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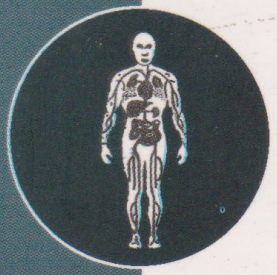
āryavaidyan

लाभानां श्रेय आरोग्यम्

Of all the gifts,
the most precious is health



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FROM THE PAGES OF VAGBHATA - LXIII

N.V.K. Varier

Abstract: The importance of *siravedham* (venesection) in *salyachikitsa,* the characteristics of pure blood, the sign and symptoms of impure blood vitiated by *dosha*s and the methods of venesection in different diseases are explained here.

अथात: सिराव्यधविधिमध्यायं व्याख्यास्याम: ।
इति ह स्माहुरात्रेयादयो महर्षय: ।

(Athāta: sirāvyadhavidhimadhyāyaṁ
vyākhyāsyāma: ।
Iti ha smāhurātrēyādayō maharṣaya: ।)

Then we have to expound the chapter titled *Siravyadhavidhi* (process of venesection). So spoke the sages Athreya and others.

Ashtanga Sangraha says (Chapter 36) - " earlier we said that there are many ways for blood-letting. Amongst them, and other purificatory treatments for diseases curable by them, venesection is more important. Because, by this the diseases get dried (reduced) as an opening of the ridge of grain field drains the water and the crops get dried. So venesection is estimated as half of total treatment or as total treatment itself. As the status given for *vasti* in *kayachikitsa* is the status for venesection in *salyachikitsa*; because, the base of all the troubles affecting the sufferer is blood".

मधुरं लवणं किञ्चिदशीतोष्णमसंहतम् ।
पद्मेन्द्रगोपहेमाविशशलोहितलोहितम् ।। १ ।।
लोहितं प्रभव: शुद्धं, तनोस्तेनैव च स्थिति: ।

(Madhuraṁ lavaṇaṁ kiñcida-
śītōṣṇamasaṁhatam ।
padmēndragōpahēmāvi-
śaśalōhitalōhitam ।। 1 ।।
Lōhitaṁ prabhava: śuddhaṁ,
tanōstēnaiva ca sthiti: ।)

Pure blood, which is the cause of the origin of the body itself, is slightly sweet and salty and a little bit hot and cold. It is not condensed (is liquid). It is red, resembling the colour of lotus, *indragopa* (an insect), madder root, the blood of sheep and hare. The body exists because of the blood.

तत्पित्तश्लेष्मळै: प्रायो दूष्यते, कुरुते तत: ।। २ ।।
विसर्पविद्रधिप्ळीहगुल्माग्निसदनज्वरान् ।
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शीतोष्णस्निग्धरूक्षाद्यैरुपक्रान्ताश्च ये गदा: ।। ४ ।।
सम्यक्साध्या न सिध्यन्ति ते च रक्तप्रकोपजा: ।

(tatpittaśḷēṣmaḷai: prāyō
dūṣyatē, kurutē tata: ।। 2 ।।
Visarpavidradhipḷīha-
gulmāgnisadanajvarān ।
mukhanētraśirōrōga-
madatṛḍlvaṇāsyatā: ।। 3 ।।

Kuṣṭhavātāsrapittāsrakaṭv-
mḷōdgiraṇabhramān ।
śītōṣṇasnigdharūkṣādyairupa-
krāntāśca yē gadā: ॥ 4 ॥
Samyaksādhyā na sidhyanti tē
ca raktaprakōpajā: ।)

It gets vitiated generally by provocation of *pitta* and *kapha*. Then it creates diseases as cellulites, abscess, splenic disorder, abdominal projections (*gulma*), slackening of the digestive fire, salty taste in the mouth, skin diseases, rheumatic diseases, haemorragic troubles, belching of acrid and acidic tastes and giddiness. When, otherwise easily curable diseases are seen not cured even after proper treatment, administration of cold or hot unctuous or dry techniques, they are to be taken as caused by vitiation of blood.

तेषु स्रावयितुं रक्तमुद्रिक्तं व्यधयेत्सिराम् ॥ ५ ॥
(tēṣu srāvayituṁ raktamudri-
ktaṁ vyadhayētsirām ॥ 5 ॥)

In such conditions, do venesection to drain out the vitiated excess blood.

न तूनषोडशातीतसप्तत्यब्दसुतासृजाम् ।
अस्निग्धास्वेदितात्यर्थस्वेदितानिलरोगिणाम् ॥ ६ ॥
गर्भिणीसूतिकाजीर्णपित्तास्रश्वासकासिनाम् ।
अतीसारोदरच्छर्दिपाण्डुसर्वाङ्गशोफिनाम् ॥ ७ ॥
स्नेहपीते प्रयुक्तेषु तथा पञ्चसु कर्मसु ।
नायन्त्रितां सिरां विध्येन्न तिर्यङ्नाप्यनुत्थिताम् ॥ ८ ॥
नातिशीतोष्णवाताभ्रेष्वन्यत्रात्ययिकाद्ददात् ।

(Na tūnaṣōḍaśātītasapta-
tyabdasrutāsṛjām ।
asnigdhāsvēditātyartha-
svēditānilarōgiṇām ॥ 6 ॥
Garbhiṇīsūtikājīrṇapittā-
sraśvāsakāsinām ।
atīsārōdaracchardipāṇḍu-
sarvāṅgaśōphinām ॥ 7 ॥
Snēhapītē prayuktēṣu
tathā pañcasu karmasu ।
nāyantritāṁ sirāṁ vidhyēnna
tiryaṅnāpyanutthitām ॥ 8 ॥
Nātiśītōṣṇavātābhrēṣva-
nyatrātyayikādgadāt ।)

But bloodletting by venesection is contraindicated in some cases; it is not recommended for those who are under sixteen or above seventy years. Also, it is not allowed in those who have already lost blood recently, who have not undergone oleation and sudation properly, those suffering from indigestion and haemorragic diseases, breathing troubles, cough, diarrhoea, ascitis, vomiting, anaemia, anasarca, etc. Venesection is not permitted in women who are pregnant or delivered recently; it is not to be done during *snehapana* (intake of ghee) or when undergoing purificatory treatments. Also, there are certain conditions that do not cut the vein without proper controlling measures; not horizontally, nor the one which is not properly raised; not on days too cold, too hot, too windy or cloudy except in emergency conditions.

