveliness to the organs, clear voice, firm jaws and strength to the head.

इति श्रीवैद्यपतिसिंहगुप्तसूनुश्रीमद्वाग्भटविरचिता-
यामष्टाङ्गहृदयसंहितायां सूत्रस्थाने गण्डूषा-
दिविधिर्नाम द्वाविंशोऽध्यायः ।। २२।।

(*Iti sreevaidyapatisimhaguptasoonu-sreemadvagbhatavirachitayamashtangahridaya-samhitayam sootrasthane gandhoosha-dividhirnama dvavimsoऽdhyayah* ।।22।।)

Thus ends the the twenty-second chapter of *sootrasthana* titled *gandhooshadividhi* of Ashtangahridaya Samhita composed by Srimad Vagbhata, son of Sri Vaidyapati Simhagupta.

Aryavaidyan Vol. XV., No. 2, Nov. 2001. - Jan. 2002, Pages 75 - 77

IMPROVED HARVESTING, PROCESSING AND STORAGE OF MEDICINAL PLANT RAW DRUGS – THEIR ROLE IN CONSERVATION AND QUALITY OF PLANT – BASED DRUGS*

Krishnan Nambiar. V.P.**

Abstract: The importance of plants used in the Tradition System of Ayurveda has been highlighted. The necessity of resorting to *in-situ* and *ex-situ* conservation aspects is brought out. The achievements of the Medicinal Plants (India) Project are described. Harvesting, drying and storage methodologies as on today, purity of plant raw drugs in the finished product and the research needs for the future are pointed out.

Introduction

According to WHO 80% of the world population is dependent upon plants for health care particularly in the developing economies (Akerele, 1992). Our own system of Ayurveda is probably more than 4,000 years old. Charaka Samhita (900 BC) and Susruta Samhita (500 BC) dealing with pharmacopoeias were completed on the basis of the knowledge contained in the *Atharvaveda*. It is estimated that as many as 3,226 of the 4,752 communities in India (70% of the population) are dependent on traditional plant based medicines (Gadgil & Rao, 1998). A status report on ethno-biology in India has revealed that tribal communities use over 7,500 species of plants for medicinal purposes (Pushpangadan, 1994). Approximately ¼th of the prescriptions dispensed from community pharmacies in the United States contained one or more ingredients derived from plants (Farnsworth & Soegarto, 1991). Aspirin, digoxin, codeine, morphine, vindblastine, pilocarpine, cocaine, ephedrine, atropine and emetine used in allopathy are derived from plants (Natesh & Mohan Ram. 1999). Following World War herbal drugs slipped from their pre-eminent perch as synthetic drugs took mainstream medicine, since independence, through successive "Five Year Plans" to develop the Indian Traditional Medical Systems (Ayurveda, Siddha and Unani). The 1982 Health Policy initiated efforts to dovetail the

*Paper presented in the Regional Workshop on sharing local and national experience in conservation of medicinal and aromatic plants in South Asia, at Pokhara, Nepal during January 21st to 23rd, organised by IDRC, SARO and Ford Foundation, New Delhi.

** *Medicinal Plant Consultant, Arya Vaidya Sala, Kottakkal.*

functioning of traditional health practitioners and their health services in the total health care system of the country.

There are 460,000 traditional medicine practitioners in the country. Of these 223,000 in Ayurveda, 30,456 in Unani, 18,128 in Siddha have registered as practitioners under the state boards. In addition to private pharmacies, almost all State Governments have their own pharmacies for production of medicines. There are separate Directorates for traditional systems of medicine in all states. According to a WHO report, there are 215 Hospitals and 14,000 dispensaries in the country devoted to traditional medicine (Bajaj & Williams, 1995).

India is recognised as one of the 12 mega diversity centers of the world which is floristically a rich country (Anon. 1997 a) ranking 10th among the plant rich nations of the world and 4th among the Asian countries. Excluding aquatic life forms we have 5,000 species of medicinal plants. A significant proportion of this is utilised in modern medicine, traditional systems of medicine, tribal and folk practice, beauty care and for export.

Only less than 10% of the medicinal plants traded in the country are cultivated. 90% are collected from the wild very often in the destructive and unsustainable manner. However, over-harvesting, loss of habitat, increasing urbanisation and shrinking forest-base have resulted in significant decline in the volume of raw materials produced. This has caused irreversible loss of population of medicinal plants. It is therefore imperative to conserve our medicinal plant wealth on a scientific basis.

Ongoing efforts in India include both *insitu* and *exsitu* approaches to conservation. While *insitu* conservation should be the preferred choice, it is unlikely that the pressures on land would permit more than 4% of the geographical area to be aside as protected area. Hence, it is essential to complement *insitu* approaches through *exsitu* measures. As a part of this we have encouraged the farmers to enter into the field of large scale cultivation of much needed medicinal species under the Medicinal Plants (India) Project.

Medicinal Plants (India) Project

The project sponsored by IDRC (International Research Centre, Canada) was undertaken by Arya Vaidya Sala, Kottakkal (Kerala) with a financial assistance of CAD$ (74880 + 64065) after getting approval of the Ministry of Home Affairs, Govt. of India for the period 1993 – 1999. Under this project, 20 widely used medicinal plants of Western Ghats region of Kerala have been studied. The studies focused on the distribution, selection of best stocks, developing sustainable techniques on propagation, increasing their availability on a sustainable basis so as to reduce tendency for adulteration, pharmacognostic features, developing modules for on-farm cultivation and drawing up recommendations for their conservation and regeneration in forests. An immediate output is organization of live collection of several provenances of 20 species for reference and research and supplies of their genuine parts for medicine preparation and evaluation. The farmers will be benefited by the propagation technique developed and the foresters can make use of the information in biodiversity management and regeneration programmes. Our preliminary investigations on the deterioration on selected plant raw drugs are clearly indicative of the need for research on storage problems.

Harvesting

The existing methods of harvesting, processing and storage are thoroughly unscientific leading to total devastation of certain medicinal species from their natural habitats and causing serious deterioration of the harvested raw drug. Harvesting as the vital link between source management and resource use; pre-harvest operation; complexity of non-wood forest products harvesting; multiple harvest and simultaneous harvest of multiple products; post-harvest treatments; and organizational issues in resource management need improvement in tools and techniques.

An important factor that influences the quality of the herb is the time at which it is harvested. The leaves are usually gathered throughout the whole growing period. They are picked either singly or the entire stem is cut off and the leaves are stripped of afterwards. The leaves should be healthy, free from diseases and insect pests, clean and dry. The aerial or top parts of the plant are collected with the flower-bearing stem just before or at the beginning of the flowering stage. Fruits and seeds are collected when they are mature. The harvested herbs have to be transported to the drying shed as quickly as possible.

Drying

Correct and proper drying is essential for drugs to be traded internationally. Drying is done to reduce to moisture content up to 5-10 percent to minimise spoilage. A considerable quantity of herbs is dried in the shade. Artificial drying is increasingly being employed since it produces a superior product retaining much more of the original flavour and avoiding a hay-like taste. The drying yard should be properly clean. The drying temperature has a vital influence on the quality. In artificial drying, the temperature should not exceed 40^{o} C, as the essential oils and the flavour are lost at high temperatures (Atal & Kapur, 1982).

Storage

Different types of storage can influence the quality of the herb. Dried herbs store best in the whole form and most buyers choose this form of storage. A further important consideration in storage is to limit contamination. Most authorities recommend storage in air-tight containers in a dry dark place at a temperature not exceeding 18^{o}C. Heat robs herbs of their flavour whilst dampness causes ground herbs to cake and deteriorate. Most authorities recommend that herbs for the retail market should be available in small quantities preferably in jars or packets (Atal & Kapur, 1982).

Research Needs

Though considerable research has been carried out on the utilization aspects of non-wood forest produce plants, there is little information available on their production, conservation, harvesting and storage practices. Judicious use of the raw drugs in the medicine manufacturing process is also to be considered to avoid wastage of raw materials. The purity of raw drugs and the processing technology have a significant role in determining the quality of the finished product. Taxonomic and pharmacognostic studies are the right tools in determining the correctness of the raw drugs used. Scientific extraction methods will have to be developed and perfected in order to prevent destructive harvesting of non-wood forest produce. Research has to be concentrated on scientific assessment of the utility of other

regenerative parts of trees in the place of their roots, so that uprooting the entire trees can be avoided.

I record my deep gratitude to the organisers of this function for providing me an opportunity for participation.

References

1 Akerale, O. et al. (1992), *Conservation of Medicinal Plants*, Cambridge University Press, Cambridge. U.K.

2 Atal. C.K. & Kapur. B.M. (1982), Cultivation *and Utilization of Aromatic Plants*

3 Bajaj, M & Williams, J.T. (1995), *Healing Forests, Healing people* – Report, IDRC, New Delhi.

4 Farnsworth N.A. & Soejarto, D.D. (1991), *Global Importance of Medicinal Plants*, Cambridge University Press, Cambridge.

5 Gadgil, M & Rao, P.R.S. (1998), *Nurturing Biodiversity An Indian Agenda*, Center for Environment Education, Ahamedabad.

6 Natesh, S. (2000), *Biotechnology in the Conservation of Medicinal and Aromatic Plants, Biotechnology in Horticultural and Plantation Crops*, Malhotra Publishing House, New Delhi, Cambridge university Press, Cambridge U.K.

7 Natesh, S & Mohan Ram, H.Y. (1999), Updating Green Medicine J. Ind. Bot. Sc., (in press)

8 Pushpangadan. P. (1994), Ethno-biology in India: A report, Min. Environ. Forests Govt. of India, New Delhi.

Aryavaidyan Vol. XV., No. 2, Nov. 2001. - Jan. 2002, Pages 78 - 85

EVOLUTION OF BASIC PRINCIPLES OF AYURVEDA*

Varier, P.M. and Raghunath, A.*****

Abstract: The perception that ayurveda is a system of knowledge dealing with health care is only a partial truth. It is actually a philosophy of life and it comprehensively deals with human and animal life in all its multifarious aspects. The original seers of the ayurvedic knowledge could view the explicit and implicit realities of life and the world around it in their comprehensive totality. The fundamental ayurvedic principles such as *tridoshik* categorization of the human body and the *trigunic* distinction of the human mind were extrapolated from the *panchabhautik* understanding of the cosmos and its components based on the philosophical approach that man is a microcosmic representation of the great macrocosm. This paper attempts to trace the conceptual roots of the important ayurvedic principles in the earlier knowledge bases.

Introduction

The ayurvedic system of healh care is said to have its origins in time immemorial. But at the same time the ayurveda that we understand and practise today is strongly built on a foundation consisting of axiomatic premises, logical development and documented records. It has a rigorous framework of principles and practices. Some of the major documents of ayurvedic principles were written in the last centuries of BC and in the beginning of AD, and they have their roots in the *atharvaveda* and even in the *rigveda*, which is recognized as the earliest form of written knowledge. The ancient Indian knowledge has developed as a result of interactions between opposing viewpoints and theories on the world and its inhabitants. Such thoughts gave birth to schemes of human functions and subsequent development of specialized sciences. Ayurveda is one such knowledge scheme. As a living system of knowledge, it has its fundamental axioms deeply rooted in one or two branches of ancient Indian philosophy. An attempt is made here to trace some such roots.

Ayurvedic view of life

Ayurveda perceives man as an integral part of nature [(1)]. They both have fundamental commonalities. Every anguish and distress of man is caused by his ignorance of the body and the

** Paper presented in the Indo- European Seminar on Ayurveda, Lisbon, Portugal on 19 -23, November, 2001.*

*** Superintendent, Ayurvedic Hospital & Research Centre, Arya Vaidya Sala, Kottakkal.*

**** Medical Officer, Govt. Ayurveda Mental Hospital, Kottakkal.*

mind [2]. It is this anguish, which manifests as a disease. Appropriate and perfect knowledge retrieves man from his anguishes.

Ayurveda attempts to understand and explain the human life in its entirety. It may not be completely true to characterize ayurveda just as a science dealing with the human body and its life. Because, more than a health care system, it happens to be a philosophy of life.

The origins

The Indian sages, who had tried to trace the origins of ayurveda, have come up with the idea that it has been in existence in one form or the other ever since the human race came on the world. Because, it is found to continuously retain its close and comprehensive relation with man and his predicament. The knowledge about man's civilization is as old as the civilization itself. This knowledge base is what is universally known as the *vedas*. It is but true that the very same *vedas* developed into specialized treatises dealing with specific subjects. These generic and specific *vedas* are a veritable collection of knowledge. In latter periods, when the study and interpretations progressed in different directions based on specific modes and traditions of application, the *vedas* were got divided into four distinct entities. The four entities are the well known *Rik*, *Yajus*, *Sama* and *Atharva*. Among them, the *atharvaveda* contains more frequent references to matters concerning human health. Ayurveda, in fact, is often treated as a sub text of *atharvaveda* [3].

A major component of ayurvedic treatises deal with the use of materia medica. The prototypes of several of the ayurvedic methodologies of drug application are seen in *atharvaveda*. But the ayurvedic methods are advanced considerably from their prototypes both in their scientific frame work as well as in their conceptual foundation. Many of the modalities propounded by the *atharvaveda* are transcendental in nature and akin to faith healing. They are mostly steeped in concepts of supernatural forces and otherworldliness. They passed through various stages of evolution before the logic-based and rationalized approach of systematized ayurveda took shape.

The hepta-substance theory (*Shadpadartha vada*)

While considering the all pervading fundamental concepts which form the major axiomatic base for a large section of the Indian thought, one of the important concepts that demands attention is the hepta-substance theory. It is mentioned that the great sages who took up the study of the material world thought it fit to categorize the whole set of substances into six groups. Here the term substance refers to material and its characteristic attributes. These six substances are called the similarity, the dissimilarity, the property, the matter, the function and the non-separableness [4]. These are collectively known as the hepta-substance group. The matter is the one which possesses property and function. Matter can give birth to new matter. That is not the case with property and function. They are dependent on the matter and they have existence only as the attributes of matter and they do not themselves give rise to new property and new function. The first two substances indicate that the properties and functions of matter can be similar or dissimilar to other properties and functions. These opposing attributes have great role in the ayurvedic methodologies. They are expanded and applied

in ayurveda while developing the therapeutic groupings of drugs. The last substance, that is, the inseparableness, describes the close association of property and function with matter. The application of Ayurvedic Materia Medica is extensively based on this hepta-substance theory. A material has its properties. Taking into account the similarities and dissimilarities of the material properties in comparison to the constitutional and conditional characteristics of the patient, a material proves useful or not for dealing with a condition of ailment. The factor which is responsible for causing an effect on the disease is the functional attribute of the material. Thus, it is the properties and functions of a material which decide its utility as a medicament.

Similar and dissimilar aspects of matter

One basic aspect of the ayurvedic method of treatment involves identifying characteristics of materials, which are similar and dissimilar to the characteristics of both the constitutional and ailment conditions. There are characteristics or properties which are similar with the ailment character. The application of such a material will act in an additive fashion on the ailment condition. That condition will, thus, aggravate. It is but natural that interaction between materials possessing characteristics which are similar to each other will result in its enhancement. Conversely, dissimilar characteristics will inhibit its growth[5]. The ayurvedic method makes use of this simple theory with remarkable efficacy for supplementing those human attributes which are deficient and also for trimming the abundant attributes in such a manner that the constitutional characteristic is maintained at a state of dynamic equilibrium. Removal of morbidity and building up health are achieved largely by the appropriate application of this principle. The recommended intake of blood for dealing with severe conditions of anaemia is a rather simplistic example for this approach. Similarly, disease causing excesses in the body are corrected by the administration of materials possessing properties of depletion. The application of additive and reductive functions of similar and dissimilar properties of matter is an integral component of ayurvedic therapeutic approach.

The universe and the man

For achieving effective use of this principle, there needs to establish clear definitions of the properties and functions of every component of the human body as well as that of the external universe. Human being is an appropriate blend of the body, the mind, the sensory organs and the soul, as per the ayurvedic philosophy. It is stressed that an intelligent man is the one who can recognize the aspects of the cosmos in man and vice versa. Several of the attributes of universe are perceived in man. That is why the human being is often described as the microcosm of the macrocosm. There are six distinct seasons which result in apparent changes in the environment. Sage Susruta says that there are similar six changes taking place in man on each day[6]. Every change occurring in the universe is reflected in man. The rain, the wind, the lightning, the mist and every other manifestation of environmental changes have their miniature parallels in human body. And this is taken to indicate that there are commonalities in the constitutional aspects of the universe and the man. The *triguna* theory, that is the tri-character theory, which is a universally

accepted view of man and his surroundings in Indian thought, is a natural offshoot of this understanding.