शिरोनेत्रविकारेषु लालाट्यां मोक्षयेत्सिराम् ॥ ९ ॥
अपाङ्ग्यामुपनास्यां वा
(śirōnētravikārēṣu
lālāṭyāṁ mōkṣayētsirām ॥ 9 ॥
Apāṅgyāmupanāsyāṁ vā)

In the diseases of head and eyes, the vein is to be cut at the forehead, or at the *apanga* (outer angle of the eye) or near the nose.

कर्णरोगेषु कर्णजाम् ।
नासारोगेषु नासाग्रे स्थिताम्

(karṇarōgēṣu karṇajām ।
Nāsārōgēṣu nāsāgrē sthitām)

In diseases of the ear, cut the vein on the ear and in disease of the nose, the vein at the tip of the nose.

नासाललाटयो: ।। १० ।।
पीनसे, मुखरागेषु जिह्वौष्ठहनुतालुगा: ।

(nāsālalāṭayō: ।। 10 ।।
Pīnasē, mukharāgēṣu
jihvauṣṭhahanutālugā: ।)

In *peenasa* (rhinitis), the vein on the nose or the forehead is to be cut. In diseases of the mouth, the veins on the tongue, lips, jaws and palate are to be dissected.

जत्रूर्ध्वग्रन्थिषु ग्रीवाकर्णशङ्खशिर:श्रिता: ।। ११ ।।

(jatrūrdhvagranthiṣu grīvā-
karṇaśaṅkhaśira:śritā: ।। 11 ।।)

In tumours above the clavicles, the veins on the neck, ears, temples and the head are to be dissected.

उरोपाङ्गललाटस्था उन्मादेऽपस्मृतौ पुन: ।
हनुसन्धौ समस्ते वा सिरां भ्रूमध्यगामिनीम् ।। १२ ।।

(Urōpāṅgalalāṭasthā
unmādēऽpasmṛtau puna: ।
hanusandhau samastē vā
sirāṁ bhrūmadhyagāminīm ।। 12 ।।)

In insanity, the veins on the chest, at the outer corner of the eyes and the forehead; in epilepsy, the veins at the joint of the jaws, or at any part of the jaws, or the vein at the central part of the eyebrows are to be cut.

विद्रधौ पार्श्वशूले च पार्श्वकक्षास्तनान्तरे ।

(Vidradhau pārśvaśūlē ca
pārśvakakṣāstanāntarē ।)

In abscess and pain in the flanks, cut the vein at the flanks, the axilla and between the breasts.

तृतीयकेऽसयोर्मध्ये, स्कन्धस्याधश्चतुर्थके ।। १३ ।।

(tṛtīyakēṁऽsayōrmadhyē,
skandhasyādhaścaturthakē ।। 13 ।।)

In tertian fever (fever recurring on every third day) cut the vein at the centre of the shoulders and in quartan fever (recurring on every fourth day), the vain below the shoulder.

प्रवाहिकायां शूलिन्यां श्रोणितो द्व्यङ्गुले स्थिताम् ।
शुक्रमेढ्रामये मेढ्रे, ऊरुगां गळगण्डयो: ।। १४ ।।

(pravāhikāyāṁ śūlinyāṁ
śrōṇitō dvyaṅgulē sthitām ।
śukramēḍhrāmayē mēḍhrē,
ūrugāṁ galaganḍayō: ।। 14 ।।)

In painful dysentery, the vein two *angula*s above or below the pelvis; in diseases of the semen and penis, the vein on the penis; and, in *galaganda* (a disease of the neck due to excess of fat) and in *gandalama* (scrofula) the vein at the thighs are to be cut.

गृध्रस्यां जानुनोऽधस्तादूर्ध्वं वा चतुरङ्गुले ।

(Gṛdhrasyāṁ jānunōऽdhastā-
dūrdhvaṁ vā caturaṅgulē ।)

In *gridhrasi* (sciatica), cut the vein of four *angula*s above or below the knee-joint.

इन्द्रवस्तेरधोऽपच्यां द्व्यङ्गुले चतुरङ्गुले ।। १५ ।।
ऊर्ध्वं गुल्फस्य सक्थ्यर्तौ, तथा क्रोष्टुकशीर्षके ।

(indravastēradhōऽpacyāṁ
dvyaṅgulē caturaṅgulē ।। 15 ।।
Ūrdhvaṁ gulphasya sakthyartau,
tathā krōṣṭukaśīrṣakē ।)

In *apachi* (a disease of the neck), cut the vein two *angula*s below *indravasti* (a *marma* on the calf). In the case of the pain on the legs,

and in the disease named *kroshtukaseersha* (swelling of the knee-joint which makes it to resemble the head of a jackal) cut the vein at four *angula*s above the ankle.

पाददाहे खुडे हर्षे विपाद्यां वातकण्टके ।। १६ ।।
चिप्पे च द्व्यङ्गुले विध्येदुपरि क्षिप्रमर्मण: ।

(pādadāhē khuḍē harṣē
vipādyāṁ vātakaṇṭakē ।। 16 ।।
Cippē ca dvyaṅgulē vidhyē-
dupari kṣipramarmaṇa: ।)

In burning sensation of the feet, in arthritis, in *harsha* (*padaharsha* - horripilation and benumbing of the feet), in *vipadika* (fissures of the feet), in *vatakantaka* (pain of the ankle due to *vata*) and in *chippa* (disease of the nails of the toes) cut the vein two *angula*s above *kshipramarma* (the *marma* between the big toe and the adjacent one).

गृध्रस्यामिव विश्वाच्यां, यथोक्तानामदर्शने ।। १७ ।।
मर्महीने यथासन्ने देशेऽन्यां व्यधयेत् सिराम् ।

(gṛdhrasyāmiva viśvācyāṁ,
yathōktānāmadarśanē ।। 17 ।।
marmahīnē yathāsannē
dēśēऽnyāṁ vyadhayēt sirām ।)

In *visvachi* (pain in the arm) also, cut the vein as described for *gridhrasi.*
If the above said veins are not visible, then cut the vein nearer to the spot where there is no *marma*.

अथ स्निग्धतनु: सज्जसर्वोपकरणो बली ।। १८ ।।
कृतस्वस्त्ययन: स्निग्धरसान्नप्रतिभोजित: ।
अग्नितापातपस्विन्नो जानूच्चासनसंस्थित: ।। १९ ।।
मृदुपट्टात्तकेशान्तो जानुस्थापितकूर्पर: ।
मुष्टिभ्यां वस्त्रगर्भाभ्यां मन्ये गाढं निपीडयेत् ।। २० ।।
दन्तप्रपीडनोत्कासगण्डाध्मानानि चाचरेत् ।
पृष्ठतो यन्त्रयेच्चैनं वस्त्रमावेष्टयन्नर: ।। २१ ।।
कन्धरायां परिक्षिप्य न्यस्यान्तर्वामतर्जनीम् ।
एषोऽन्तर्मुखवर्ज्यानां सिराणां यन्त्रणे विधि: ।। २२ ।।

(atha snigdhatanu: sajja-
sarvōpakaraṇō balī ।। 18 ।।
Kṛtasvastyayana: snigdha-
rasānnapratibhōjita: ।
agnitāpātapasvinnō
jānūccāsanasaṁsthita: ।। 19 ।।
Mṛdupaṭṭāttakēśāntō
jānusthāpitakūrpara: ।
muṣṭibhyāṁ vastragarbhābhyāṁ
manyē gāḍhaṁ nipīḍayēt ।। 20 ।।
Dantaprapīḍanōtkāsa-
gaṇḍādhmānāni cācarēt ।
pṛṣṭhatō yantrayēccainaṁ
vastramāvēṣṭayannara: ।। 21 ।।
Kandharāyāṁ parikṣipya
nyasyāntarvāmatarjanīm ।
ēṣōऽntarmukhavarjyānāṁ
sirāṇāṁ yantraṇē vidhi: ।। 22 ।।)

Then the patient has to be made ready for undergoing the venesection. First make the patient unctuous by lubricating processes. After performing all auspicious rites, set him at a place where all equipments are kept ready. He should be fed with an unctuous diet of rice and meat soup. Then expose him to sunlight or fire for sudation. Let him sit on a seat as high up to the knee. His hair is to be bound with a soft cloth. His elbows are to be placed on his knees. Then the sides of his neck are to be pressed tightly with fists in which a piece of cloth is hold. He should be asked to press his teeth, to hem, and to inflate the mouth for distending the cheeks. Now an attendant, standing behind, has to bind a cloth around the patient's neck, and putting his index finger between the neck and cloth,; manage to wind it avoiding too much tightening and troubling

the breath. This is the way for raising the veins except in the mouth.

ततो मध्यमयाऽङ्गुल्या वैद्योऽङ्गुष्ठविमुक्तया ।
ताडयेत्, उत्थितां ज्ञात्वा स्पर्शाद्वाऽङ्गुष्ठपीडनैः ।। २३ ।।
कुठार्या लक्षयेन्मध्ये वामहस्तगृहीतया ।
फलोद्देशे सुनिष्कम्पं सिरां, तद्वच्च मोक्षयेत् ।। २४ ।।
ताडयन् पीडयंश्चैनां

(Tatō madhyamayāऽṅgulyā
vaidyōऽṅguṣṭhavimuktayā ।
tāḍayēt, utthitāṁ jñātvā
sparśādvāऽṅguṣṭhapīḍanaiḥ ।। 23 ।।
Kuṭhāryā lakṣayēnmadhyē
vāmahastagṛhītayā ।
phalōddēśē suniṣkampaṁ
sirāṁ, tadvacca mōkṣayēt ।। 24 ।।
tāḍayan pīḍayaṁścaināṁ)

Then the physician is to make a tap at the particular spot of the vein with his middle finger tripped off by the thump. Assuring that the vein is raised by touch or exertion of pressure with the thump, place the *kuthari* (axe) held in the left hand, at the middle of the vein, and then tap on it without shaking the hand. Then, in the same way, the axe is to be taken up. The process of tapping and pressing the vein is to be repeated to have more flow of blood.

विध्येद्व्रीहिमुखेन तु ।
अङ्गुष्ठेनोन्नमय्याग्रे नासिकामुपसासिकाम् ।। २५ ।।

(vidhyēdvrīhimukhēna tu ।
aṅguṣṭhēnōnnamayyāgrē
nāsikāmupasāsikām ।। 25 ।।)

The vein nearer to the nose is to be cut with *vreehimukha* (the lancet with its face shaped like paddy seed). This is performed after raising the tip of the nose with the thumb.

अभ्युन्नतविदष्टाग्रजिह्वस्याधस्तदाश्रयाम् ।

(Abhyunnatavidaṣṭāgra-
jihvasyādhastadāśrayām ।)

To cut the vein under the tongue, the patient is asked to raise the tip of the tongue and hold it firmly by biting.

यन्त्रयेत्स्तनयोरूर्ध्वं ग्रीवाश्रितसिराव्यधे ।। २६ ।।

(yantrayētstanayōrūrdhvaṁ
grīvāśritasirāvyadhē ।। 26 ।।)

For cutting the vein on the neck, the part above the breasts has to bind with cloth.

पाषाणगर्भहस्तस्य जानुस्थे प्रसृते भुजे ।
कुक्षेरारभ्य मृदिते विध्येद्बद्धोर्ध्वपट्टके ।। २७ ।।

(Pāṣāṇagarbhahastasya
jānusthē prasṛtē bhujē ।
kukṣērārabhya mṛditē
vidhyēdbaddhōrdhvapaṭṭakē ।। 27 ।।)

To cut the vein on the arms, let the patient grasp a stone in both fists, and place the hands stretched on the knees. Then do kneading from the stomach. Just above the spot where the vein is to be cut, do bandage on the hand with a piece of cloth.

विध्येद्धस्तसिरां बाहावनाकुञ्चितकूर्परे ।
बद्ध्वा सुखोपविष्टस्य मुष्ठिमङ्गुष्ठगर्भिणम् ।। २८ ।।
ऊर्ध्वं वेध्यप्रदेशाच्च पट्टिकां चतुरङ्गुले ।

(Vidhyēddhastasirāṁ bāhā-
vanākuñcitakūrparē ।
baddhvā sukhōpaviṣṭasya
muṣṭhimaṅguṣṭhagarbhiṇam ।। 28 ।।
Ūrdhvaṁ vēdhyapradēśācca
paṭṭikāṁ caturaṅgulē ।)

To cut the vein on the hand, the patient is to be well seated, with his arms stretched, clenching the fists with toes held inside. Bind a piece of cloth four *angula*s above the cutting point.

विध्येदालम्बमानस्य बाहुभ्यां पार्श्वयो: सिराम् ।। २९ ।।

(vidhyēdālambamānasya
bāhubhyāṁ pārśvayō: sirām ।। 29 ।।)

To cut the veins of the flanks, the patient is kept in a suspending position with his hands holding on a support above.

प्रहृष्टे मेहने, जङ्घासिरां जानुन्यकुञ्चिते ।

(Prahṛṣṭē mēhanē, jaṅghā-
sirāṁ jānunyakuñcitē ।)

The vein on the penis is to be cut in erected position. The vein on the calf is to be cut when the knee is not contracted.