The three basic characters

The Indian concept of the Universe attributes two aspects to it. One is manifest and clear and the other un-manifest, diffused and unclear. Day-time represents the former and night-time the latter[7]. The manifest world gets perceived and understood and becomes clearer and more defined in three forms. They are the three basic characters. These three basic characters refer to (a) *Rajas* which is responsible for creation, (b) *Tamas* which is responsible for annihilation and (c) *Satva* which maintains a balance between the two. These three fundamental characters can be termed as the vigorous, the base and the sublime respectively. The whole world is the manifestation of the combination of these three characters in different proportions. Their respective roles manifest in two major segments. The one segment contains eleven components which have their base in the sensory related attributes of man. They comprise five motor organs, five sensory organs and one motor cum sensory organ, which is identified as the mind. All these eleven components are related to the sublime and the vigorous characters. Whereas, the second segment having ten components have their origin from the vigorous and the base characters. There are five molecular forms of these two characters and their corresponding five *bhootas*, that is their elementary manifests. These five elements are the macroscopic manifestations of the five microscopic molecules. Man is the combination of these two segments which, as seen above, are the compositional result of the three basic characters. Similarly, every aspect of the universe is also the result of unique blending of these three characters. All the twenty-one constituents of man can be conceptualized. But what can be perceived as material realities are the five elements (*panchabhootas*). Susruta insists that the five elements are nothing but the manifestation of the three characters, just as every other aspect of the living and the inanimate constituents of the universe[8]. In the case of the Universe, the sublime character is identified with the element of space, the vigorous character with the element of wind, the sublime and vigorous jointly with the fire element, the sublime and base together with the element of water and the base character alone is identified with the element of earth[9]. Thus, it is seen that not only man but his environment is also associated with the three basic characters in different proportions. It should be mentioned here that the practical aspects of therapy, unlike the foregoing theoretical considerations, take into account the formal manifestations of the five elements rather than their original attributes of the three characters.

The influence of *sankhya* philosophy

The development of Indian philosophy subsequent to the *vedas* is exemplified in six *darsanas* viz. *sankhya, vaiseshika, yoga, nyaya, purvameemamsa* and *vedanta*. Among them, *sankhya* and *vaiseshika* have contributed extensively to ayurvedic theories and *yogadarsana* to a lesser extent.

The five primordial element approach is extensively propounded in *sankhya* philosophy. It talks about a 24-doctrine system. It starts with the indistinct and nebulous original

nature which leads to the expansive and lofty principle from which arises the egotism. This egotism is a manifestation of the three basic characters. Subsequently come the eleven sensory and motor organs and finally the five molecular forms and their five elements. All these together form the famous 24 doctrine philosophy of *sankhya.* When the soul enters this conglomeration of 24 entities, the inanimate body gets energized and becomes a living human being. The first indistinct and unmanifest form is the original point of source. And this original un-manifest form and the remaining 23 manifest forms are seen separate from the soul. Because, man has the power of life and he has consciousness. Whereas, the other 24 principles are inanimate attributes of the nature. The amalgamation of the inanimate nature on the one hand and consciousness on the other results in the existence of man. It is this individual having a life of consciousness, who is the target of ayurvedic approach.

The role of *vaiseshika* philosophy

The *vaiseshika* philosophy perceives an individual primarily as a manifestation of a unique individual soul. This soul is accompanied by the mind and its supporting structure of the five elements. The temporal and spatial changes influence the human being. The soul, the mind and the five elements of the individual along with the temporal and spatial components are together treated as the nine-matter group by the *vaiseshika* philosophy. Among them the five elements are the only ones which can be perceived by sensory organs. And they constitute the human body which falls sick and also the materia medica which help to treat sickness. The development of the five-element theory of ayurveda is partly indebted to the *vaiseskika* philosophy.

***Yoga* philosophy**

Another important branch of Indian thought is the *yoga* philosophy. But this branch has much less to do with the five-element theory. It talks more about the ways and means of dealing with the human mind. The part of ayurveda which deals with the health and ill health of mind might have received some inputs from the *yoga* philosophy.

The human body and the five elements

The bodily organs and attributes are categorized as per their correlation with each constituent of the five elements. The five elements are the space, the wind, the fire, the water and the earth. Each one of them wields an influence on a certain part of the human constitution. Every opening in the body, the ears and the voids and internal sounds of the body are all belonging to the element of space. The touch and the skin, and the vibrations, the movements and the activities of the body are dependent on the element of wind. The element of fire influences the human form and its glow, the eyes, the bodily heat, the digestive activity and also the feelings of anger and valour. The element of water causes the taste and the tongue, the bodily fluids, the body cooling, the unctuousness and the semen. Earth, the last element, influences the smell, the nose, the corporeality and heaviness [(10)].

Materia Medica and the five elements

It has been seen earlier that both the *sankhya* and *vaiseshika* philosophies have an important commonality in their concept of the five elements and their critical influence on the human body as well as on the external

world. The natural extrapolation from this stand is the observation that every medicament, which is originating from the world around, will be under the domain of the theory of five primordial elements. Every organ, aspect and activity of the human body is controlled by a dominating element. When this natural presence is upset due to whatever reason, then complications arise and they manifest as diseases. The objective of therapy will be to replenish whatever element has depleted and to frugalise whatever element has enchanced in such a way to achieve back the original dynamic equilibrium. The application of the additive and reductive functions of the similar and dissimilar qualities for achieving this purpose has been mentioned earlier. The important modality is to identify the particular drug or combination of drugs which possesses the necessary balance of the five elements or properties and to apply them in an appropriate manner. The deciding factor for selecting the right combination of drugs is their elemental constitution.

The property based application of drug

There is nothing in the universe which is devoid of the five elements. And the natural corollary is that there is nothing in the universe which cannot act as a therapeutic agent[(11)]. It is mentioned that there are a total of 41 items of properties which are commonly found in the matter. This number is obtained from the five elements and their various manifestations. Every drug belongs to specific grouping of property. In addition to that, the drugs are categorized as per their attributes which are more extensively employed in their therapeutic application. There are five common attributes viz. the taste, the property, the potency, the *vipaka* (post digestive state) and the synergy. Polyherbal medicines are formulated by the appropriate mixing of these five attributes.

The *tridosha* theory

The five-element basis of the human body is the starting point. A condition of ailment caused by erratic alterations of the natural composition of the five elements is set right by the optimum use of materials obtained from the universe which are also composed of the five elements. The sages also observed the changes occurring in the surroundings and found that the three major influencing factors for such changes are the moon, the sun and the wind. And it was postulated that the moon was a moistening agent, the sun was an emaciating agent and that the wind was an agent causing motion. They were respectively conceived as indicating the *kapha* (aggregative factor), the *pitta* (vital heat) and the *vata* (motive force), respectively [(12)]. This is the well-known *tridosha* theory. This theory is unique to the ayurveda texts. They don't find any possible origin in the earlier Indian thoughts, but for some very vague allusions in the *veda*s.

These three factors are closely related to the five elements. The *vata* represents a combination of the elements of the space and the wind. The *pitta* represents the fire element, and the *kapha* represents the elements of the water and the earth. The human body and its activities are maintained by retaining an appropriate and optimum balance between these three factors. This balance is unique to each individual and unique even to each and every organ and function of the individual. These three factors are conceived as the three fundamental functional units of the body. Then there are seven

structural units known as the *dhatu*s and excretionary matter for each *dhatu* known as the *mala*s. These units together decide the condition of health or ill health of an individual. All these attributes are related to the five primordial elements. At the same time, the major factor of the mind is not necessarily decided by them. It is the domain of the basic *triguna*s, that is the sublime, the vigorous and the base characteristics.

Conclusion

An attempt has been made here to take an overview of some of the fundamental principles which have critical influence on the theoretical and practical aspects of the ayurvedic system of health care. The effort has not been an exhaustive one. It is observed that the theories of five elements, three characters and *tridosha* have their origins in the later philosophies of *sankhya* and *vaiseshika*, whereas some of their primordial indications are present in the *atharvaveda* and even in the *rigveda*.

References:

1. Agnivesa, *Carakasamhita*, Sareerasthanam V - 3, Page No. 325, Chaukhamba Sanskrit Sansthan, Varanasi, 1943.

2. Agnivesa, *Carakasamhita*, Sutrasthanam XXX - 84, Page No. 195, Chaukhamba Sanskrit Sansthan, Varanasi, 1941.

3. Susruta, *Susrutasamhita*, Sutrasthanam, I - 6, Page No. 2, 2nd Ed., Pandurang Jawaji, Nirnayasagar Press, Bombay, 1931.

4. Agnivesa, *Carakasamhita*, Sutrasthanam I - 28-29, Page No. 7, Chaukhamba Sanskrit Sansthan, Varanasi, 1941.

5. Agnivesa, *Carakasamhita*, Sutrasthanam I - 44 Page No. 8, Chaukhamba Sanskrit Sansthan, Varanasi, 1941.

6. Susruta, *Susrutasamhita*, Sutrasthanam, VI - 15, Page No. 26, 2nd Ed., Pandurang Jawaji, Nirnayasagar Press, Bombay, 1931.

7. Vedavyasa Bhagavatgita, (a collection from *Mahabharatam*), VII – 18, Page No. 210, 9th Ed., H & C Publishing House, Trissur, 1996.

8. Susruta, *Susrutasamhita*, Sarirasthanam, I – 12 - 13, Page No. 286, 2nd Ed., Pandurang Jawaji, Nirnayasagar Press, Bombay, 1931.

9. Susruta, *Susrutasamhita*, Sarirathanam, I - 20, Page No. 288, 2nd Ed., Pandurang Jawaji, Nirnayasagar Press, Bombay, 1931.

10. Susruta, *Susrutasamhita*, Sarirathanam, I - 19, Page No. 287, 2nd Ed., Pandurang Jawaji, Nirnayasagar Press, Bombay, 1931.

11. Agnivesa, *Carakasamhita*, Sutrasthanam, I – 49, Page No. 8, Chaukhamba Sanskrit Sansthan, Varanasi, 1941.

12. Susruta, *Susrutasamhita*, Sutrasthanam, VI – 8, Page No. 25, 2nd Ed., Pandurang Jawaji, Nirnayasagar Press, Bombay, 1931.

Aryavaidyan Vol. XV., No. 2, Nov. 2001. - Jan. 2002, Pages 86 - 97

PHARMACOGNOSTICAL STUDIES ON *MANALIKEERAI* [*GISEKIA PHARNACEOIDES* L. MOLLUGINACEAE]

Shantha, T.R., Vasantha Kumar, K.G., Saraswathy Pasupathy and Bikshapathi, T.*

Abstract: In the Siddha system of medicine the plant *Gisekia pharnaceoides* L. constitutes the drug *manalikeerai* / *manalkeerai* / *mandanalikeerai*. Whole plant is used as a powerful anthelmintic, aperient, expectorant and in *pittadosha*. The whole plant is used in bronchitis and as aperient and anthelmintic. The present paper deals with macro, microscopical, histochemical tests, powder study and maceration of root, stem, leaf and seed along with its physical constants, extractive values, U – V studies, test for organic and inorganic constituents and thin layer chromatographic studies of whole plant of *Gisekia pharmaceoides*.

Introduction

Gisekia pharmaceoides L. belongs to the family Molluginaceae. The whole plant constitutes the drug *manalkeerai* / *manalikeerai* / *madanalikeerai* in Siddha system of medicine and is used as *pulikolli* (anthelmintic), *kolaiagattari* (expectorant), *malamellakkai* (aperient), *vatakopam* (*vataprakopa*), *paityadosham* (*pittadosha*), *marpushali* (phlegm in the chest) and also useful in *krimiroga* (vermifuge). The properties are *tuvarpu, pullipu, sirukaippu* in *suvai* (*rasa*), *veppam* in *tanmai* (*veerya*) and *karpu* in *peeruvu* (*vipaka*) [Mudaliar (1988)]. It is an edible plant.

The plant is a powerful anthelmintic in cases of taenia. The fresh plant including leaves, stalks and seeds are ground with water and employed in cases of taenia. Dose is about 2 ounces given in morning in empty stomach may be repeated 3 times at intervals of four days. Seeds contain tannin like principle namely α *gisekia* and β *gisekia* both having probably anthelmintic properties. [Nadkarni (1976), R.N. Chopra et al (1956), Mudaliar (1988).]

Literature r\ nteview revealed that pharmacognostical studies on this plant has not been carried out (M.A. Iyengar 1975 and Roma Mitra 1986), hence the present study is undertaken.

Materials and methods

The identified plant of *Gisekia pharmaceoides* was procured from the survey of Medicinal unit, Palayamkottai, Tamil Nadu. Plant was soaked in 70% alcohol; free hand sections were taken following Johansen (1940) and Wallis (1967). Transverse sections of the whole plant were taken for detailed microscopical

* *Regional Research Institute (Ay.), Jayanagar, Bangalore 560 011.*

observations and figures were drawn using camera Lucida. Dry powder of whole plant was used for chemical analysis. Physico-chemical analysis was carried out as per standard procedure. (Anonymous 1966). All reagents used for chemical analysis were of G.P.R. grade.

TLC studies were carried out following Igon Stahal (1969). The fluorescence analysis of the powdered drug under ultra violet light was done according to the methods described by Chase and Pratt (1949).

Botanical description (Fig. I)

A diffuse glabous herb, stem 15 - 45 cm long, branches prostrate, leaves subfleshy, sub opposite, linear oblong, elliptic – lanceolate entire, tapering at the base, patioles long, flowers numerous in almost sessible umbellate cymes, sepals long, stamens 5, filaments dilated at the base, ripe carpels membranous, seed solitary rounded, black with scattered white glandular provinces.

Vernacular names

Manalikeerai, madanalikeerai, manal keerai, navamaliikeerai in Tamil; *aileya, aluka, elavaluka, sugandhi* in Sanskrit; *Isakadasari, isikedantikura* in Telugu; *isakudari soppu, aathriphala* in Kannada; *valuka* in Bengal; *valuka – sag* in Hindi & Duk and *manalkeera* in Malayalam.

Macroscopical characters - Root (Fig. IIa)

Roots are long, woody, creame coloured with small lateral roots. Root measures 3 to 8 cm in length. Surface smooth, easily breakable, tastes slightly saltish without any aroma.

Microscopical characters (Fig II b, c)

Transverse section of the root is circular in out line and shows single layered epidermis, cells of epidermis are rectangular and covered by thin, wavy brown cuticle. Epidermis is followed by cortex, made up of 5 to 10 layers of thin walled, tangentially elongated, compressed, parenchymatous cells. Some of the cells show abundant bundles of acicular crystals where crystals are long and needle shaped. Phloem cells are thin walled, 5 to 6 layered and intercepted by single layered cambium. Xylem vessels are well developed and intercepted by uniseriate medullary rays.

Maceration of the root shows following elements (Fig. II d, e, f). 1) Broad and elongated vessels with oblique ends and simple perforation. Walls are highly thickened. 2) Elongated xylem fibers with simple thickenings with thickened walls and 3) Needle shaped acicular crystals which are long.

Macroscopical characters – Stem (Fig. IIIa)

Stems long, light green measures 15 to 45 cm in length branches prostrate or ascending. In fresh form, stems are soft, slightly hollow in the centre. Surface smooth, some times stems are fibrous and young stems break up easily. Tastes slightly saltish without any aroma.

Microscopical characters (Fig. III b, c)

Transverse section of the stem is circular in outline and shows single layered epidermis with striated brown cuticle. Epidermis is followed by narrow cortex, 3 to 5 layered, thin walled tangentially elongated parenchymatous cells. Cortex is followed by 2 to 3 layered sclernchymatous tissue. Followed by sclerenchymatous layer, 3 to 4 layered thin walled parenchymatous cells are present, representing the phloem region. Phloem region is intersepted by

a) **b**)

Fig I. *Gisekia pharnaceoides* L. - **a**) Whole plant, **b**) Crude drug

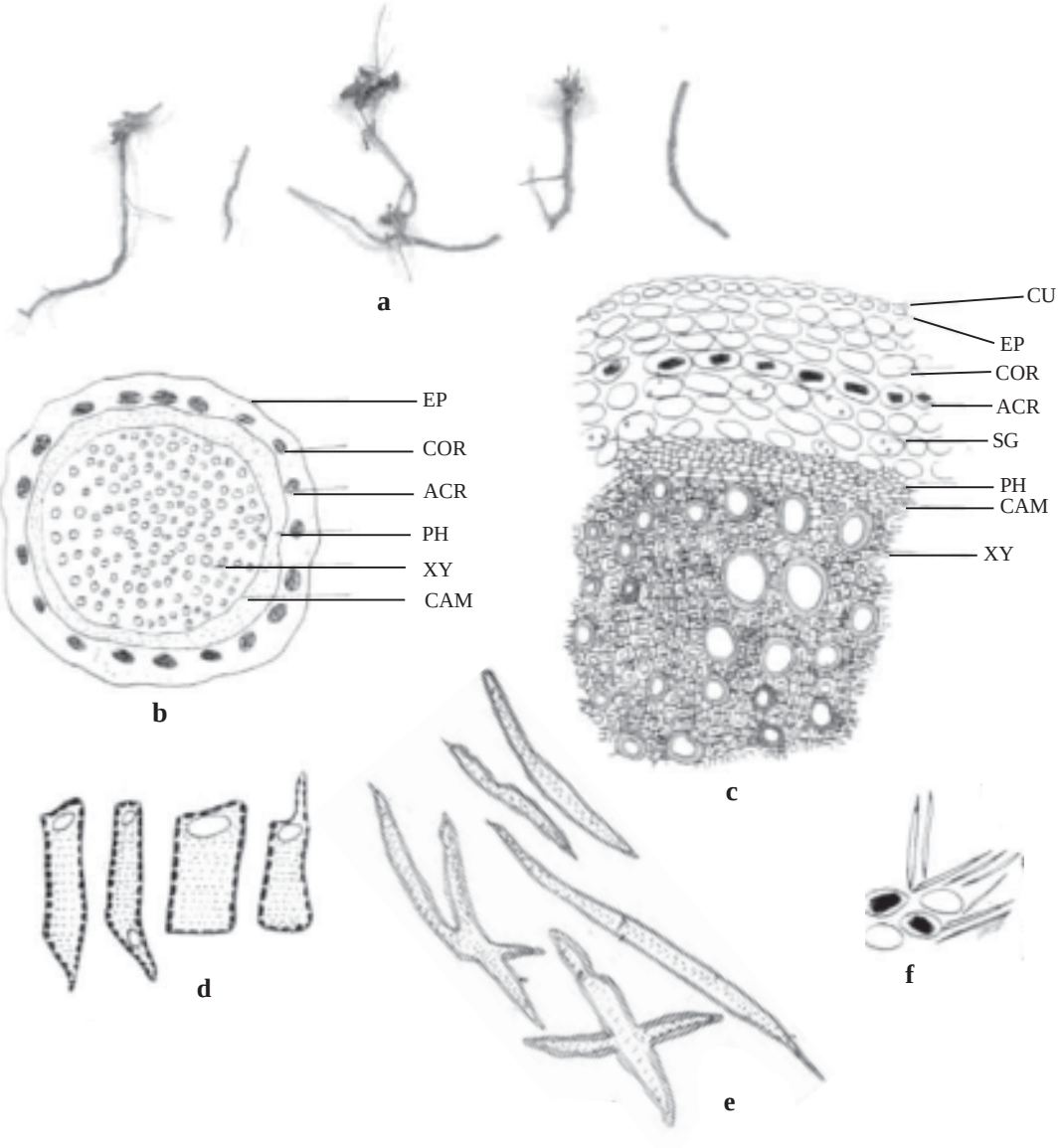


Fig II **a - f**. *Gisekia pharnaceoides* L. - **a**) Root; **b**) T.S. of the root (semi-diagrammatic) **c**) Portion of root enlarged showing epidermis, cortex and stelar region; **d**) Xylem vessels; **e**) Xylem fibers; **f**) Parenchyma cells showing raphide bundles

EP Epidermis **COR** Cortex **ACR** Acicular crystals **PH** Phloem **XY** Xylem **CAM** Cambium **CU** Cuticle **SG** Starch grain.

single layered cambium. Cambium is followed by xylem region with well-developed, wide pith. Pith is made up of few layered thin walled, compactly arranged, rounded parenchymatous cells. In the centre of the pith, hollow space is present without any cells.