पादे तु सुस्थितेऽधस्ताज्जानुसन्धेर्निपीडिते ।। ३० ।।
गाढं कराभ्यामागुल्फं चरणे तस्य चोपरि ।
द्वितीये कुञ्चिते किञ्चिदारूढे हस्तवत्तत: ।। ३१ ।।
बद्ध्वाविध्येत्सिराम्

(pādē tu susthitēऽdhastā-
jjānusandhērnipīḍitē ।। 30 ।।
Gāḍhaṁ karābhyāmāgulpha
caraṇē tasya cōpari ।
dvitīyē kuñcitē kiñci-
dārūḍhē hastavattata: ।। 31 ।।
Baddhvāvidhyētsirām)

Set the foot in an orderly way. Then press well the area from beneath the knee down to the ankle. Place the other foot slightly bent on it, and tie a band as in the case of the hand (four *angula*s above the cutting point).

इत्थमनुक्तेष्वपि कल्पयेत् ।
तेषु तेषु प्रदेशेषु तत्तद्यन्त्रमुपायवित् ।। ३२ ।।

(itthamanuktēṣvapi kalpayēt ।
tēṣu tēṣu pradēśēṣu
tattadyantramupāyavit ।। 32 ।।)

In this way, a wise physician, can select the techniques suited to the particular locations, not referred here.

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PHARMACOGNOSTICAL STUDIES ON *ROTULA AQUATICA* LOUR.

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Abstract: This work describes the anatomy, morphology, floral vasculature and chemical analysis of the plant *Rotula aquatica*, a source of the drug *pashanabedah*. For correct identification of the source plant, stomatal index, palisade ratio and vein-islet number are determined. Propagation trials using seeds and stem cuttings are also conducted.

Introduction

Rotula aquatica, belonging to the family Boraginaceae, is known as *kallurvanchi* in Malayalam; *pashanabedah* in Sanskrit and *seppunerinji* in Tamil. Root is the main ingredient in more than 10 ayurvedic formulations like *Pootikaranjasava, Matsyakshyadi kashaya, Traikantakaghrita, Varahyadighrita, Dadhikaghrita*, etc (S.R. Iyer, 1983). The plant is distributed throughout India in the sandy and rocky beds of steams and rivers. In Kerala the plant is naturally growing attached to rocks along running waters in Parappa, Payyanur, Kannoth, Mattanur and Aralam of Kannur district; Vazhachal, Chalakkudy and Atirappally of Thrissur district; Mukkali, Parambikulam, Poovanchola and Bhavani river of Palakkad district; Nilambur and Nedumkayam of Malappuram district; Cheruthoni, Pooyamkutty and Panamkutty of Idukki district; Adukkalam of Kottayam district; Ranni and Achankovil of Pathanamthitta district; Peruntenaruvi and Kollam of Kollam district and Bottuvara of Ernakulam district (Fig.I).

The roots are bitter, astringent, cooling, diuretic and laxative and are useful in haemorrhoids, renal and vesical calculi, diabetes and venereal diseases (Warrier et al, 1996).

Morphological description

A small branched villous shrub growing up to 150 cm in height, with numerous short branchlets often producing adventitious roots which help in the vegetative propagation; leaves small, simple, alternate, obtuse, short-petioled, spathulate, tomentose beneath; flowers pink, short pedicellate, single or 2-4, produced at the tip of the lateral branchlets; calyx 5-partite, united at the base, hairy, lobes lanceolate, imbricate; corolla gamopetalous, five partite; stamens five, epipetalous ; ovary ovoid, 4-celled with one ovule in each chamber, style long, thin, stigma capitate; fruits sub-globose, orange red drupes (Fig.II&III).

* *IDRC Project, Arya Vaidya Sala, Kottakkal*

Fig. I *Rotula aquatica* Lour. - Location Map

Districts:

1. Thiruvananthapuram
2. Kollam
3. Pathanamthitta
4. Alappuzha
5. Kottayam
6. Idukki
7. Ernakulam
8. Trissur
9. Palakkad
10. Malappuram
11. Kozhikode
12. Wayanad
13. Kannur
14. Kasargode

Localities:

Ach. Achankovil
Adu. Adukkalam
Ara. Aralam
Ati. Atirappally
Bha. Bhavani
Bho. Bhottuvara
Cha. Chalakudy
Che. Cheruthoni
Kan. Kannoth
Kol. Kollam
Mat. Mattannur
Muk. Mukkali
Ned. Nedumkayam
Nil. Nilambur
Pan. Panamkutty
Par. Parambikulam
Pap. Parappa
Pay. Payyanur
Per. Perunthenaruvi
Pon. Poovanchola
Poy. Pooyamkutty
Ran. Ranni
Vaz. Vazhachal

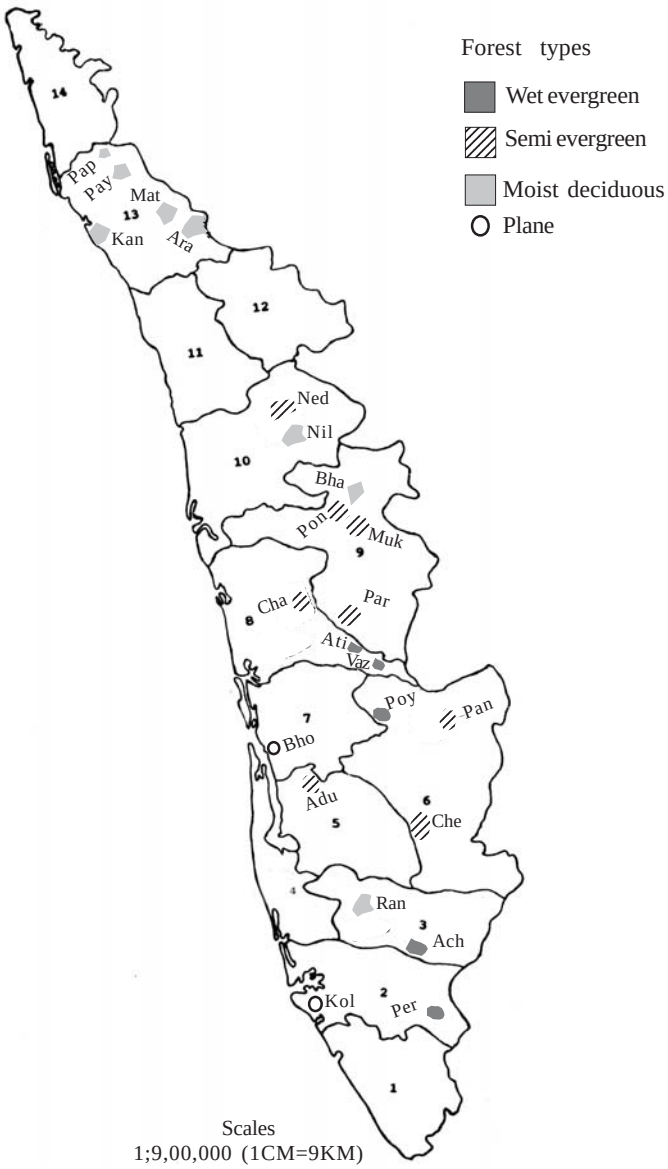

Fig. II. *Rotula aquatica* Lour. - **a**) Habit **b**) Root

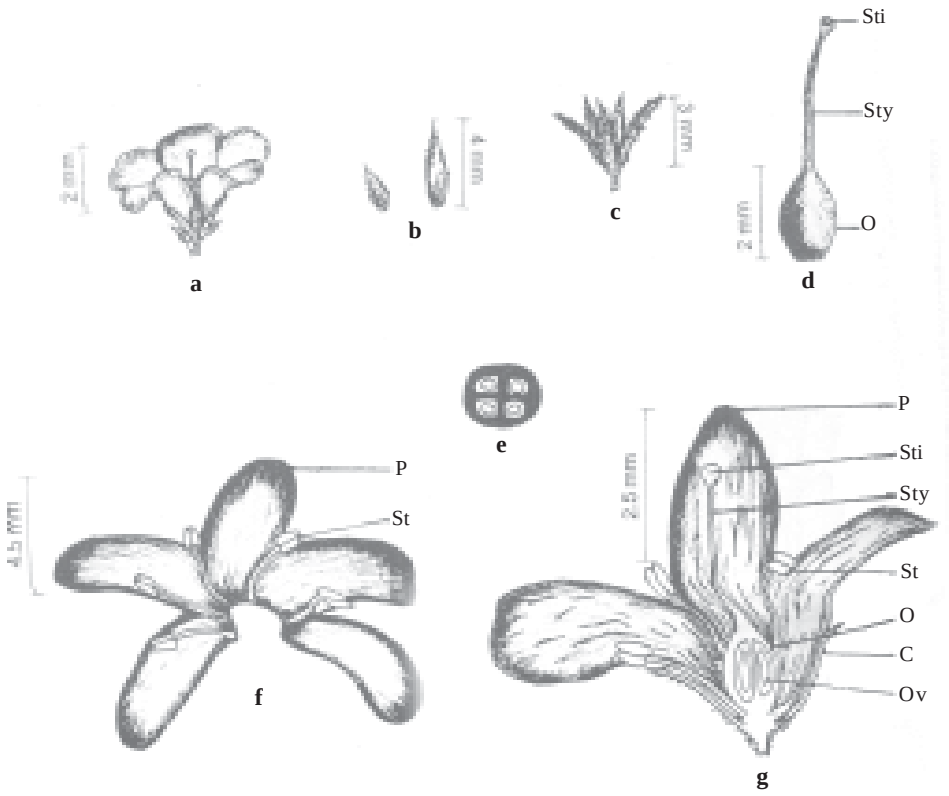

Fig. III. **a - g** *Rotula aquatica* Lour.
a) Single flower **b**) Bracts **c**) Calyx **d**) Gynoecium
e) Ovary C.S. **f**) Corolla with staments **g**) Flower L.S

C. Calyx **O**. Ovary **Ov**. Ovule **P**. Petal **St**. Stamen **Sti**. Stigma **Sty**. Style

Materials and methods

Plant materials for macro and microscopic observations were collected from different parts of Kerala and fixed in F.A.A. Seeds were collected for propagation studies. For anatomical works stained hand sections and macerated materials were examined under compound microscope. Vein-islet number, stomatal index and palisade ratio were found out using samples treated in 5% KOH solution. For determining stomatal index, ten epidermal pealings from both surfaces of a fresh leaf were taken and ten countings were recorded from ten different areas of each piece (i.e. number of stomata as well as epidermal cells per 1 sq. mm area). Stomatal index value is then calculated by using the formula $\frac{E}{E+S} \times 100$ where E and S stand for the number of epidermal cells and number of stomata of unit area respectively (Salisbery, 1928). The values are represented graphically. Palisade ratio was determined by using 5 fresh leaves. From each of these four pieces (i.e. one from base, one from apex, one from margin and one from centre) were selected. After clearing, washing and staining they were mounted in glycerin. From these 100 readings were recorded, taking 5 counts from each piece. Average of these is the palisade ratio. The values are represented graphically. The report that number of palisade cells per unit area increases successively from base to apex with the ratio always remaining constant (Zorning & Weiss, 1925) holds true in this species also. The vein-islet number is calculated by counting the minute areas of photosynthetic tissue encircled by the ultimate division of the conducting strands per 1 sq. mm of cleared leaf samples taken from 5 different leaves. The values are represented graphically. All these numerical values may be considered as a diagnostic constant and will help for identifying the plant species.

Floral vasculature

Calyx

Each calyx lobe is supplied with a single vascular strand which branches into three right from the base. Each branch again branches irregularly and rejoins to form a network throughout the lobe (Fig.IVa).

Corolla

Each corolla lobe is supplied with a single vascular bundle. Two lateral branches arise from it at different levels near the base. Again these lateral branches get dichotamously branched. The middle one traverses through the centre and simply get branched only at the tip (Fig.IVb).

Stamen

A single vascular strand enters into each stamen. This bundle traverses through the filament and enters into the connective without any branching (Fig.IVc).

Gynoecium

The vascular bundles enter into the gynoecium. Each bundle divides into two. The inner one forms the ventral bundle and supplies the ovules. The outer branch passes through the ovary wall and enters into the stigma through the style without any branching (Fig.IVd).

The sepal is supplied with three vascular strands running from the base to the tip, giving rise to branches alternating to the right and left. The petals also have the same pattern of vasculature. The labellum is supplied with seven vascular bundles. The median one reaches the top without giving rise to any branch. All the other six bundles branch and rebranch on a symmetrical pattern on both sides.