Maceration of the stem shows following elements (Fig. III d,e,f,g): 1) Rectangular parenchyma cells with acicular crystals in bundles, 2) Xylem vessels are broad and elongated with helical to spiral thickenings, 3) Tracheids are elongated with tapering ends with simple pitted thickenings and 4) Xylem fibers are narrow and elongated with simple pits.

Macroscopical characters – Leaf (Fig. IVa)

Leaves are sub opposite, spathulate – oblong or elliptic, lanceolate and aromatic

Microscopical characters (Fig. IV b,c,d)

Transverse section of the leaf through midrib region shows single layered upper and lower epidermis covered by thin wavy cuticle. Both upper and lower epidermis are followed by 2 to 3 layers of collenchyma and thin walled, rectangular, parenchymatous cells. Parenchymatous cells shows bundles of raphide crystals. Vascular bundle is well developed with xylem and phloem. Phloem region consists of thin walled, 5 to 6 layers of polygonal cells. Transverse section through laminar region shows upper and lower epidermis covered by thin cuticle. Upper epidermis is followed by 1 to 2 layers of palisade tissue and spongy parenchyma cells. Most of the cells are filled by bundles of raphide crystals. In between palisade and spongy tissue, vascular tissue is represented vascular strand. Vascular strands shows helical to spiral xylem. Leaf is dorsiventral and stomata are present more on the lower surface of the leaf than on the upper surface. Stomata are of Ranunculaceous type.

Maceration of the leaf shows the following elements: (Fig. IV e,f,g,h,i)

1) Rounded and rectangular parenchyma cells, with brown content, 2) acicular crystals which are needle shaped, 3) spiral xylem vessel, 4) polygonal parenchyma cells, 5) stomata with epidermal cells and 6) polygonal parenchymatous cells with bundles of acicular crystals.

Macroscopical characters – Seed (Fig. Va)

Seeds are small, black in colour, smooth, sub reniform, minutely glandular, embryo curved, less than a semi circle.

Microscopical characters - Powder study

Seed powder is light brown in colour and when was treated with chloral hydrate, glycerin and water and observed under the microscope following elements were seen (Fig V b,c,d): 1) fragments of polygonal parenchymatous cells with oil globules and starch grains, 2) fragments of brown coloured polygonal parenchymatous cells with brown tannin and oil globules and 3) fragments of polyglobal, highly lignified stone cells with broad lumen without any pits.

Powder study (whole plant)

Powder of whole plant is pale green in colour, coarse to touch, tastes slightly saltish with pleasant smell. When powder was observed under the microscope treated with glycerin, water and chloral hydrate solution following elements were observed.

- Fragments of parenchymatous cells with tannin and acicular crystals,

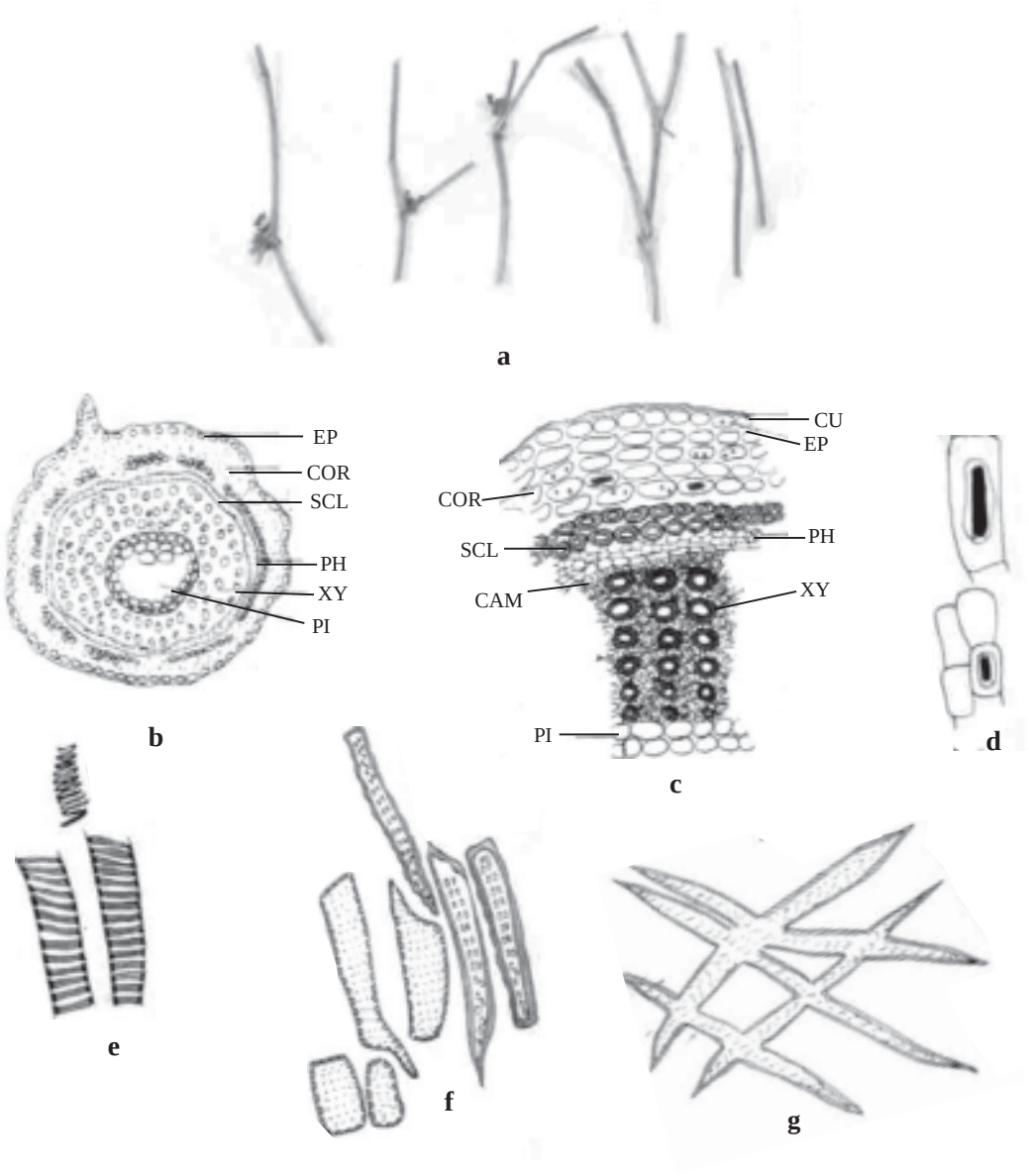


Fig III **a - g**. *Gisekia pharnaceoides* L. - **a**) Stem; **b**) T.S. of stem (semi-diagrammatic); **c**) Portion of stem enlarged showing epidermis, cortex, vascular region and portion of a pith; **d**) Paranchyma cells with raphide bundles; **e**) Helical and Xylem vessels; **f**) Xylem tracheides; **g**) Xylem fibers.

EP Epidermis **COR** Cortex **SCL** Sclerenchyma **PH** Phloem **XY** Xylem **PI** Pith **CU** Cuticle **CAM** Cambium.

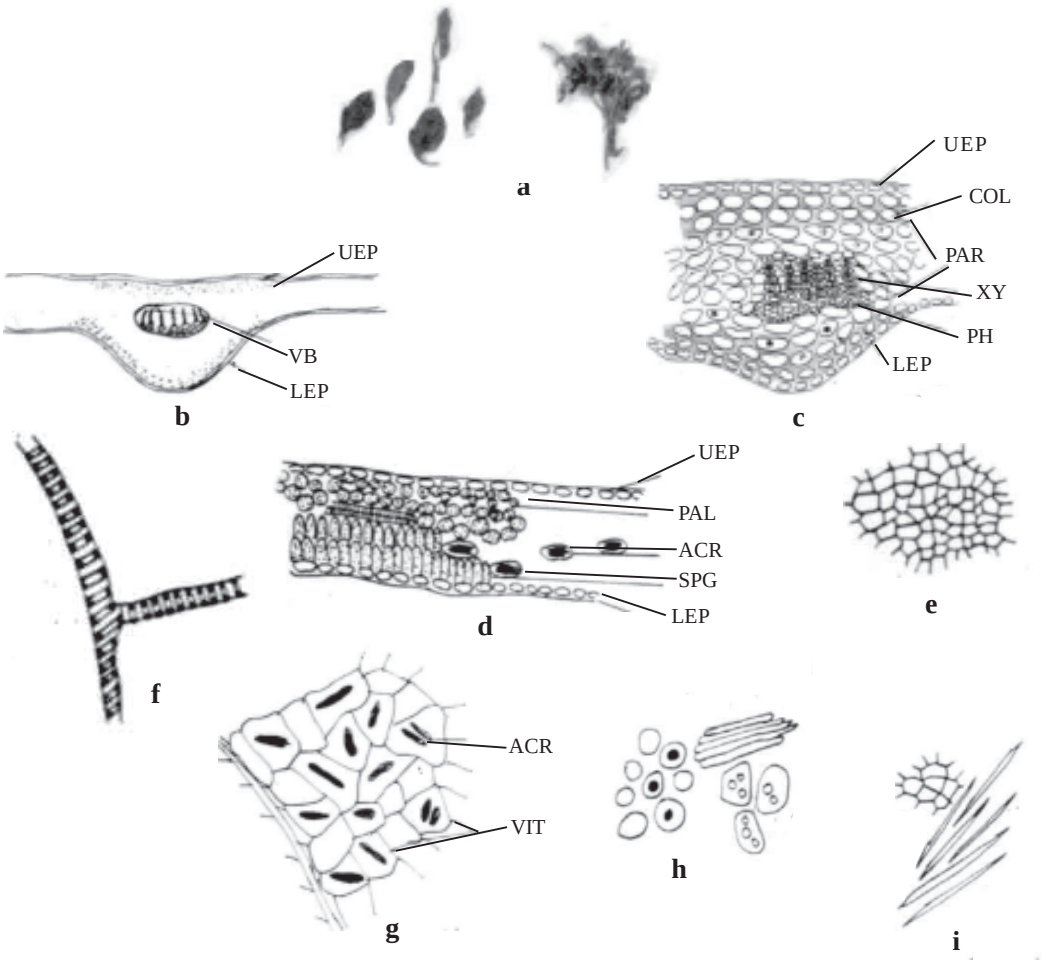


Fig IV **a - i**. *Gisekia pharnaceoides* L. - **a**) Leaves; **b**) T.S. of leaf through midrib region (semidiagrammatic); **c**) Portion of leaf enlarged showing collenchyma, paranchyma and vascular bundles; **d**) T.S. of the leaf through laminar region showing palisade and spongy tissue (dorsiventral leaf strcture); **e**) Epidemal surface; **f**) Helical vessel; **g**) Vein islet of the leaf showing raphide bundles; **h**) Paranchyma cells; **i**) Acicular crystals.

VB Vascular Bundle **LEP** Lower Epidermis **UEP** Upper Epidermis **PAL** Palisade Tissue **ACR** Acicular crystals **SPG** Spongy parenchyma **COL** Collenchyma **PAR** Parenchyma **XY** Xylem **PH** Phloem **VIT** Vein islet

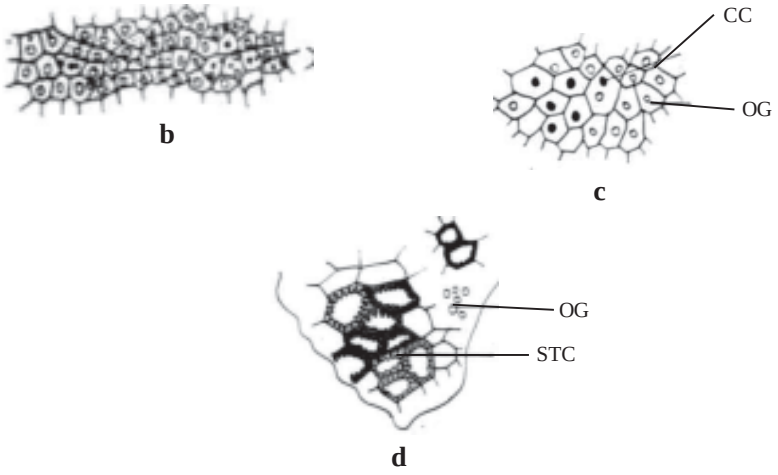


Fig V **a - d**. *Gisekia pharnaceoides* L. - **a**) Seed; **b**) Cotyledonary portion with oil globules and grains; **c**) Seed coat surface view; **d**) Stone cell layer and oil globules.

OG Oil globule **STC** Stone cell **CC** Cell content

- Acicular needle crystals,
- Polygonal epidermal cells,
- Fragments of epidermal cells with stomata,
- Helical to spiral xylem vessel,
- Fragments of chocolate brown polygonal parenchymatous cells,
- Fragment of polygonal cells with oil-globules and starch grains,
- Fragments of cotyledon portion,
- Fragments of polygonal stones cells,
- Fragments of palisade tissue,
- Fragments of pollengrains.

Diagnostic characters

Diagnostic characters shows the presence of - a) creme coloured woody roots, b) bundles of acicular crystals, c) soft crème coloured stem with smooth surface with hollow pith, d) hollow wide large pith with few layers of thin walled parenchymatous cells, e) Ranunculaceous type of stomata on the lower side of the leaf, f) prominent bundles of acicular crystals in the cortex of the stem, root and in the mid rib region and in the laminar region of the leaf and g) thick chocolate brown testa of the seed.

Cell contents

Abundant bundles of needle shaped acicular crystals, scanty tannin, oil-globules and simple starch grains.

Leaf

Quantitative study of the leaf such as stomatal index, palisade ratio and vein islet numbers were also carried out. The average quantitative values of the leaves are vein islet number 10 and 12, stomatal number 20 to 25 and palisade ratio 8 to 12. Measurements of different tissues are tabulated (Table 1).