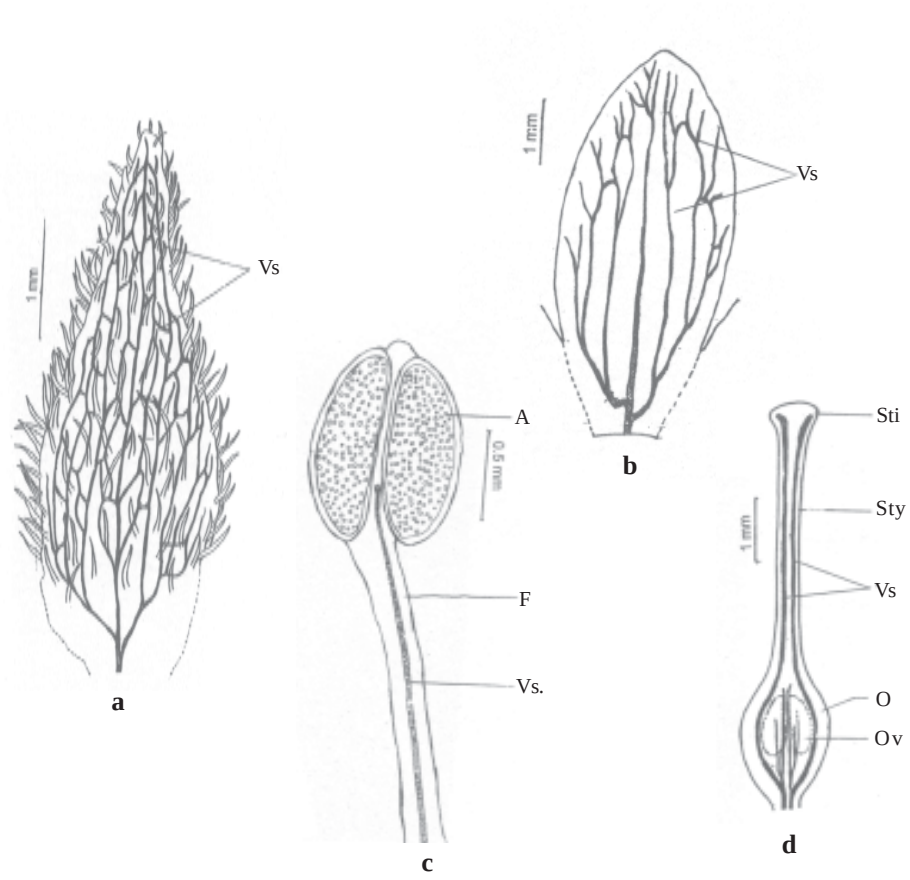

Fig. IV. **a - d** *Rotula aquatica* Lour. - Floral vasculature
a) Calyx lobe **b**) Corolla lobe **c**) Stamen **d**) Gynoecium

A. Anther lobe **F**. Filament **O**. Ovary **Ov**. Ovule **Sti**. Stigma
Sty. Style **Vs**. Vascular supply

Six vascular bundles supply the ovary. Of these, the dorsal one gets divided into two, traverse through the column and enter into the staminal glands where it gets feebly divided. Another two get divided into two at the region of ovary. One branch of each supplies the stigma and the other branch supplies the ovary wall. The remaining three get divided into two, only at the tip and their supply the placentum.

Anatomy

Stem

The important anatomical features of the stem are the following:-

1. The outermost zone is cork consisting of 4-6 layers of rectangular cells, of which the innermost 2-3 layers contain an yellow pigment
2. The narrow zone of secondary cortex consists of polygonal cells containing starch grains and druses.
3. Small groups of stone cells are distinctly seen above the phloem. The phloem cells are thick walled and contain yellow pigment.
4. Cambium is two layered.
5. Xylem consists of vessels with small lumen, fibers and parenchyma.
6. Medullary rays are uniseriate and these cells and pith cells contain abundant starch grains (Fig.Va,b).

Root

Cork consisting of 8-10 layers of tangentially elongated cells, two layered phellogen, prosenchymatous cortex, 2-4 layered cambium and predominant wood are the characteristic parts of the root (Fig.Vc,d).

Leaf

Petiole:

In T.S, the petiole is somewhat heart shaped with a broad c-shaped vascular bundle. Epidermis is single layered with unicellular trichomes. Cortex is composed of prosenchymatous cells. Some of these cells contain druses (Fig.VIa,b).

Lamina:

Epidermis is single layered provided with unicellular trichomes. Mesophyll consists of 2-3 layered palisade tissue and multilayered sponge tissue. Palisade extends to the midrib portion. The midrib vascular bundle has a distinct patch of phloem fibers on the adaxial side. The cells around the veinlets are uniformly large and devoid of chloroplasts. Cystoliths and druses are very prominent and seen throughout the leaf. Stomata are of Ranunculaceous type (Fig.VIc-g).

The somatal index of Lower epidermis is 13.08 and of Upper epidermis is 12.58 (Table I&II, Fig. VIIa&b). The Palisade ratio is 5.11 and vein-islet number is 6.4 (Table III&IV, Fig.VIII&IX).

Propagation

The plant can be propagated through seeds and stem cuttings. The seeds are very small and should be carefully collected from mature fruits when they are orange red in colour. After repeated washings, seeds should be dried in shade for two days. These seeds can be sown either in pots filled with sand or in sterilised sponge. Regular watering is essential for germination. Germination will commence from 6^{th} day onwards. The percentage of germination is around 67. Four leaved seedlings can be transplanted into polybags containing potting mixture. The survival percentage is only 30.

The stem cuttings collected in the month of April-May give better result. Four noded cuttings of 15 cm long are usually used for propagation. Cuttings with actively growing