Table 1. Measurements of different Tissues in microns

Root		
Epidermis	-	15 - 20 - 22 x 12 - 18 - 20
Cortex	-	20 - 25 - 35 x 10 - 15 - 20
Xylem	-	10 - 18 - 25 x 8 - 12 - 20
Phloem	-	15 - 20 - 25 x 10 - 12 - 22
Crystals	-	18 - 25 - 35 (length)
Stem		
Epidermis	-	15 - 18 - 20 x 10 - 12 - 18
Cortex	-	25 - 28 - 30 x 15 - 20 - 25
Sclerenchyma	-	15 - 20 - 25 x 12 - 18 - 20
Xylem	-	10 - 18 - 24 x 8 - 15 - 20
Phloem	-	15 - 20 - 25 x 10 - 18 - 22
Cambium	-	8 - 12 - 20 x 5 - 10 - 18
Pith	-	15 - 18 - 25 x 10 - 15 - 22
Leaf		
Upper epidermis	-	10 - 18 - 22 x 8 - 10 - 15
Lower epidermis	-	12 - 20 - 25 x 10 - 12 - 18
Collenchyma	-	15 - 20 - 30 x 12 - 18 - 25
Parenchyma	-	18 - 25 - 35 x 15 - 20 - 25
Xylem	-	15 - 20 - 25 x 10 - 15 - 20
Phloem	-	10 - 15 - 20 x 8 - 12 - 15
Needle (Acicular crystals)	-	15 - 25 - 35 (in length)

Maceration		
Root		
Xylem vessels	-	35 - 55 - 80 x 15 - 20 -25
Tracheids	-	25 - 40 - 75 x 10 - 15 - 20
Fiber (xylem)	-	50 - 85 - 105 x 12 - 15 - 20
Acicular crystals	-	20 - 30 - 35 (length)
Stem		
Epidermal cells	-	15 - 20 - 25 x 10 - 15 - 20
Xylem vessels	-	25 - 45 - 65 x 10 - 20 - 25
Tracheids	-	20 - 50 - 80 x 15 - 20 - 22
Fiber	-	65 - 70 - 88 x 15 - 20 - 25
Leaf		
Epidermis	-	20 - 25 - 38 x 10 - 12 - 18
Epidermis (Surface view)	-	30 - 40 - 50
Xylem vessel	-	25 - 45 - 80 x 15 - 20 - 25
Stomata	-	20 - 25 - 30 x 10 - 15 - 20
Acicular crystal	-	20 - 30 - 40
Seed		
Polygonal parenchyma cells	-	20 - 30 - 45 x 15 - 20 - 22
Starch	-	10 - 15 - 20 (diameter)
Oil globules	-	10 - 15 - 25 (diameter)

Physico-chemical studies

The physico-chemical parameters like solubilities and ash content of the powdered drug were determined. The ash was analysed for inorganic constituents. A weighed quantity of the air-dried drug was extracted with petroleum ether 60 - 80°C, benzene, chloroform and alcohol successively using a soxhlet apparatus and the percentage of each extract were determined. The results are tabulated in Table 2. The above four extracts were screened for their organic constituents and the results are recorded in Table 3.

Thin layer chromatographic studies

T.L.C. studies of the above four extracts were carried out in various solvents systems at 30°C using silica gel 'G' as adsorbent. The Rf values are recorded in Table 4.

Table 2. Physico-chemical parameters

	(%w/w)
1. Percentage loss on drying at 110°C.	2.82
2. Percentage ash content	18.06
3. Percentage acid insoluble ash	2.14
4. Solubility:	
a. Percentage in ethyl alcohol	9.32
b. Percentage in water	7.62
5. Qualitative inorganic analysis of the ash	Presence of carbonate, chloride, sulphate, phosphate, iron, silica, calcium.
6. Extractive values:	
a. Percentage in Petroleum ether 60 - 80°C.	4.96
b. Percentage in benzene	0.56
c. Percentage in chloroform	0.35
d. Percentage in alcohol	12.38

Table 3. Organic constituents of *Gisekia pharnaceoides* - whole plant

Sl. No.	Constituents	Extracts and test results			
		Pet. ether	Benzene	Chloroform	Alcohol
1.	Steroids	+ve	+ve	-ve	-ve
2.	Flavonoids	-ve	-ve	-ve	-ve
3.	Phenols	-ve	-ve	-ve	-ve
4.	Sugars	-ve	-ve	+ve	+ve
5.	Alkaloids	-ve	-ve	-ve	-ve
6.	Tannins	-ve	-ve	-ve	+ve
7.	Saponins	-ve	-ve	-ve	+ve

Fluorescence analysis

The powdered drug was sieved through No. 120 mesh and the fine powder in different solutions was examined in ordinary and ultra violet light (both long and short wave length) for their fluorescence characters. The results are recorded in Table 5.

Summary

In this paper macro, microscopical maceration and powder study of root, stem, leaf and seed of *manalikeerai* has been carried out along with its physical constants, extractive values, U-V studies and thin layer chromatographic studies of *Gisekia pharnaceoides* which constitutes the drug *manalikeerai* in Siddha system of medicine.

Acknowledgement

Authors are thankful to the Director, CCRAS, New Delhi for evincing interest in this work and to the Survey of Medical Plants Unit,

Table 4. Thin layer chromatography - Rf values

Extracts	Solvent systems	Developer / Spray	Rf values
Pet. ether 60-80°C.	Benzene : ethanol (9:1)	50% ethanol	0.08, 0.16, 0.33, 0.38, 0.51, 0.60, 0.69, 0.77, 0.83, 0.90.
Benzene	Benzene : ethanol (9:1)	50% ethanol	0.18, 0.33, 0.37, 0.45, 0.50.
Chloroform	Chloroform : methanol (9:1)	50% ethanol	0.27, 0.35, 0.43, 0.55, 0.59.
Alcohol	Chloroform : methanol (4:1)	50% ethanol	0.18, 0.58, 0.62, 0.82, 0.91.

Table 5. Fluorescence studies of *Gisekia pharnaceoides* - whole plant

Treatment	Ordinary light	U - V Light	
		Long-wave 365 mμ	Short-wave 254 mμ
Powder as such	Dull brown	Yellowish brown	Dark violet
Powder + water	Dull brown	Yellowish green	Dark violet
Powder + 50% HCl	Yellowish green	Yellowish green	Bluish violet
Powder + 50% H_2SO_4	Greenish yellow	Yellowish grey	Bluish black
Powder + 50% HNO_3	Yellow	Dull green	Bluish black
Powder + 40% NaOH	Yellowish brown	Olive green	Buish black
Powder + NaOH in methanol	Yellowish brown	Yellowish green	Deep violet
Powder + acetic acid	Yellowish green	Dark green	Brownish violet
Powder + methanol	Brownish green	Yellowish green	Violet with reddish tinge

Palayamkottai, Tamil Nadu, for the supply of plant material to carryout the research work.

References

1. Anonymous, 1966, *Pharmacopoeia of India*, 2nd Edn., Manager of Publications, Govt. of India, pp 930-990.

2. Chopra, R.N., Nayar, S.R. and Chopra, I.C., 1956, *Glossary of Indian Medicinal Plants*, pp. 135.

3. Chase, C.R. and Pratt, 1949, *Fluorescence of powdered vegetable drugs with particular reference to development system of identification*, Jour. Am. Associ. (Sci. edn.), 38:324 to 331.

4. Igon Stahal, 1969, *Thin Layer Chromatography, A laboratory Handbook*, Spinger International student edition, Springer Verlag Berlin, Heidelberg, New York, pp. 52-86, 127-128, 900.

5. Iyengar, M.A., 1950 to 1975, *Bibliography of Investigated Indian Medicinal Plants*, Manippal Power Press, Manippal, pp. 38.

6. Johansen, D.A., 1940, *Microtechnique*, Mograw Hill, New York, pp 183 to 203.

7. Kiritikar, K.R. and Basu, B.D., 1975 (reprint Edn.), *Indian Medicinal Plants*, Vol. II, pp. 1187 to 1188.

8. Murgesha Mudaliar, K.S., *Materia Medica (veg. Section) in Tamil*, Tamil Nadu, Department of Siddha Medicine, Madras, pp. 273 - 274.

9. Nadkarni, K.M., 1976, *Indian Materia Medica*, pp. 578.

10. Roma Mitra, 1986, *Bibliography on Pharmacognosy of Medicinal Plants*, NBRI, Lucknow, pp. 127.

11. Wallis, 1967, *Textbook of Pharmacognosy*, 15th edition, TA Churchill, London, pp 571 - 582.

Aryavaidyan Vol. XV., No. 2, Nov. 2001. - Jan. 2002, Pages 98 - 102

SAPONINS FROM A FEW LEGUMINOUS PLANTS

Seetharam, Y.N., Santosh, M.K., Vijay and Shivkumar, D.*

Abstract: The seven leguminous plants considered for the present study shows the presence of saponins. Out of seven plants *Bauhinia racemosa* Lam. and *Crotalaria juncea* Linn. showed positive result for preliminary foam test for saponins. The qualitative separation of saponins of all seven plants and observations were made after exposing the plates to iodine vapours, spraying with vanillin in ethanol and spraying with vanillin in methanol. Lysis of erythrocytes also indicates the presence of saponins in seven leguminous plants. The significance and therapeutic efficacy of saponins have also been discussed.

Introduction

In modern medicine, plants occupy significant role as a raw material for important drugs. Many of the secondary metabolites are directly or indirectly responsible for therapeutic efficacy of the medicinal plants. Among these phytoconstituents saponins are the most important constituents whose therapeutic values are well established[1].

Saponins are triterpenoidal or steroidal glycosides which occurs in various tissues of many plant species including several food plants[2]. Saponins are also present in some of the sea animals and in snake venom[3].

Saponins have important applications for the diagnosis and treatment of allergy[4], and are also used as an adjuvant in foot and mouth disease vaccines[5]. These saponins are also used as anti-fertility drugs by cutting the tail of sperm[3]. Considering these facts, the present study is undertaken on a few leguminous plants for preliminary and qualitative separation of saponins.

Materials and methods

Collection of plant materials

The plant materials used for the present work were collected from various places of Gulbarga. The plant species collected were identified with the help of "Flora of Presidency of Madras" by Gamble (1935)[6] and "Flora of Karnataka" by Saldanha (1980)[7] and are deposited in the Herbarium, Department of Botany, Gulbarga University, Gulbarga (HGUG) and are listed in the Table I.

Preliminary tests.

Thus collected plant materials were shade dried and powdered using grinder. The powdered materials were used for extraction of

**Taxonomy and Medicinal Plants Laboratory, Dept. of Botany, Gulbarga University, Gulbarga - 585 106.*

saponins. Preliminary test to test the occurrence of saponins was conducted using foam test (Gibbs, l974)[8]. The plant materials were homogenised in a suitable volume of PBS using mortar and pestle and the suspension was centrifuged. The supernatant was taken for further work.

Lysis of erythrocytes

The PBS extracts of plant materials were mixed with 2% suspension of human erythrocytes in PBS (1:1), in the cavity slides. The contents of the cavity were mixed well at regular intervals and observations for the lysis of erythrocytes were made at 10,15,20,30,45,60 and 120 min.[9]

Separation of saponins

For the separation of saponins the ethanolic extract of plant materials were used. These extracts were concentrated, re-dissolved in chloroform and subjected to separation on TLC using ethyl acetate and hexane (1:9 v/v) as the solvent system[10-13].

The saponins were observed on TLC plates by incubating in a glass chamber saturated with I_2 vapours as they develop yellowish brown spots. The plates were sprayed with 1% vanillin in ethanol, dried for five minutes sprayed with acetic anhydride and concentrated $H_2 SO_4$ (12:1) and heated at 85°-90°C until yellow spots appeared turning gray and then blue black on a pinkish or gray background colour. The plates were sprayed with 1% vanillin in methanol with 1% concentrated $H_2 SO_4$ and heated at 90°C for five minutes. The saponins were indicated by yellow spots turning gray in a creamy white background colour.

Results and discussion

The preliminary test for saponin have indicated the presence of saponin by the formation of a stable foam when an ethanolic extract was shaken vigorously with water, in two out of the seven species studied. But the characteristic feature of saponins of lysing the cell membrane was shown by all the seven species under study. This confirms the occurrence of saponins in the species under study (Table II).

Table I. Showing particulars of the taxa studied.

Sl. No.	Name of the plant	Part used	Place of collection	Date of collection
1.	*Atylosia scarabaeoides* Benth.	Whole plant	G.U.G. Campus	09.09.99
2.	*Bauhinia racemosa* Lam.	Leaves	G.U.G. Campus	17.09.99
3.	*Crotalaria juncea* Linn.	Seeds	Market	09.09.99
4.	*Delonix elata* Gamble	Leaves	Santraswadi	09.09.99
5.	*Delonix regia* Raf.	Leaves	G.U.G. Campus	09.09.99
6.	*Hardwickia binata* Roxb.	Leaves	G.U.G. Campus	09.09.99
7.	*Rhynchosia minima* DC	Whole plant	G.U.G. Campus	09.09.99

Table II. Indicating the occurrence of saponins.

Sl. No.	Test	Observation	1	2	3	4	5	6	7
1.	Foam test	Foam formation	-ve	+ve	+ve	-ve	-ve	-ve	-ve
2.	Haemolysis test	Lysis of RBC	+ve	+ve	+ve	+ve	+ve	+ve	+ve

1. *Atylosia scarabaeoides* Benth., 2. *Bauhinia racemosa* Lam., 3. *Crotalaria juncea* Linn.
4. *Delonix elata* Gamble, 5. *Delonix regia* Raf., 6. *Hardwickia binata* Roxb., 7.*Rhynchosia minima* DC.

The loss of granular nature of cell contents and membrane-destablising effect of saponins is common features. It may depend on concentration of saponins[4]. We have observed that erythrocytes on exposure to saponin for longer than 60 min. lead to the cell to lysis. But lysis was not observed during 10,15,20,30 and 40 min.

Seperation of saponins

Saponins were easily separated using ethyl acetate and hexane solvent system. The separated chromatogram was placed in 1_2 vapour saturated chamber, sprayed with vanillin in ethanol and sprayed with vanillin in methanol. The colour changes, etc. are shown in detail in Tables III, IV & V.

Table III. Separation of bands in ethyl acetate and hexane (in I_2 saturated chamber) with Rf values.

Sl. No.	Name of the plant	Colour of the band	Rf value
1.	*Atylosia scarabaeoides* Benth.	Yellow	0.21
		Yellow	0.40
		Light yellow	0.60
		Light yellow	0.70
		Yellow	0.90
2.	*Bauhinia racemosa* Lam.	Yellow	0.21
		Yellow	0.41
		Yellow	0.56
		Yellow	0.78
		Brown yellow	0.90
3.	*Crotalaria juncea* Linn.	Brown yellow	0.07
		Yellow	0.17
		Yellow	0.23
		Yellow	0.38
		Brown yellow	0.59
		Brown yellow	0.92
4.	*Delonix elata* Gamble	Yellow	0.25
		Dark brown	0.44
		Yellow	0.59
		Yellow	0.74
		Brown yellow	0.88
5.	*Delonix regia* Raf.	Yellow	0.25
6.	*Hardwickia binata* Roxb.	Yellow	0.51
		Yellow	0.71
7.	*Rhynchosia minima* DC	Brwon yellow	0.18
		Brown yellow	0.34
		Yellow	0.50
		Yellow	0.63
		Yellow	0.72

Table IV. Separation of bands in ethyl acetate and hexane (in 1% vanillin in ethanol) with Rf values.

Sl. No.	Name of the plant	Colour of the band	Rf values
1.	*Atylosia scarabaeoides* Benth.	Dark gray	0.10
		Gray	0.19
		Gray	0.35
		Light gray	0.61
		Light gray	0.70
		Light gray	0.78
2.	*Bauhinia racemosa* Lam.	Dark gray	0.10
		Light gray	0.27
		Gray	0.60
3.	*Crotalaria juncea* Linn.	Lght gray	0.18
		Light gray	0.36
		Dark gray	0.50
		Blue black	0.67
4.	*Delonix elata* Gamble	Dark gray	0.08
		Dark gray	0.39
		Blue black	0.75
5.	*Delonix regia* Raf.	Gray	0.41
		Gray	0.53
		Blue black	0.94
6.	*Hardwickia binata* Roxb.	Gray	0.12
		Gray	0.89
7.	*Rhynchosia minima* DC	Dark gray	0.12
		Light gray	0.21
		Light gray	0.36
		Light gray	0.54
		Light gray	0.72

In the present investigation it is found that all the plants tested for the presence of saponins indicated their occurrence which is supported by preliminary test, lysis of Erythrocytes and separation of TLC.

Saponins usually occurs in very large number of plant species and in all tissue (Kameshwara Rao and W. Sangeeta 1997)[14], but in the previous work on pollen of *Bauhinia* sps., *Delonix regia* and *Crotalaria mysorensis* did not show the occurrence of saponins, *C. verrucosa* showed the occurrence of saponins in its pollen[9].

This needs further studies to confirm their presence by isolating and elucidating the structures of saponins by spectral studies.

Table V. Separation of bands in ethyl acetate and hexane (in 1% vanillin in methanol) with Rf values.

Sl. No.	Name of the plant	Colour of the band	Rf values
1.	*Atylosia scarabaeoides* Benth.	Gray	0.18
		Gray	0.19
2.	*Bauhinia racemosa* Lam.	Gray	0.10
		Gray	0.29
		Gray	0.81
3.	*Crotalaria juncea* Linn.	Gray	0.08
4.	*Delonix elata* Gamble	Gray	0.08
		Gray	0.31
		Gray	0.84
5.	*Delonix regia* Raf.	Gray	0.18
6.	*Hardwickia binata* Roxb.	Gray	0.16
7.	*Rhynchosia minima* DC	Gray	0.11
		Gray	0.86

References

1. Trease, G.E. and Evans, W.C., *Pharmacognosy*, 10th ed., Baillier Tindall, London, l972.

2. Birk, Y., *Saponins – In: Toxic constituents of Plant Food Stuffs* (ed. I.E. Liener), Acad. Press, New York, l969, l69-210.

3. Kameshwar Rao, C. and Meera, B.K. *Bal Vignyan*, l999,20-21.

4. Sangeeta, *Lectins and saponins in pollen and stigmas*, Ph.D. Thesis, Bangalore University, Bangalore, India l994.

5. W.H.O., *Immunological Adjuvants*, Tech. Rep. Ser. No. l959, Geneva, l976.

6. Gamble, J.S., *Flora of the presidency of Madras*, Adlard and Son. Ltd., W.L. London, Vol.I-III, l935.

7. Saldanha, C.J., *Flora of Karnataka*, Oxford and IBH Publishing Co.Pvt. Ltd., New Delhi, Vol. I, l980.

8. Gibbs, R.D., *Chemotaxonomy flowering plants*, Mc Gill-Queen's University Press, Montreal and London, Vol.I, 1974, 523 619.

9. Sangeeta Wadhawan and Kameshwar Rao C., *Grana*, l993, 32, 255-259.

10. Harborne, J.B., *Phytochemical Methods*, 2nd ed., Chapman and Hall, London, l984.

11. Furniss, B.S., Hannaford, A.J. Smith, P.W.G., and Thatchell, A.R., *Vogel's text book of practical organic chemistry*, 5th ed. Longman Sci. and Tech., Essex, l989.

12. Ergon Stahl, *Thin Layer chromatography*, Spiringer international student edition, New York, l965

13. Dawson, R.M.C., Elliott, D.C. Elliott, W.H. and Jones, K.M., *Data for biochemical research* 3rd edn., Oxford Sci.Publ., Oxford, l986.

14. Kameshwara Rao, C. and Sangeeta W., *Aerobiology*, Chief Ed., S.N. Agashe, Oxford and IBH Co. Pvt. Ltd., New Delhi, l997, 487 497.

Aryavaidyan Vol. XV., No. 2, Nov. 2001. - Jan. 2002, Pages 103 - 106

PLANTS USED FOR THE TREATMENT OF WOUNDS BY TRIBES OF DADRA, NAGAR HAVELI AND DAMAN

Sharma, P.P.* and Singh, N. P.**

Abstract: This paper deals with the use of plants for the treatment of wounds by tribes of Dadra, Nagar Haveli and Daman. Information collected from knowledgeable people like traditional healers, medicine-men, etc. has revealed that 30 plant species are used for treatment of wounds. The use of plants or plant parts as a paste, juice and powder are the commonest categories of the preparation made for treatment.

Introduction

Plants have always played an important role in the traditional healthcare systems. Recent figures show that herbal medicines are being used by about 80% of the world population primarily in the developing countries for primary healthcare (Kamboj, 2000).

The Union Territories of Dadra, Nagar Haveli and Daman are situated on the West Coast of India. Dadra and Nagar Haveli is surrounded by Gujarat State from west, north and north-east and south and south-east of the territory is surrounded by Maharashtra State. Major part of the union territory of Daman and Diu is bounded by Arabian Sea on the west and other sides by Gujarat State. Tribal people in these areas belong to Warli, Konkana, Dhodia, Dubala, Kathudi, Koli and the Naika tribes. Tribes in Dadra and Nagar Haveli constitute 80% and in Daman 24% of the total population. The tribal people of these areas are depends on plants for the treatment of various diseases and ailments including the uses of plants for the treatment of wounds. Traditional knowledge about use of plants for treating several diseases or ailments is generally confined to few people in communities or societies, but the use of plants in treating wounds is known to most of the people even children too are found well aware of this knowledge.

Wounds arising from incisions, cuts, bruises, eruptions, scratches, etc. are sometimes left untreated at the initial stages. When skin is wounded it changes its colour, swells or gets inflamed and becomes hard. If untreated at initial stage wounds becomes sceptic in most cases. Tribal people in these areas treat such wounds in traditional way using plant materials.

** National Botanical Research Institute, Lucknow - 226 001.*
*** Botanical Survey of India, P-8, Brabourne Road, Calcutta - 700 001.*

Table I.

Botanical name	Local name	Family	Locality & Field Collection	Use (Plant part, preparation formulation)
Abelmoschus manihot (L.) Medik.	*Bambudo, Ranbhindo*	Malvaceae	Nagar Haveli 176416	Root paste is applied.
Acacia nilotica (L.) Del. ssp. *indica* (Bth.) Brenan	*Babul, Bawar*	Mimosaceae	Daman 173962	Bark paste is applied.
Achyranthus aspera L.	*Agheda*	Amaranthaceae	Nagar Haveli 173928	Root paste is applied.
Alhagi pseudalhagi (Bieb.) Desv.	*Javaso*	Fabaceae	Daman 176491	Leaf and flower juice is applied, useful for cuts also.
Annona squamosa L.	*Sitaphal*	Annonaceae	Nagar Haveli 176465	Leaf paste is applied for killing worms.
Artemisia nilgirica (Clarke) Pamp.	*Dhor-dhavana*	Asteraceae	Nagar Haveli 176453	Bark paste is applied for treating un-healthy wounds.
Boerhaavia diffusa L.	*Hatodi*	Nyctaginaceae	Daman 173328	Fresh roots crushed and applied.
Bridelia squamosa (Lamk.) Gaertn.	*Asan*	Euphorbiaceae	Nagar Haveli 177304	Bark juice is applied, useful for cuts also.
Cryptolepis buchanani Roem. & Schult.	*Kavali*	Periplocaceae	Nagar Haveli 173317	Latex is applied, useful for cuts also.
Curcuma longa L.	*Halad*	Zingiberaceae	Daman 176486	Rhizome powder is applied, useful for cuts also.
Dalbergia sissoo Roxb.	*Shisav*	Fabaceae	Nagar Haveli 173366	Leaf crushed and applied.
Eclipta prostrata (L.) L.	*Malliyabhaji*	Asteraceae	Dadra 173967	Leaf crushed and applied for wounds on toes and for deep foot cracks.
Gloriosa superba L.	*Kal-lawi*	Liliaceae	Nagar Haveli 173332	Tuber paste is applied.
Heterophragma quadriloculare (Roxb.) Schum	*Murus*	Bignoniaceae	Nagar Haveli 173989	Bark paste is applied, useful for sores on toe also.
Hygrophila auriculata (Schum.) Heine.	*Akhiryo*	Acanthaceae	Nagar Haveli and Daman 173344 & 173959	2-3 small root pieces (about 2.5 - 5.0 cm) eaten for 3 - 4 days.

Table contd....

Table I. Contd....

Botanical name	Local name	Family	Locality & Field Collection number	Use (Plant part, preparation formulation)
Lannea coromandelica (Houtt.) Merr.	*Madhal*	Anacardiaceae	Nagar Haveli 173973	Bark decoction taken orally and paste is also applied
Leea indica (Burm.f.) Merr.	*Dini*	*Leeaceae*	Nagar Haveli 173386	Leaf paste is applied.
Macaranga peltata (Roxb.) Muell - Arg.	*Chand-diva*	Euphorbiaceae	Nagar Haveli 176448	Latex is applied, useful for cuts also. Bark extract is given to cattle for killing wound worms.
Madhuca longifolia (Koen.) Mc Bride var. *latifolia* (Roxb.) Chevalier	*Mohwa*	Sapotaceae	Nagar Haveli 173302	Bark ash mixed with coconut oil is applied.
Malachra capitata (L.) L.	*Nano-bhindo*	Malvaceae	Daman 173908	Dry plant powder mixed with coconut oil is applied.
Michelia champaca L.	*Sonchafa*	Magnoliaceae	Nagar Haveli 173395	Fruit and seed paste is applied, useful for foot cracks also.
Momordica charantia L.	*Karle*	Cucurbitaceae	Nagar Haveli 176438	Leaves crushed and applied.
Pergularia daemia (Forsk.) Chiov.	*Utaran*	Asclepiadaceae	Daman 177312	Leaf paste is applied.
Semecarpus anacardium L.f.	*Bibba*	Anacardiaceae	Nagar Haveli 173338	Seed oil with melted jaggery is applied in case of pierced thorn to expel it out and for healing wound.
Sida cordata (Burm.f.) Borss.	*Bhoybal*	Malvaceae	Daman 173909	Leaf paste is applied.
Sida cordifolia L.	*Khiranti*	Malvaceae	Nagar Haveli 174345	Root and leaf paste is applied.
Sterculia urens Roxb.	*Kahandol*	Sterculiaceae	Nagar Haveli 173917	Leaf or inner bark juice is applied.
Trichodesma sedgwickianum S.P. Banerjee		Boraginaceae	Nagar Haveli 176422	Root paste is applied.
Tridax procumbens L.	*Kurhadu*	Asteraceae	Dadra 173383	Leaf crushed and applied, useful for cuts also.
Withania somnifera (L.) Dunal	*Askand*	Solanaceae	Nagar Haveli 176494	Root paste is applied.

Methodology

The data presented here is based on personal observations and interviews with informants like medicine-men, local healers, etc. Each use of the plant was confirmed and verified during visits to different localities in the area and even with the same informant on different occasions. A total of nine field tours were undertaken during 1995 to 1998 and each visit lasted for 20-25 days. The voucher specimens collected are deposited in Botanical Survey of India (BSI), Western Circle Herbarium , Pune, under senior author's name (P.P. Sharma).

Enumeration

30 plants with their correct botanical names, local names, family names, localities with field collection numbers and uses with plant parts, preparation and formulations are detailed in Table I.

Discussion

Ethnobotanical studies conducted in Dadra, Nagar Haveli and Daman revealed that 30 plant species belonging to 23 families are used for treating wounds by tribes. The method of preparation involved plants applied as paste - 16 species; those crushed and applied - 5 species; applied directly (e.g. latex, seed oil) - 3 species, juice applied from fresh parts - 3 species; decoction or extract or plant part taken orally - 3 species; ground into powder or ash of plant part - 3 species. Most frequently, plant parts used in these preparations are leaves (12 species); followed by roots (9 species); bark (7 species); seeds and latex (2 species); flowers, fruits and whole plant (1 species each).

To test the scientific validity of the herbal preparations or drugs, clinical trials are necessary, which could establish therapeutic properties of these preparations for their safe use.

References

1. Bennet, S.S.R., 1978, Ethnobotanical Studies in Nagar Haveli Forests - Some interesting native drugs, *Indian Forester*, 104(10): 676-681.

2. Kamboj, V.P., 2000, Herbal Medicine, *Current Science*, 78 (1): 35.

3. Sabnis, S.D. and Bedi, S.J., 1983, Ethnobotanical studies - Dadra, Nagar Haveli & Daman, *Indian Forester*, 6(1): 65-69.

4. Sharma, P.P. and Singh, N.P., 1999, Less known ethnobotanical uses of plants in Dadra and Nagar Haveli (U.T.), Part I (A-K), *Ethnobotany*, 11:109-114.

5. Sharma, P.P. and Singh, N.P., 2000, Less known ethnobotanical uses of plants in Dadra and Nagar Haveli (U.T.), Part II (L-Z), *Ethnobotany*, 12 (in press).

Aryavaidyan Vol. XV., No. 2, Nov. 2001. - Jan. 2002, Pages 107 - 110

IN-VITRO ANTIBACTERIAL EVALUATION OF *TINOSPORA CORDIFOLIA* STEM EXTRACTS

Rajurkar, S.R. and Vadlamudi, V.P.*

Abstract: Investigations were carried out to assess the antibacterial property of stem of *Tinospora cordifolia*. Fresh *Tinospora cordifolia* stem was processed to obtain aqueous, ethyl acetate, methanol and chloroform extracts. The antibacterial activity of the extracts was studied *in-vitro* by disc diffusion and tube dilution tests against *Escherichia coli, Staphylococcus aureus* and *Salmonella gallinarum. Tinospora cordifolia* stem possessed antibacterial principles, soluble in ethyl acetate which suppressed the growth and multiplication of *Salmonella gallinarum* and the aqueous, ethyl acetate and methanol soluble principles possessed the antibacterial activity against *Staphylococcus aureus.*

Introduction

The widespread and indiscriminate use of proprietary anti-bacterial, especially the broad spectrum antibiotics has confounded the problems of their efficacy as a result of microbial resistance and adverse effects on the host. Further, the newer broad spectrum antibiotics are cost prohibitive and are not within the reach of poor. Therefore it is also worthwhile to investigate a better therapeutic tool of low cost.

The plants on the mother earth not only provide food for man and fodder for animals, but also elaborate a number of active principles with potent and varied therapeutic values to fight against diseases.

The herbal remedies are economic and within the reach of common man. About 80 percent of people living in developing countries are almost completely dependent on traditional methods for their primary healthcare needs (Fransworth, 1990). Further, the WHO recommended utilization of this traditional system of medicine in primary healthcare programmes (Pushpangadan, 1996). Accordingly, the search for effective and economically viable alternatives to expensive antibiotics is being pursued. The voluminous literature on Indian medicinal plants illustrate the antibacterial values and utility of herbs in the treatment of a variety of infectious diseases (Kirtikar and Basu, 1935; Nadkarni, 1954; Chopra et al., 1956; Sawant, 1974; Ogale, 1986; Deshpande et al., 1989). The present investigation includes *in-vitro* evaluation of *Tinospora cordifolia* extracts for antibacterial activity against some common pathogenic bacteria.

** Department of Pharmacology, College of Veterinary and Animal Sciences, Maharashtra Animal & Fisheries Science University, Parbhani - 431 402.*

Materials and methods

Freshly collected stem of *Tinospora cordifolia* was ground into a fine paste. The paste (100 g) was macerated in one litter distilled water, ethyl acetate, methanol and chloroform separately. After 48 hrs. the contents of the beaker were filtered first through muslin cloth followed by Whatman No. 1 filter paper. The filtrates so obtained were placed in evaporating dishes and air dried for evaporation of solvents. After complete evaporation, the residues/extracts left in the dishes were taken in airtight screw-cap vials.

The pathogenic bacterial isolates *Escherichia coli, Staphylococcus aureus* and *Salmonella gallinarum* were obtained from the Disease Investigation Section, State Department of Animal Husbandry, Pune. The organisms were sub-cultured in nutrient agar and maintained at 4° C for antibacterial screening of the extracts. The antibacterial activity of the extracts was assessed by disc diffusion and plate dilution tests (Cruickshank, 1975). The sensitivity discs of 6.25 mm diameter were punched from a blotting paper and sterilized by dry heat (at 100° C) and stored in sterile screw-cap vials.

The discs were impregnated with the extracts. The 24 hrs. old cultures in nutrient broth were diluted to 10^{-3} in broth. Drug sensitivity test was conducted using the prepared discs of the four solvent extracts as per the method of Cruikshank (1975). All the plates were incubated at 37° C for 24 hrs. The plates were then removed to assess the antibacterial pattern of the four extracts and the zones of inhibition were measured.

A nutrient broth tube containing 3 ml of broth was added with a loopful of 24 hrs. old broth culture of each bacterium under test. Each sample was incubated for four hrs. at 37°C and then diluted further up to 10^{-5}. The dilution tubes ranging from 10^{-3} to 10^{-5} were added with two extract dried disc of each compound separately and incubated for 24 hrs. The bacterial growth was observed by plating the broth cultures on nutrient agar plates and 10^{-5} dilution was standardised for final observation.

The cultures thus diluted to 10^{-5} in triplicate, added with two discs of each solvent extract and incubated at 37° C overnight was poured on nutrient agar plate. The excess broth was discarded after soaking for 3 minutes and after 24 hrs. incubation at 37°C the colony counts was recorded.

Results and discussion

The cold aqueous, ethyl acetate, methanol and chloroform extracts of *Tinospora cordifolia* stem were evaluated *in-vitro* for antibacterial activity against *Escherichia coli, Staphylococcus aureus* and *Salmonella gallinarum* as the test organisms. The anti-bacterial activity was observed by disc diffusion and tube dilution techniques.

Disc diffusion test

The antibacterial assay was graded based on the zone of inhibition around the disc. The ethyl acetate and methanol extract impregnated discs showed moderate zone of inhibition, (++) against *Escherichia coli* and *Staphylococcus aureus*. Minimal antibacterial activity was observed against *Salmonella gallinarum*. However, both aqueous and chloroform extracts were ineffective against *Escherichia coli, Staphylococcus aureus* and *Salmonella gallinarum.* The methanol extract showed mild

antibacterial activity against *Escherichia coli* and *Staphylococcus aureus*. However, it was observed to be ineffective against *Salmonella gallinarum*. (Table 1)

Tube dilution test

All the four extracts had no effect on the colony counts of the *Escherichia coli*. Whereas, the ethyl acetate extract completely inhibited the growth and multiplication of *Salmonella gallinarum*, as compared to the aqueous, methanol and chloroform extracts, where the colony counts were similar to that of untreated control (Table 2).

The chloroform extract was observed to be ineffective in inhibiting the growth of *Staphylococcus aureus*. However, the aqueous, ethyl acetate and methanol extracts significantly inhibited the growth of *Staphylococcus aureus* the mean colony count was observed to be 77.67 + 9.03, 92.67 + 7.67 and 81.33 + 7.63 in aqueous, ethyl acetate and methanol extracts treated plates respectively, as compared to that of control (258.33 + 16.99).