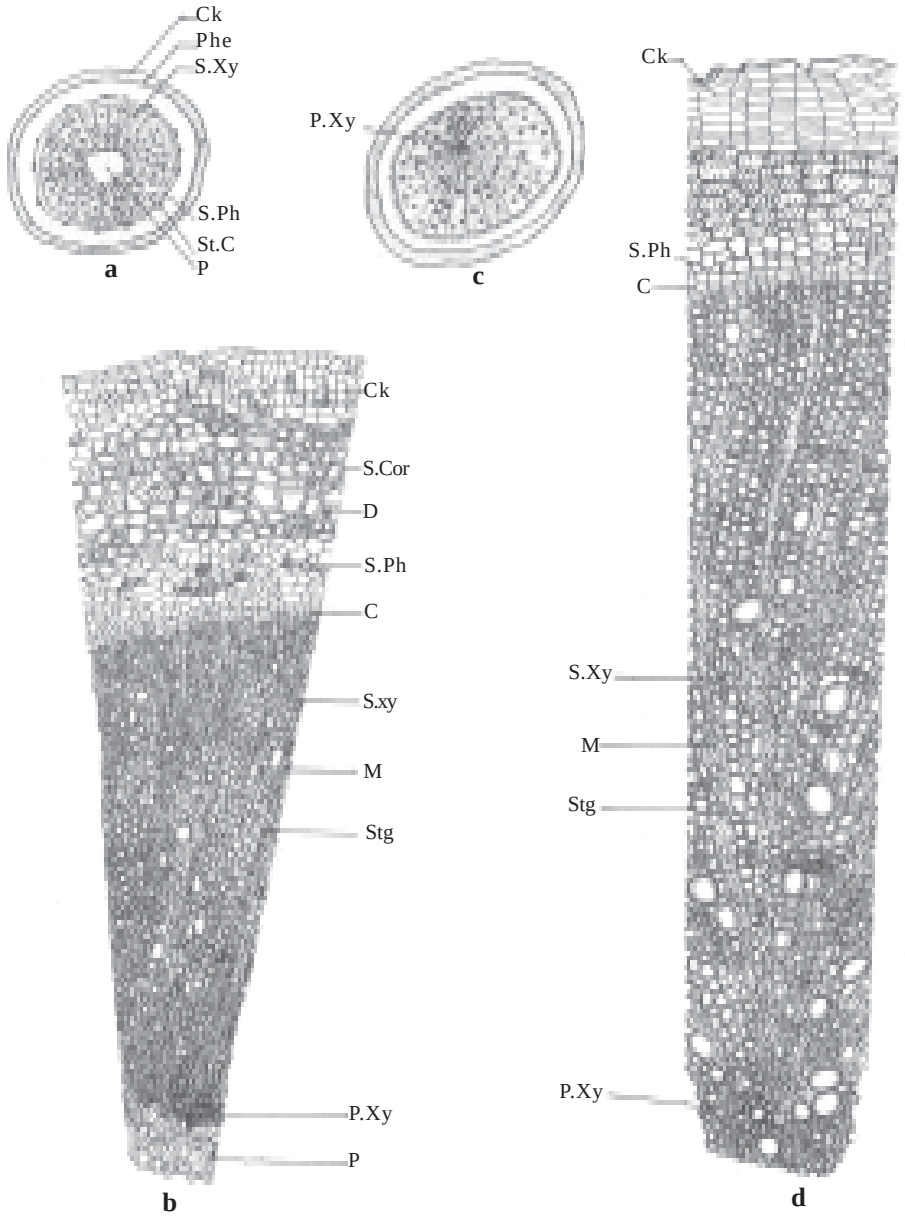

Fig. V. **a - d** *Rotula aquatica* Lour. **a**) T.S. of stem - diagrammatic **b**) A portion of stem enlarged **c**) T.S. of root - diagrammatic **d**) A portion of root enlarged

C. Cambium **Ck**. Cork **D**. Druses **M**. Medullary ray **P**. Pith **Phe**. Phellogen **P.Xy**. Primary xylem **S.cor**. Secondary cortex **S.Ph**. Secondary phloem **St.C**. Stone cell **Stg**. Starch grain **S.Xy**. Secondary xylem

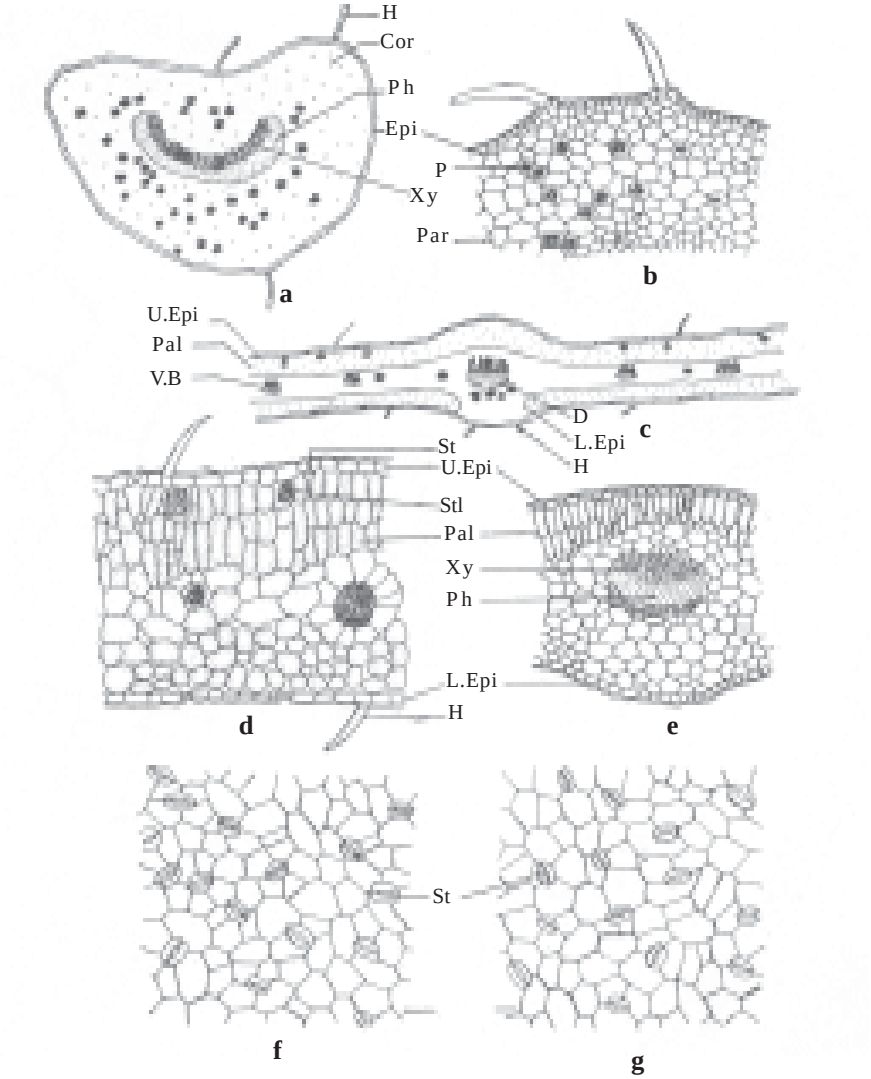

Fig. VI. **a - g** *Rotula aquatica* Lour. **a**) T.S. of petiole - diagrammatic
b) A portion of petiole - cellular **c**) T.S. of leaf through midrib - diagrammatic
d) Detailed T.S. of lamina **e**) Detailed T.S. of midrib **f**) Lower epidermis **g**) Upper epidermis
Cor. Cortex **D**. Druses **Epi**. Epidermis **P**. Pith **H**. Hair **L**.**Epi**. Lower epidermis
Ph. Phloem **Par**. Parenchyma **Pal**. Palisade **St**. Stomata **Stl**. Systolith
U.**Epi**. Upper epidermis **V**.**B**. Vascular bundle **Xy**. Xylem