Table 1. Antibacterial pattern of sensitivity discs impregnated with *Tinospora cordifolia* stem extracts

Extract discs	*Escherichia coli*	*Staphylococcus aureus*	*Salmonella gallinarum*
Aqueous	–	–	–
Ethyl acetate	++	++	+
Methanol	+	+	–
Chloroform	–	–	–

– No zone of inhibition
++ Moderate zone of inhibition
+ Mild zone of inhibition

Table 2. Antibacterial activity of *Tinospora cordifolia* stem extracts based on plate dilution technique

Bacteria	Mean colony count + S.E.				
	Untreated control	*Tinospora cordifolia* extract treated plates			
		Aqueous	Ethyl acetate	Methanol	Chloroform
Escherichia coli	215.67 + 27.20	219.67 + 20.77	235.67 + 22.74	211.00 + 22.58	255.00 + 18.00
Salmonella gallinarum	234.00 + 26.91	220.67 + 19.44	0.00	254.33 + 13.00	239.67 + 16.28
Staphylococcus aureus	258.33 + 16.99	77.67 + 9.03	92.67 + 7.67	81.33 + 7.63	276.00 + 6.94

From the present results, it is evident that *Tinospora cordifolia* stem possessed antibacterial principles, soluble in ethyl acetate which suppressed the growth and multiplication of *Salmonella gallinarum* and the aqueous, ethyl acetate and methanol soluble principles possessed the antibacterial activity against *Staphylococcus aureus*. Since the number of replications in the present study were limited, it may not be appropriate to draw final conclusion on sensitivity of each bacterial culture to the compounds tested. Further studies on *Tinospora cordifolia* stem extracts (ethyl acetate) against *Salmonella gallinarum* and aqueous, ethyl acetate and methanol extracts against *Staphylococcus aureus* using minimum inhibitory concentration tests against spectrum of bacteria may highlight the antibacterial activities.

References

1. Chopra, R.N., Nayar, S.L. and Chopra, I.C., (1956), *Glossary of Indian Medicinal Plants*, Edn. I, Council of Scientific and Industrial Research, New Delhi.

2. Cruickshank, R., Duguid, J.P., Marmion, B.P. and Swain, R.H.A, (1975), *Medical Microbiology*, Edn. 12., The English Language Book Society and E. and Churchill Livingstine, Edinburgh.

3. Deshpande, A.P., Jalgekar, R.R. and Ranade, S., (1989), *Dravyagun Vijnyan*, Edn. I, Anmol Prakashan, Pune.

4. Fransworth, N.R., (1990), *The role of Ethnopharmacology in drug development in bioactive compounds from plants*, Chichestor, N. (Editor), pp 2-21, Ciba foundation f symposium.

5. Kirtikar, K.R. and Basu, B.D., (1935), *Indian Medicinal Plants*, Edn. II, Vol. I-IV, International Book Distributors, Dehradun 1, India.

6. Nadkarni, K.M., (1954), *The Indian Materia Medica*, Edn. III, Vol. I-II, Popular Prakashan, Bombay.

7. Ogale, P.B. (1986), *Chikitsa Prabhakar*, Continental Book Service, Pune-30

8. Pushpangadan, P. (1994), *Ethnobiology in India - A status report*, All India Coordinated Research Project on Ethnobiology (AICRPE), Ministry of Environment and Forests, Govt. of India, New Delhi.

9. Sawant, S.Y., (1974), *Maharashtratil Divya Vanaushadhi*, Edn. I, Continental Prakashan, Pune.

Aryavaidyan Vol. XV., No. 2, Nov. 2001. - Jan. 2002, Pages 111 - 115

ANTIBACTERIAL AND ANTIFUNGAL ACTIVITY OF TWO CYNOBACTERIA

Angadi, S.B., Santosh, M.K., Shivkumar, D. and Sharanabasappa, G. *

Abstract: In the present investigation, the antibacterial and anti-fungal activity of two cynobacteria was bioassayed against the bacteria such as *Pseudomonas aeruginosa, Klebsiella pneumoniae. Escherichia coli* and *Staphylococcus aureus* and fungi such as *Aspergillus niger* and *Aspergillus flavus* at different concentrations. The petroleum ether, butanol, alcohol and water extracts of cyanobacteria were tested against pathogenic bacteria and fungi. All the extracts showed significant activity at higher concentrations. The water extract of cynobacteria showed significant activity against bacteria but it fails to inhibit the growth of fungi.

Introduction

Cynobacteria play an important role in nitrogen fixation and in addition to this it possess significant therapeutic efficacy. A large number of antibiotic compounds, many with novel structures, have been isolated and characterised in cynobacteria. The sources of extractions and synthesis of antibiotics have been elaborately worked out. Now many cynobacteria have been shown to produce antimicrobial compounds. A range of pharmacological activities has also been observed with extract cynobacteria. However, the active constituents are as yet unknown in most cases. The cyanobacteria have the potential to produce natural source of bioactive compounds in culture which are difficult or impossible to produce by chemical synthesis[1]. Considering the above facts the present study was carried out on two cynobacteria such as *Calothrix* spp. and *Oscillatoria* spp.

Materials and methods

The cynobacteria *Calothrix* spp. and *Oscillatoria* spp. were isolated from garden soil and were grown in Fogg's (1949)[2] medium at pH 7.6. The cultures were grown under 14/10h of light/dark cycle t 25 + 2°C and 1500 lux light intensity was provided by fluorescent tubes. The cultures were shaken manually twice a day.

Extraction

The healthy cultured cynobacterial material was filtered from the culture medium and washed in distilled water 2-3 times. The moisture of cynobacterial material was blotted with filter paper and shade dried. The fully dried material was powdered with the help of pestle

** Phycology laboratory, Department of Botany, Gulbarga University, Gulbarga 585 106.*

Table I. Showing the antimicrobal activity of different concentrations of *Calothrix* ssp. and *Oscillatoria* ssp. at 250 ppm concentration

Sl. No.	Pathogens	*Calothrix* ssp. (inhibition zone in mm)				*Oscillatoria* ssp. (inhibition zone in mm)				Standard inhibition zone in mm
		1	2	3	4	1	2	3	4	
I	**Bacteria**									
a.	*Pseudomonas aeruginosa*	10.5+ 0.707	13.5+ 0.707	15.5+ 0.707	Nil	15.5+ 0.707	12+ 2.25	17.5+ 0.707	Nil	22.5+ 0.707
b.	*Klebsiella pneumoniae*	13+ 1.41	13.5+ 0.707	15+ 0.707	Nil	Nil	Nil	11+ 1.41	10+ 1.41	22+ 1.41
c.	*Escherichia coli*	11+ 1.41	13.5+ 0.707	16.5+ 0.707	10+ 1.41	10.5+ 0.707	Nil	11+ 1.41	13+ 1.41	21.5+ 0.707
d.	*Staphylcococcus aureus*	12.5+ 0.707	15.5+ 0.707	14.5+ 0.707	15+ 1.41	13.5+ 0.707	11.5+ 0.707	18.5+ 0.707	Nil	23.5+ 0.707
II	**Fungi**									
a.	*Aspergillus niger*	12.5+ 0.707	12.5+ 0.707	13.5+ 0.707	Nil	11.5+ 2.25	15+ 1.41	12.5+ 3.53	Nil	23+ 0.41
b.	*Aspergillus flavus*	14+ 1.41	13.5+ 0.707	14.5+ 0.707	Nil	13.5+ 0.707	16.0+ 1.41	14+ 1.41	Nil	25+ 1.41

1. Petroleum ether extract, 2. Butanol extract, 3. Ethanol extract, 4. Distilled water extract.

Table II. Showing the antimicrobal activity of different concentrations of *Calothrix* ssp. and *Oscillatoria* ssp. at 500 ppm concentration

Sl. No.	Pathogens	*Calothrix* ssp. (inhibition zone in mm)				*Oscillatoria* ssp. (inhibition zone in mm)				Standard inhibition zone in mm
		1	2	3	4	1	2	3	4	
I	**Bacteria**									
a.	*Pseudomonas aeruginosa*	16.5+ 0.707	17.5+ 0.707	19+ 1.41	Nil	16.5+ 0.707	20.5+ 2.25	17.5+ 0.707	18.5+ 0.707	24.5+ 0.707
b.	*Klebsiella pneumoniae*	13.5+ 0.707	13.5+ 3.53	16.5+ 3.53	17.5+ 0.707	17.5+ 2.25	23+ 2.82	21.5+ 3.53	25.5+ 3.53	25.5+ 0.707
c.	*Escherichia coli*	14+ 2.82	17+ 1.41	16.5+ 0.707	22.5+ 0.707	10.5+ 0.707	11.5+ 0.707	18+ 4.24	25.5+ 6.36	25+ 1.41
d.	*Staphylcococcus aureus*	14.5+ 0.707	18+ 2.82	15.5+ 0.707	21+ 1.41	14+ 1.41	12+ 1.41	15.5+ 4.94	17.5+ 0.707	24+ 1.41
II	**Fungi**									
a.	*Aspergillus niger*	12.5+ 0.707	12.5+ 0.707	14.5+ 0.707	Nil	12.5+ 0.707	16.5+ 0.707	17.5+ 0.707	Nil	23+ 1.41
b.	*Aspergillus flavus*	15.5+ 0.707	21+ 1.41	20.5+ 0.707	Nil	21+ 1.41	16.5+ 1.41	17+ 1.41	Nil	26.5+ 0.707

1. Petroleum ether extract, 2. Butanol extract, 3. Ethanol extract, 4. Distilled water extract.

Table III. Showing the antimicrobal activity of different concentrations of *Calothrix* ssp. and *Oscillatoria* ssp. at 1000 ppm concentration

Sl. No.	Pathogens	*Calothrix* ssp. (inhibition zone in mm)				*Oscillatoria* ssp. (inhibition zone in mm)				Standard inhibition zone in mm
		1	2	3	4	1	2	3	4	
I	**Bacteria**									
a.	*Pseudomonas aeruginosa*	23.5+ 0.707	22+ 1.41	23.5+ 2.25	27.5+ 3.53	21.5+ 2.25	20.5+ 0.707	21+ 1.41	20.5+ 0.707	32+ 2.82
b.	*Klebsiella pneumoniae*	17+ 2.82	23.5+ 0.707	20.5+ 0.707	29.5+ 0.707	18+ 1.41	23+ 1.41	24+ 1.41	30+ 3.53	30.5+ 0.707
c.	*Escherichia coli*	15+ 1.41	19.5+ 0.707	17+ 2.82	32.5+ 3.53	12+ 2.82	13.5+ 0.707	20+ 2.82	29.5+ 0.707	31+ 1.41
d.	*Staphylcococcus aureus*	17+ 1.41	20.5+ 3.53	19+ 1.41	24+ 1.41	17+ 1.41	14.5+ 2.25	21+ 1.41	18.5+ 0.707	26+ 1.41
II	**Fungi**									
a.	*Aspergillus niger*	16.5+ 2.25	17+ 4.24	14.5+ 0.707	Nil	13.5+ 0.707	15+ 1.41	19+ 1.41	Nil	27+ 1.41
b.	*Aspergillus flavus*	15.5+ 0.707	25.5+ 0.707	23.5+ 0.225	Nil	21+ 1.41	23+ 1.41	22.5+ 0.707	Nil	28+ 1.41

1. Petroleum ether extract, 2. Butanol extract, 3. Ethanol extract, 4. Distilled water extract.

and mortar. 10 g of cyanobacterial material was extracted successively with petroleum ether, butanol, alcohol and distilled water.

Antibacterial and antifungal activity

The antibacterial and antifungal activity of petroleum ether, butanol, alcohol and water extract of *Calothrix* spp. and *Oscillatoria* spp. using different concentrations viz. 1000 ppm, 500 ppm and 250 ppm were bioassyed against bacteria i.e. *Pseudomonas aeruginosa* (gram negative), *Klebsiella pneumoniae* (gram negative), *Escherichia coli* (gram negative) and *Staphylococcus aureus* (gram positive) and fungi i.e. *Aspergillus niger* and *Aspergillus flavus* by cup plate method[3]. Streptomycin was used as standard for bacteria and nystatin for fungi.

Results and discussion

The results of antibacterial and antifungal activity of *Calothrix* spp. and *Oscillatoria* spp. are tabulated in Table 1,2, and 3. Both the cyanobacteria were found to be active against bacteria and fungi tested. The petroleum ether, butanol, alcohol and water extract of *Calothrix* spp. and *Oscillatoria spp.* had shown significant activity against tested bacteria at higher concentration. Except water, extract all the three extracts of both the cyanobacteria inhibited the growth of tested fungi. The moderate activity was observed against bacteria and fungi at lower concentrations.

The antibacterial and antifungal activities of various cynobacteria have also been reported[4-7]. Substances having pronounced antibacterial activity from culture filtrates of *Chlorella pyrenoidosa* and *Oscillatoria splendida* have been shown to be oxidation products of unsaturated fatty acids[8].

References

1. Borowitzka, M.A. and Borowitzka, L.J., *Vitamins and fine chemicals from micro algae In: Microalgal Biotechnology*, Press Syndicate of the University of Cambridge, New York, USA, 1989.

2. Fogg, G.E., *Growth and heterocyst production in Anabaena cylindrica Lemm. II.in relation to carbon and nitrogen metabolism*, Adv. Bot. N.S., 13,1,241-259, 1949.

3. Indian pharmacopoea, 3rd Ed., Vol II, The controller of publication, Delhi, 88, 1985.

4. Kreitlow Susann, Mundt Sabine and Lindequist Ulrike, *Cynobacteria - A potential source of new biologically active substance*, Journal of Biotechnology, 70 (1-3), 61-63, 1999.

5. Srivastava Vishal, C., Manderson, G.J. and Bhamidimarri, R., *Inhibitory metabolite production by the cynobacterium Fischerella muscicola, Microbiological Research,* 153, 4-309-317, 1999.

6. Angadi, S.B., Lavanya, B.M. and Patil, P.C., *Antibacterial activity of Spirulina subsalsa and Ulothrix* sp., National Symposium on Phycology in the new millennium, University of Madras, Chennai, 2000.

7. Metting, B. and Pyne, J.W., *Biologically active compounds from microalgae*, Enzyme, Microb. Technol., 8, 386-394, 1986

8. Venkataraman, G.S., Goyal, S.K., Kaushik, B.D. and Paromita Roychoudhury, *Algae: Form and Function*, Today and Tommorrow's printers and publishers, New Delhi, 1974.

Aryavaidyan Vol. XV., No. 2, Nov. 2001. - Jan. 2002, Pages 116 - 121

RASAVAISESHIKA – XXVI

Raghavan Thirumulpad, K. *

Abstract: In this issue, different types of *veerya* and *vipaka* are explained in detail.

26. वातपित्तप्रकोपणं श्वयथुजननम् । विलयनं सर्वेषाम् ।

श्वयथुजननं वातपित्तप्रकोपणं विलयनं सर्वेषाम् ।।

(The *veerya* producing *svayatu*, swelling agitates *vata* and *pitta*)

The *veerya vilayana* pacifies all the *dosha*s. *Vilayana* is quelling a swelling.

27. मेध्यायुष्यवृष्यवयस्यवर्चस्यरक्षोघ्नपुंसवनसौभाग्य–विशल्यविमोक्षोन्मादक्लैब्यवशीकरणविद्वेषणप्रवासना–कर्षणान्तर्धानिकपौष्टिकराजद्वारिकप्रभृतीनि च ।

मेध्यायुष्यवृष्यवयस्यवर्चस्यरक्षोघ्नपुंसवनसौभाग्य–विशल्यविमोक्षोन्मादक्लेब्यवशीकरणविद्वेषणप्रवासना–कर्षणान्तर्धानिकपौष्टिकराजद्वारिकप्रभृतीनि अपि वीर्याणि भवन्ति ।।

(*Medhya*, *ayushya*, *vrishya*, *vayasya rakshoghna*, *pumsavana*, *saubhagya*, *visalya*, *vimoksha*, *unmada*, *klaibya*, *vaseekarana*, *vidveshana*, *pravasana*, *akarshana*, *antardhanika*, *paushtika*, *rajadvarika*, etc. are *veerya*s.)

1) *Medhya* is that which increases *medha*, intelligence. That is the *veerya* of the drugs *vacha*, *svarna*, *snakhupushpa*, *ghrita*, etc. and 2) that which increases *ayus*, life, is *asyushya* like honey, *dhatri* (gooseberry) and *svarna* (gold).

मध्वामलकचूर्णं च सुवर्णमिति तत् त्रयं ।

प्राश्यारिष्टगृहीतोऽपि मुच्यते प्राणसङ्कटात् ।।

Rasayana is also *asyushya*, increasing life. 3) *Vrishya* increases *vrisha*, *sukla*, the seventh *dhatu*, *vajeekarana*. 4) *Vayasya* is good for *vayas*, youth. To ward off *jara*, old age, prolonging youth. 5) *Varchasya* increases *varchas*, vigour. 6) *Rakshoghna* destroys evil spirits. 7) *Pumsavana* causes birth of son. 8) *Saubhagya* produces attractive personality. 9) *Visalyakarana* is that brings out something that has entered the body. *Salya* is that which has entered the body and got seated somewhere in the body. 10) *Vimokshana* is that breaks a chain by just applying the paste of the dung on a chain made of iron. 11) *Unmadakarana* makes one mad, lunatic. कृकलासस्य मांसं तु मधुना सह योजयेत् । तदन्नपानभक्षे वा दत्तमुन्मादकारणम् ।। 12) *Klaibyakarna* is something that causes infertility. 13) *Vaseekarana* attracts a man towards a woman or a woman towards a man. 14) *Vidveshana* makes people quarrel, producing hatred. 15) *Pravasana* makes people to leave a place. 16) *Akarshana* attracts people living far away. 17) *Antardhanika* makes one, wearing the particular herb invisible. 18) *Rajadvarika* helps to influence

* *Raghava Ayurvedics, Chalakkudi, Trichur Dist., Kerala.*

and achieve the favour of the king. In the texts (not ayurvedic texts, but texts which deal with *mantrasastra*) many dung with other *veerya*s which bestow particular powers to the wearer are seen explained. These have to be tested and verified to understand the truth behind those assertions.

28. रसगुणभूतसमुदायाश्रय एषामनवधारणीय: ।
तथारसगुणभूतसमुदायानामन्येषामन्यथावीर्यत्वात् ।।

एषां रसगुणभूतसमुदायाश्रय: अनवधारणीय: ।
तथारसगुणभूतसमुदायानां अन्येषां अन्यथावीर्यत्वात् ।।

(It is difficult to determine the *rasa guna* and the *bhautic* structure of the particular drug with the particular *veerya*. As other drugs with similar *rasa guna* and structure are seen to have some other *veerya*.)

Here in the context of *veerya*, the *bhautic* structure and *rasa* and *guna* of herbs with some particular *veerya* have been explained. There are *dravya*s with the same structure and same *rasa* and *guna*, not manifesting the same *veerya* - so such statements mean only likelihood. The *veerya*s, *medhya*, etc. cannot at all be explained in terms of structure or *rasa* or *guna* – So in *veerya*, it is the texts which are codification of the experiences of earlier *acharya*s, and personal experience have to be depended for knowledge and guidance. The ultimate valid source of information at least as far as *veerya* is concerned is experience, *anubhava*.

29. समन्त्राणि पुनरेषां कानिचित् ।
एषां कानिचित् समन्त्राणि पुन: ।।

(Some of these veeryas depend on *mantra* for efficacy.)

The *veerya*s, *akarshana*, *vaseekarana*, *vidveshana* etc are effective only with *mantra*. The recitation of the *mantra* confers the particular power. So, these kinds of *veerya*s are the subject of *mantrasastra*.

30. कर्मणा अनुमेया सम्पत्ति: ।
सम्पत्ति: कर्मणा अनुमेया ।।

(The efficacy of the *veerya* has to be inferred by experience, how it works.)

Veerya of a *dravya* has to be inferred, because it cannot be understood with its *rasa*, etc. There can be other *veerya*s also. Nothing actually works without its *veerya*. So, any effect desired and affected has to be due to its particular *veerya*. *Acharya* adds *jeevaneeya*, *seeteekarana*, *pachana* and *ropana* also as *veerya*s. *Jeevaneeya* sustains life (with the *bhoomi* and *jala bhoota*s) *seeteekara* keeps cold (with extreme aspect of the *jala bhoota*) *pachana* digests (with the *agni bhoota*) *ropana* healing wound (with *bhoomi*, *jala*, and *vayu bhoota*s), certain *acharya*s consider the extreme aspect of the *seeta* and *ushna*, two *guna*s, as *veerya*, as is experienced in the conditions of *chaya*, *kopa* and *sama* of the *dosha*s.

Increase is affected with similar *guna*s, *vata*, *dosha* is *rooksha*, *laghu*, *seeta*, *khara*, *sookshma* and *chala*, and naturally, it is increased with *dravya*s with the same *guna*s. But without *seeta vata* is not increased to the extend of *kopa*, that is the aspect when it spreads throughout the system through its channels, So, also, even if all other dissimilar *guna*s join together if the *guna ushna* is not there, *vata* will not be controlled. That is the case with *pitta* also, when other similar *guna*s join together. *Pitta* will not be agitated if they are not assisted by *ushna*. If *ushna* is not there, *pitta* will be increased not agitated. In spite of all other dissimilar *guna*s joining together, *pitta* will not be quelled without *seeta*. With *kapha*

also with its solidicity without *ushna* with all similar *guna*s it will get increased only, not agitated. In case of *kapha* also, without *seeta* it will not be controlled. So, *ushna* and *seeta* can be seen to have the power to control the other *guna*s in efficiency and such termed *veerya*. There is an opinion, that the *guna*s, *snigdha*, *seeta*, *mridu*, *laghu*, *rooksha*, *ushna* and *teekshna* are more efficient than rest of the *guna*s. Usually *dravya*s are explained with these eight *guna*s. So, some opine that these eight *guna*s can be termed as *veerya*. In *rasavaiseshika*, the ten *guna*s are termed effective, *karmanya*, these eight *guna*s with *visada* and *picchila*. Some *acharya*s are of the opinion that anything that has some action should have its own *veerya* and such *veerya* cannot be strictly limited by number. This is an example how opinions have to viewed and verified from various standpoints. Each opinion is correct from its own view of point. The next subject *vipaka* is introduced with a difference of opinion.

31. यथारसं विपाकमेके ब्रुवते ।

एके यथारसं विपाकं ब्रुवते ।।

(Some *acharya*s say that each *rasa* has its own *vipaka*.)

Here *rasa* means the drug with that particular *rasa*. In the course of digestion, various changes take places in the drug. In the final change, the *rasa* manifested is termed *vipaka*. It can only be inferred, as it cannot be tasted with the tongue. It has to be accepted as such, as some particular action of the drug is attributed to *vipaka*, by the *achayra*s, in explaining the drug.

32. न, भिन्नलक्षणत्वात् ।

न, भिन्नलक्षणत्वात् ।।

(It cannot be so *rasa* and *vipaka* have different definitions.)

Vipaka is some aspect that manifests at the final stage of digestion. If the aspect is termed by the term *rasa*, how can something that can be ascertained only by the tongue, be attributed at a time when it is beyond the stage of activity of the tongue.

33. विपाकद्वयपक्षेप्ययं प्रसंगस्तुल्यः ।

विपाकद्वयपक्षे अपि अयं प्रसंगः तुल्यः ।।

(Even in the opinion that *vipaka* is twofold, *madhura* and *katu* there can be the same objection.)

Rasavaiseshika accepts two *vipaka*s, *madhura* and *katu* also termed in the names of *rasa*. Tastes *madhura* and *katu* are *rasa*s to be understood by the tongue. Here also the same objection can be raised.

34. किमस्माकमपि रसशब्दानां कालवाचकत्वे प्रतिषेधः ।

रसशब्दानां कालवाचकत्वे किमस्माकं अपि प्रतिषेधः ।।

(If by the term *rasa*, time is intended, can we be objected if we also accept that meaning.)

If the objection is answered by that, *madhura* and *katu* indicates the time taken for digestion. Let the *amla*, *katu*, etc. terms denoting the *rasa*s also indicated different times. The question is answered.

35. शब्दान्तरेण कालस्य ग्रहणमिति चेत् कतमे षट् कालाः ।

शब्दान्तरेण कालन्तरस्य ग्रहणं इति चेत् ।।

(By some other term if the time is indicated, what are those six times -)

If by the term of *rasa*, time intended, those

who argue that there are six *vipaka*s, denoted by the term of the six *rasa*s, should answer the question which are the six times. Some drugs are digested slowly and some swiftly. Slowness in digestion is *madhura vipaka* and swiftness is *katuvipaka*. So also, only two kinds of *vipaka*s can be accepted, as there are comparative conditions, no third *vipaka* need be accepted.

36. तथा गुणाः ।

तथा गुणाः ।।

(There is the same objection if *vipaka* is indicated by *guna.)*

Some say that the two *vipaka* are *guru* and *laghu*. Slowly digested is *guru*, and swiftly digested is *laghu*. *Guru* and *laghu* are *guna*s if that explanation can be accepted, then also the argument that *dravya* with a particular *rasa* has a particular *vipaka*, as indicated by the name of the *rasa* cannot be sustained.

37. रसस्यैवेति चेत् केनचित् कथंचित् कस्यचित् च विपाकादसम्यक् ।

रसस्य इति चेत् केनचित् कथंचित् कस्यचित् विपाकात् असम्यक् ।।

(If *vipaka* is of the *rasa*, something caused by something, somehow or other of something else change becomes unreasonable.)

If *vipaka* is of the *rasa*s actually understood by taste, if it does not denote *kalka* and *guna* how can something caused in the course of digestive process, can be termed by something understood by some term denoting taste, understood by the contract of the tongue. By some thing means, by *agni* digestive process. By somehow means slowly or swiftly. Every aspect in the *dravya* gets changed in the course of digestion. So, it cannot be termed as belonging to *rasa* alone.

38. एकोपयोगे वानेकोपलब्धेः ।

वा एकोपयोगे अनेकोपलब्धेः विपाकः यथारसं न भवति ।।

(Sometimes by using one thing, something else is obtained. *Vipaka* cannot be termed in accordance with the particular *rasa*.)

Eka is something, *aneka* means not that thing. Milk is *madhura* in *rasa* as well as in *vipaka*. But ghee which is *madhura* is *katuka* in *vipaka*. That is why ghee ignites digestion *deepana*. *Pippali* which is *katuka* in *rasa*, *madhura* in *vipaka*. That is why it does not agitate *pitta*. If *dravya* with each *rasa* has the same *vipaka*, the ghee with *madhura rasa* should have *madhura vipaka*, and *pippali* with *katurasa* should have *katu* as *vipaka* also.

39. परोक्षत्वाच्चात्यन्तम् ।

अत्यन्तं परोक्षत्वात् च यथारसं विपाकः न भवेत् ।।

(As *vipaka* is extremely out of scope for the senses, *vipaka* cannot be according to *rasa*.)

It cannot be explained by a term denoting something ascertained by the senses. *Rasa* is ascertained by the contact with the tongue, *vipaka* is to be inferred by particular action, and *karma* of the *dravya* in the system.

40. यथास्वं दोषवर्धनात् त्रय इत्येके ।

यथास्वं दोषवर्धनात् त्रयः एव विपाकाः इति एके आचार्याः वदन्ति ।।

(Each *vipaka* increases a particular *dosha*, there are three *vipaka*s according to the opinion of certain *acharya*s.)

There are three *dosha*s, each *vipaka* increases its particular *dosha*. So *vipaka* also have to be three, according to some *acharya*s. *Dravya* with *madhura vipaka* increases *kapha*,

amla vipaka, *pitta*, and *katu vipaka*, *vayu*. There the term *madhura*, *amla* and *katu* are used to denote the *vipaka*, because, the functions attributed to the particular *rasa* are manifested by the particular *vipaka* also. That cannot be true.

41. न, क्षीरदानां बालानां सर्वदोषप्रकोपात् ।

न क्षीरदानां बालानां सर्वदोषप्रकोपात् ।।

(It cannot be true. As it is seen that all the three *dosha*s are agitated in producing diseases in a child which drinks the mothers milk alone. *Vipaka* cannot be said to be three, denoted by the particular *rasa*.)

Milk is *madhura vipaka*. A child fed only with milk can be affected with the diseases of *kapha vikara* alone. In experience child gets also diseases where other *dosha*s are agitated. So it cannot be said that *vipaka* is determined with its capacity to agitate the *dosha*.

42. न, प्रकोपदर्शनात् पर्यायेण ।

न पर्यायेणप्रकोपदर्शनात् ।।

(It cannot be so also as we see the agitation of the other *dosha*s also.)

एको हि दोषः कुपितः सर्वानेव प्रकोपयेत् ।।

One *dosha* in agitation agitates other *dosha*s also. But in the case of the child, in state of being fed with milk, sometimes *pitta* is seen agitated; sometimes *vata* is agitated, causing various other diseases. Here the objection can be replied in this way.

43. तत्रोपहतत्वाद्विपर्ययः पाकस्य ।

तत्र उपहतत्वात् पाकस्य विपर्ययः स्यात् ।।

(In this case, as the milk is polluted a change in *vipaka* can be expected.)

Milk is *madhura vipaka*. But because of the unhealthy habits of the mother, the milk can be polluted with a change in its *rasa* and *vipaka* and drinking the same the child may get its *pitta* or *vata* agitated as the case may be.

44. संसृष्टस्यानुपपत्तिः ।

45. प्रचितस्य च प्रकोपात् एकेन चानेकस्याप्रचयात् प्रतिज्ञाहानिः वा सति प्रचये ।

संसृष्टस्य अनुपपत्तिः हि प्रचितस्य प्रकोपात् एकेन अनेकस्य अप्रतिचयात् प्रचये सति प्रतिज्ञाहानिः भवति ।।

(Arguing both the ways is improper. Because, only that which is increased gets agitated, and with one cause, more than one *dosha* is not increased.)

Here the assertion is that each cause increases its own *dosha*. If the milk gets polluted, first the *madhurya* has to be deranged to the *amla* and then become *katuka*. It cannot become *katuka* all on a sudden. Generally, derangement does not take place without increasing. It will have to be said that not only one *dosha*, but more *dosha*s also can be increased and agitated at a time. So, with one *vipaka*, it will have to be said that some other *dosha* also can be increased and agitated. If that is the case, we cannot infer *vipaka* with the derangement of a particular *dosha*.

यथास्वं दोषसंभवात् एको हि दोषः कुपितः सर्वानेव प्रकोपयेत् ।।

An agitated *dosha* agitated all the other *dosha*s also. But here without increasing or agitating any *dosha*, some other *dosha* is increased and agitated. It will have to be said fed with milk which is *madhura* will have *pitta* or *vata* agitated directly without *kapha* being agitated.

46. यथास्वं वर्धनात् प्रशमाभावः ।

यथास्वं प्रशमाभावः वर्धनात् ।।

(As each *vipaka* increases its own *dosha*, it will have to be said that *vipaka* does not reduce or pacify any *dosha*.)

In the texts, as is said that –

मधुरं शीतं स्निग्धं सर्पि: श्ळेष्माणं शमयति लघुविपाकित्वात् ।।

Ghee which is *madhura*, *seeta* and *snigdha* pacifies *kapha*, as the ghee is *laghu* in *vipaka*. Such assertions indicates that *vipaka* pacifies also as the case is.

47. कस्मात् प्रशमनं नास्त्यस्त्येव प्रशमनम् ।
कस्मात् प्रशमनं नास्ति प्रशमनम् अस्ति एव ।।

(Why does *vipaka* not pacify, there can be pacification with *vipaka* also.)

Being opposite with different *gunas*, *pitta* can be pacified with *madhura vipaka*, *vayu* can be controlled *amla*, *vipaka* and *kapha* can be controlled with *katu vipaka*, it can be argued. The argument is replied.

48. सति वा प्रशमने यथास्वं दोषवर्धनं न भवति ।
सति वा प्रशमने दोषवर्धनं न भवति ।।

(If pacification is accepted for *vipaka* there cannot be increase of the connected *dosha*.)

Madhura rasa increases *kapha*, and decreases *pitta*. Each *dosha* has three *rasa*s increasing it and other three *dosha*s decreasing it. A *rasa* increasing one *dosha* may decrease other *dosha*. But at the same time, it does not do both, increasing one *dosha* and decreasing another *dosha*. Thus, argue some people. It cannot be so, as the assertion in that. There are three *vipaka*s, one *vipaka* increasing one *dosha*. It will be against the assertion, if any *vipaka* decrease any *dosha*.

49. कालतो गुणतो रसतश्चानुपपत्ति: त्रित्वस्य ।
त्रित्वस्य कालत: गुणत: रसत: च अनुपपत्ति: ।।

(For the assertion that there are three *vipaka*s, with *kala*, time with *guna*, with *rasa* also there is no substantiation.)

For time, there can be swiftly and slowly, there is not a third condition for *guna*, a *vipaka* caused by *guru guna*, and *vipaka* caused by *laghu guna*, not a third one. For *rasa*, *katu*,, *thikta* and *kashaya* cause *laghu vipaka* and *madhura amla* and *lavana* cause *guru vipaka*. There is not a third *vipaka* to be associated with any other *rasa*. So *vipaka* can be associated with digestion, *agni* as swiftly digested and slowly digested with ease as easily digested and digested with difficulty. There can be *madhura vipaka* denoting slowness and difficulty, *katu vipaka* denoting swiftness and ease. No other *vipaka* to be associated with any other *rasa*. So, when *vipaka* is denoted by the term of *rasa*, it is only in associated meaning, not in the main meaning. If we include *amla* also as *vipaka* there is not a third *kala* to sustain it. So there are only two *vipaka*s associated with time and ease.

50. द्वौ, द्वैविध्यदर्शनात् परिणामस्य ।
द्वौ विपाकौ परिणामस्य द्वैविध्यदर्शनात् ।।

(There are only two kinds of *vipaka*, because change is seen only in two ways.)

Change is the result of *paka*, *agni* and *karma*, digestion as is explained in the previous *sutra*s. Hard wood is burnt slowly; straw is easily burnt.

Aryavaidyan Vol. XV., No. 2, Nov. 2001. - Jan. 2002, Pages 122 - 127

EXCERPTS FROM CHIKITSAMANJARI – XXXVI

Unnikrishnan, P.*

Abstract: In this chapter an elaborate description on the treatment of *vriddhi* with its various condition is discussed. Some of the famous formulations like *Gandharvahastadi kashayam, Hingutriguna tailam,* etc. are mentioned.

TREATMENT OF *VRIDDHI*

Vriddhi, in Sanskrit means an increase. In this context, it is a general term given to conditions that result in the enlargement of the scrotum or scrotal sac. Orchitis, hydrocele, pus, urine or portions of intestine filling the sac all come under this heading.

1. Depending upon the cause, *vriddhi* is classified into a) *vataja*, b) *pittaja*, c) *kaphaja*, d) *medoja* (fat), e) *mootraja*, f) *antraja* (intestine) and g) *raktaja* (blood). Collection of urine in the sac called *mootravriddhi* and protruding portions of intestine in the sac called *antravriddhi* is in fact caused by vitiation of *vata* but they are classified separately to have a better understanding of the condition.

2. *Virechana* and *vasti* using *kashaya*s are to be done for the relief of *vriddhi*. When vitiated *vata* is the cause, *vasti* with medicated oils (*anuvasana*) is more effective. Sudation and external application of medicinal pastes that cure *vata* is also indicated. When the enlarged sac suppurates, the pus formed is drained surgically and the wound is treated as in the case of *vrana* (abscess).

Gandharvahastadi kashaya, detailed below may be consumed with the addition of 10 to 15 ml castor oil, as such or medicated.

Gandharvahastadi kashayam

Gandharvahasta	*Ricinus cummunis*
Chiruvilva	*Holoptelea integrifolia*
Hutasa	*Plumbago indica*
Visva	*Zingiber officinale*
Pathya	*Terminalia chebula*
Punarnava	*Boerhaavia diffusa*
Yavashaka	*Tragia involucrata*
Bhoomitala	*Curculigo orchioides*

A small quantity of rock salt and jaggery shall be added to the *kashaya* at the time of consumption.

3. A *kashaya* prepared from the following when consumed with castor oil and a small quantity of rock salt reduces the enlarged scrotal sac.

Ulli	*Allium sativum*
Vettatuku	*Caesalpinia bonduc* (substitute)
Chukku	*Zingiber officinale*
Uzhijnaver	*Cardiospermum halicacabum* (root)
Avanakku	*Ricinus communis* (root)
Ikanatol	*Toona ciliata* (bark)

* *Vice Principal, Vaidyaratnam P.S. Varier Ayurveda College, Kottakkal, P.O. Edarikode 676 501.*

4. The following medicines, crushed well should be kept overnight in water. In the morning, the water should be filtered and consumed with the addition of suitable quantity of castor oil (10 to 15 ml).

Prasarinee	*Merremia tridentata* ssp. *tridentata*
Morata	*Chonemorpha fragrans*
Sakravalli	*Cardiospermum halicacabum*
Kuberadrik	*Caesalpinia bonduc*
Visva	*Zingiber officinale*
Kulattha	*Macrotyloma uniflorum*
Sigru	*Moringa oleifera*
Punarnnava	*Boerhaavia diffusa*

5. A *kashaya* prepared from the following, to which a small quantity of (1 to 2 gm) fried *hingu* (*Ferula asafoetida*) is added shall be consumed for the cure of *vriddhi*, *anaha* (flatulence) and *udara* (ascites)

Lasuna	*Allium sativum*
Oushadha	*Zingiber officinale*
Yakshakshee	*Caesalpinia bonduc*
Varshabhoo	*Boerhaavia diffusa*
Hapusha	*Sphaeranthus indicus*

6. Finely powdered castor seeds and crushed *tavizhama* (*Boerhaavia diffusa*) should be used to prepare medicated milk, to be consumed with the addition of castor oil for a period of one month for the relief of *vriddhi*.

Two or three *nazhi** of castor oil should be mixed with one or two *nizhi* of ghee. This mixture should be medicated with the addition of *kayam* (*Ferula asafoetida*) and *induppu* (rock salt). About 25 to 30 ml of this preparation, melted in hot water is to be consumed on empty stomach every morning, for the relief from gastralgia and oedema.

Pulinkuzhampu (cross ref. *Gulma-chikitsa*, 13,14) mixed with buttermilk shall be consumed.

7 – 9 A *kashaya* prepared from the following crushed, to which *dhanyamla* is added. This preparation should be used for sudation of the patient.

Narakattila	*Citrus limon* (leaf)
Unmattayila	*Datura metel* (leaf)
Puliyila	*Tamarindus indica* (leaf)
Avanakkila	*Ricinus communis* (leaf)
Pavattayila	*Morinda pubescens* (leaf)
Neermatalattila	*Cretaeva nurvala* (leaf)
Orila	*Desmodium gangeticum*
Jnettajnetunga	*Physalis minima*
Kuruntotti	*Sida rhombifolia* ssp. *retusa* (whole plant)
Prasarinee	*Merremia tridentata* ssp. *tridentata*
Uzhinja	*Cardiospermum halicacabum*
Ampazhattinila	*Spondias pinnata* (leaf)
Amleeka	*Emblica officinalis* (leaf)
Erikkila	*Calotropis gigantia* (leaf)
Ullittoli	*Allium sativum*

Oil is to be applied on the head, and ghee mixed with oil sufficiently warmed should be applied on the body of the patient to be subjected for sudation. The patient should lie on a wooden cot having a net like plank or plank with sufficient holes to permit passage of medicinal fumes arising from pots kept below the cot. His body, up to the level of neck should be covered with blanket or thick cotton sheet. The *kashaya* prepared as detailed above should sufficiently warmed and kept below the cot in a pot so as to see that fumes are arising. Extra sudation shall be done on regions having *vriddhi* and pain and

*1 *nazhi* = 384 ml

also on and around the gluteal region. Purgation may be done to the patient once in every five or six days. This relieves gastralgia, oedema, etc.

10. Expressed juice from the leaves of *uzhinja* (*Cardiospermum halicacabum*) and *puli* (*Tamarindus indica*) mixed with *kati* (first washing of rice) can be used for irrigation on the umbilical and sacral regions. Alternatively, *kati* alone can be used for irrigation.

11. *Pirakkinmel puzhukkoodu* (Cocoon on *Clerodendrum viscosum*), *ullittoli* (garlic scrapings) and ghee mixed together and used for fumigation on the affected part relieve *vriddhi* caused by protruding intestine and gastralgia.

Purgation with castor oil or *Gandharvahastadi kashaya* mixed with castor oil on alternate days reduces *vriddhi.*

12. A *mukkuti** prepared from the following when consumed with a small quantity of *hingu* (*Ferula asafoetida*) and rock-salt relieves *vriddhi*.

Katalati - kurunnu	*Achyranthus aspera* (tender leaves)
Kazhachil - kurunnu	*Caesalpinia bonduc* (tender leaves)
Avil kurunnu	*Holoptelea integrifolia* (tender leaves)
Vizhal- kurunnu	*Embelia ribes* (tender leaves)
Indralata	*Cardiospermum halicacabum*
Avanakkin- kurunnu	*Ricinus communis* (tender leaves)

Sand should be fried and tied in a cloth bundle (termed *kizhi*). This should be used for sudation in gastralgia in *vriddhi*. Sudation as detailed earlier is also good.

A *mukkuti* prepared from the tender leaves of *ezhavacehmpu* (*Colocasia* sp.) can be taken. Expressed juice of *uzhinja* (*Cardiospermum halicacabum*) mixed with finely powdered castor seeds, fried in a pan shall be taken. Consumption of boiled buttermilk mixed with *illanakkari* (soot formed in kitchen) may be taken. Buttermilk boiled with crushed castor roots, mixed with rock salt shall be taken. *Mukkuti* prepared from *adakkamaniyanver* (root of *Sphaeranthus indicus*) and *tavizhamaver* (root of *Boerhaavia diffusa*) shall be consumed. *Mukkuti* prepared with *kodiyavanakku* (*Ricinus communis*) and *jeerakam* (*Cuminum cyminum*) shall be taken. These preparations relieve gastralgia.

13-15 Roots of *neeli* (*Indigofera tinctorea*) ground to a paste, mixed with oil shall be taken. Expressed juice of *karpaseepatra* (leaf of *Gossypium herbaceum*) mixed with oil, slightly warmed may be consumed. Expressed juice of *vamsapatra* (leaf of *Bambusa arundinacea*) mixed with *hingu* (*Ferula asafoetida*) and rock salt may be taken. Expressed juice of *koosmandapatra* (leaf of *Benincasa hispida*) mixed with *takra* (buttermilk) may be taken.

A *kashaya* prepared from the following mixed with castor oil (10 to 15 ml) as additive relieves gastralgia in *vriddhi*.

Uzhinjaver	*Cardiospermum halicacabum* (root)
Mulayila	*Bambusa arundinacea* (leaf)
Chukku	*Zingiber officinale*
Jeerakam	*Cuminum cyminum*

16. A medicated ghee prepared from the following relieves gastralgia.

Kashaya prepared from *kshudra* (*Solanum*

**Mukkuti*: A liquid preparation in which drug/drugs are cooked in butter milk, churned well and boiled.

surattense) *chitraka* (*Plumbago indica*) crushed *uzhinja* (*Cardiospermum halicacabum*) and *jeerakam* (*Cuminum cyminum*) as *drava*, ghee and castor oil as *sneha* and *sindhuja* (rock salt), *ulli* (garlic) as *kalka*.

17. A medicated oil prepared by the following relieves gastralgia associated with *vriddhi*.

Neelimoola (root of *Indigofera tinctorea*) *kashaya* as *drava*, oil as *sneha*, and fine powder from the roots of *neeli* as *kalka*.

18-19. Consumption of medicated ghee prepared from the following relieves gastralgia.

Expressed juice of *kshudra* (*Solanum surattense*), *chitraka* (*Plumbago indica*) and coconut milk; *kashaya* prepared from *jeeraka* (*Cuminum cyminum*) as *drava*; ghee as *sneha*; and powdered *jeeraka* as *kalka.* In this preparation, ghee can be substituted with oil or castor oil.

20 Expressed juice from the tender leaves of *piraku* (*Clerodendrum viscosum*) mixed with half its quantity of oil and rock salt, fried in a pan relieves *antravriddhi*.

21 Expressed juice of *ulli* (*Allium sativum*) and *uzhinja* (*Cardiospermum halicacabum*) mixed with caster oil relieves *antravriddhi.*

22 A medicated ghee prepared with *chukku* (*Zingiber officinale*), *kayam* (*Ferula asafoetida*), *ayamodakam*(*Trachyspermum roxburghianum*), *uppu* (salt), *ulli* (*Allium sativum*) and *tippali* (*Piper longum*) as *kalka;* Coconut milk and *ikanatolnir* (expressed juice of *Toona ciliata* - bark) as *drava;* and ghee as *sneha* relieves colic, griping, oedema associated with *vriddhi* and pain caused by *arsa* (piles).

Expressed juice from *kotiyavanakku* (*Ricinus communis*) and coconut milk as *drava*; two *nazhi*s of castor oil and one *nazhi* of ghee as *sneha*; and the following, finely powdered as *kalka*.

Chukku	*Zingiber officinale*
Kayam	*Ferula asafoetida*
Ayamodakam	*Trachyspermum roxburghianum*
Induppu	Rock salt
Ulli	*Allium sativum*
Tippali	*Piper longum*

This ghee, melted in hot water, may be consumed. This relieves colic, gastralgia, scrotal enlargement, piles, etc. (Do not disclose it.)

23-24 The following medicated preparations cures all types of *vriddhi*, flatulence and discomforts associated with stomach.

A *kashaya* prepared from the following as *drava:*

Varuna	*Crataeva magna*
Chitra	*Ricinus communis*
Bala	*Sida rhombifolia* ssp. *retusa*
Indralata	*Cardiospermum halicacabum*
Abhaya	*Terminalia chebula*
Hapusha	*Sphaeranthus indicus*
Yakshadrik	*Caesalpinia bonduc*
Agni	*Plumbago indica*
Mahaushadha	*Zingiber officinale*
Kulattha	*Macrotyloma uniflorum*
Rasona	*Allium sativum*
Suradruma	*Cedrus deodara*
Punarnava	*Boerhaavia diffusa*

Ghee and castor oil as *sneha* and the following finely powdered as *kalka.*

Lavana	Rock salt
Jeeraka	*Cuminum cyminum*
Hingu	*Ferula asafoetida*

Kanajata	*Piper longum* (root)
Maricha	*Piper nigrum*
Chavya	*Piper brachystachyum*
Suradruma	*Cedrus deodara*
Deepyaka	*Trachyspermum ammi*

In the above preparation, in *drava*, the expressed juice of *kodiyavanakku* (*Ricinus communis*) and coconut milk shall also be added. Ghee melted with *ulli* (garlic) shall also be consumed.

Antravriddhi, when fully developed will not respond to the above treatments. Then *avagaha* (immersion of body up to the level of neck in fluids sufficiently warmed) with *kati* (first washing of rice), *vasti*, consumption of *Indukanta ghrita* and *Varanachitrabaladi ghrita* (*sloka* 23) are effective.

Hingutriguna taila

The following medicated castor oil when taken as such or mixed with *kashaya* relieves *gulma* (flatulence), *udara* (ascites), *vriddhi* and gastralgia.

Hingu	*Ferula asafoetida*	1 part
Saindhava	Rock salt	3 parts
Eranda taila	(castor oil)	9 parts
Rasona rasa	(garlic juice/*kashaya*)	27 parts

The following medicated ghee relieves *gulma, antrasoola* (gastralgia) and oedema.

Gandharvahastadi kashaya 16 parts, *ullineer* (garlic juice/*kashaya*) 24 parts as *drava*; castor oil 8 parts and ghee 4 parts as *sneha* and medicines of *Gandharvahastadi kashaya* (ref. *sloka* 2) one part as *kalka*.

A *kizhi* prepared from the leaves of castor plant cut to small pieces, leaves of *ummam* (*Datura metel*) cut to small pieces and coconut scrambles fried should be warmed in the mixture of ghee and oil. The *kizhi* so prepared should be used for sudation of the affected part. A *kizhi* prepared from fried sand shall also be used in a similar manner.

26 The following should be crushed well and ground to a paste in *aranala* (*kati*). This paste on local application relieves pain and oedema caused by *vriddhi*.

Vaikuntha-kusuma	*Lucas aspera* (flower)
Manjal	*Curcuma longa*
Ellu	*Sesamum indicum*
Uzhinjaver	*Cardiospermum halicacabum* (root)

Irrigation with *kati* and purgation relieves *vriddhi*.

27 A *khala* (*mukkuti*) prepared from the following relieves pain.

Khapura	*Liquidamber orientalis*
Kodieranda	*Ricinus communis*
Tavizhamaver	*Boerhaavia diffusa* - root

Induppu (rock salt) and *jeeraka* (*Cuminum cyminum*) finely powdered shall be consumed.

28. The following, finely powdered, on consumption relieves pain very fast.

Kuberakshee	*Caesalpinia bonduc* (seed)
Lasuna	*Allium sativum*
Hingu	*Ferula asafoetida*
Saindhava	Rock salt

29-32 The following medicated ghee termed *Sukumaraghrita* shall be consumed.

Kashaya:

Punarnnava	*Boerhaavia diffusa* 1 *tulam**

*1 *tulam* = 4.8 kg

Dasamoola (each)	
Payasya	*Holostemma ada-koedien*
Asvagandha	*Withania somnifera*
Eranda	*Ricinus communis*
Satavari	*Asparagus racemosus*
Dvidarbha	*Desmostachya bipinnata* *Imperata cylindrica*
Sara	*Saccharum arundinaceum*
Kasa	*Saccharum spontaneum*
Ikshumoola	*Saccharum officinarum*
Potagala	*Sphaeranthus indicus*
	10 *pala** each

Guda	30 *pala*
Erandatailam	1 *prastha***
Ghrita	2 *prastha*
Kalka:	
Krishna	*Piper longum*
Krishnamoola	*Piper longum* (root)
Saindhava	Rock salt
Yashtimadhuka	*Glycyrrhiza glabra*
Mridvika	*Vitis vinifera*
Yavani	*Trachyspermum ammi*
Nagara	*Zingiber officinale*
	2 *pala* each
Payasa	Milk - 2 *prastha*

* 1 *pala* = 48 g ** 1 *prastha* = 1536 ml

Centenary Release:

ARYA VAIDYA SALA, KOTTAKKAL

1. **A Life of Healing** - Gita Krishnankutty, Viking Penguin Books
   A Biography of Vaidyaratnam P.S. Varier

   The book reconstructs the history of this extra-ordinary man and the institution he established and nurtured. It shows how an ordinary student spurred on by curiosity and determination to explore avenues of knowledge, succeeded in improving, modernising and popularizing ayurveda at a time when allopathic medicines were making inroads in to the Indian market.

   Price: Rs. 395/-

2. **The Rediscovery of Ayurveda** - M.R. Raghava Varier, Viking Penguin Books
   The Story of Arya Vaidya Sala, Kottakkal

   The story of a tradition in transition and of an institution that has pioneered this transition and changed the lives of those associated with it in many different ways.

   Price: Rs. 295/-

3. **Lectures on Ayurveda**
   A collection of lectures on Ayurveda.

   K.N. Panikkar, Swami Ranganathananda, V.R. Mehta, C.G. Joshi S.R., Joshi & Bakul S. Joshi, P.J. Deshpande, G.D. Singhal, M.S. Valiathan, M.L. Gharote, K.N. Udupa, V. Narayana Swami, H.S. Wasir, Sharadini A. Dahanukar, and I Sanjeeva Rao.

   Price: Rs. 240/-

4. **Padamudrakal** (Malayalam) - P.K. Warrier
   Collection of selected lectures and papers by Padmasree P.K. Warrier.

   There are eighty learned papers covering a wide range of subjects in the cultural, social and medical branches. The variety of topics makes the work an intersection of the contemporary social life. On the whole the book gives exciting moments of delightful reading.

   Price: Rs. 240/-

5. **Satabdi Smaranika**
   Souvenir in two volumes published on the occasion of Centenary Celebrations of Arya Vaidya Sala, Kottakkal

āryavaidyan

A Quarterly Journal of
the Arya Vaidya Sala, Kottakkal.

Vol. XV., No. 2 Regn. No. 55127/87 November 2001 - January 2002

Aryavaidyan is intended to encourage scientific writing and intellectual interactions among scholars, academicians, practitioners and students of Ayurveda and allied subjects like Siddha, Unani, modern medicine, etc.