Table I : *Rotula aquatica:*.Stomatal index - Lower Epidermis

	I			II			III			IV			V		
	No. of Epi. cells	No. of Stom-ata	Stom-atal Index	No. of Epi. cells	No. of Stom-ata	Stom-atal Index	No. of Epi. cells	No. of Stom-ata	Stom-atal Index	No. of Epi. cells	No. of Stom-ata	Stom-atal Index	No. of Epi. cells	No. of Stom-ata	Stom-atal Index
1	368	48	11.53	408	48	10.52	416	64	13.33	334	72	17.73	370	56	13.15
2	364	52	12.50	416	72	14.75	448	48	9.68	320	64	16.66	415	48	10.37
3	360	56	13.46	412	60	12.71	432	56	11.48	332	68	17.00	390	50	11.36
4	416	48	10.34	400	56	12.28	376	48	11.32	432	72	14.29	357	50	14.00
5	392	64	14.04	424	56	11.67	384	56	12.73	440	69	12.70	440	45	9.28
6	404	56	12.17	412	56	11.97	380	52	12.04	336	68	16.83	360	60	14.29
7	368	56	13.05	392	56	12.50	376	48	13.32	410	72	10.66	400	56	12.28
8	404	64	12.12	384	40	09.43	384	80	17.24	400	56	13.56	380	50	12.24
9	408	60	12.82	388	48	11.01	380	64	14.41	388	60	13.39	436	46	09.54
10	359	49	12.00	401	53	11.67	399	59	12.88	408	64	13.56	381	59	13.41
Average			12.42			11.85			12.84			14.51			11.99

	VI			VII			VIII			IX			X		
	No. of Epi. cells	No. of Stom-ata	Stom-atal Index	No. of Epi. cells	No. of Stom-ata	Stom-atal Index	No. of Epi. cells	No. of Stom-ata	Stom-atal Index	No. of Epi. cells	No. of Stom-ata	Stom-atal Index	No. of Epi. cells	No. of Stom-ata	Stom-atal Index
1	432	40	08.47	480	56	12.44	488	40	08.20	340	80	18.88	316	49	13.40
2	448	56	11.11	440	64	12.70	400	48	10.71	344	56	14.00	302	53	14.93
3	440	48	09.89	460	60	11.54	344	66	14.00	352	68	16.19	308	49	13.73
4	336	64	16.00	448	56	11.11	392	64	14.03	328	48	12.77	333	57	14.62
5	352	48	12.00	400	64	13.79	360	48	11.76	320	72	18.37	360	55	13.25
6	344	56	14.00	424	60	12.40	376	72	16.07	384	60	15.63	307	53	14.72
7	384	56	12.73	376	64	14.55	424	44	09.40	352	48	12.00	370	61	14.15
8	338	64	16.00	400	56	12.38	368	60	14.02	344	64	15.69	354	63	15.11
9	408	40	08.93	388	60	13.39	368	60	14.02	331	80	19.23	308	54	14.92
10	372	52	12.26	370	62	14.35	370	50	11.36	353	63	15.14	322	50	13.26
Average			12.34			12.66			12.36			15.72			14.23

Ranges: 11.85 - 15.72 Mean: 13.9 Standard deviation : 2.25

Table II : *Rotula aquatica*:.Stomatal index - Upper Epidermis

	I			II			III			IV			V		
	No. of Epi. cells	No. of Stom-ata	Stom-atal Index	No. of Epi. cells	No. of Stom-ata	Stom-atal Index	No. of Epi. cells	No. of Stom-ata	Stom-atal Index	No. of Epi. cells	No. of Stom-ata	Stom-atal Index	No. of Epi. cells	No. of Stom-ata	Stom-atal Index
1	360	56	13.46	472	56	10.61	365	52	12.47	432	56	11.48	416	40	08.77
2	352	64	15.38	416	56	11.86	454	54	10.63	360	48	11.76	368	48	11.54
3	400	48	10.71	362	49	11.92	448	56	11.61	416	64	13.33	424	56	11.67
4	380	52	12.04	356	52	12.94	426	56	11.76	388	56	12.61	420	48	10.26
5	360	56	13.46	402	60	12.99	426	48	10.26	352	48	12.00	408	56	12.07
6	356	60	14.42	357	53	12.93	375	53	12.38	328	48	12.77	388	52	11.82
7	392	56	12.50	391	57	12.72	47	47	10.35	328	72	18.00	409	47	10.31
8	360	56	13.46	358	49	12.04	410	49	10.24	340	60	15.00	413	49	10.61
9	440	56	11.29	351	50	12.47	378	50	11.68	368	64	14.81	348	52	13.00
10	416	56	11.86	383	59	13.35	402	48	10.67	348	56	13.86	351	53	13.12
Average			12.86			12.38			11.16			13.56			11.32

	VI			VII			VIII			IX			X		
	No. of Epi. cells	No. of Stom-ata	Stom-atal Index	No. of Epi. cells	No. of Stom-ata	Stom-atal Index	No. of Epi. cells	No. of Stom-ata	Stom-atal Index	No. of Epi. cells	No. of Stom-ata	Stom-atal Index	No. of Epi. cells	No. of Stom-ata	Stom-atal Index
1	368	48	11.54	384	48	11.11	352	56	13.73	336	56	14.29	341	55	13.88
2	376	64	14.51	416	48	10.34	344	56	14.00	344	72	17.31	362	70	16.20
3	372	56	13.08	312	48	13.33	348	56	13.86	382	64	15.38	332	53	13.77
4	360	56	13.46	348	48	12.12	384	72	15.79	336	32	08.70	358	61	14.56
5	408	64	13.56	360	56	13.46	408	40	08.73	340	52	13.27	340	43	11.23
6	424	56	11.67	388	52	11.81	396	56	12.39	576	56	12.96	382	49	11.37
7	392	56	12.50	364	52	12.50	376	48	11.32	364	60	14.15	334	62	15.66
8	432	64	12.90	368	40	09.80	380	48	11.21	376	40	09.61	365	60	14.11
9	420	64	13.22	320	64	16.67	384	48	11.11	352	40	10.20	361	50	12.17
10	354	50	12.38	328	60	16.30	360	64	15.09	364	40	09.90	352	51	12.66
Average			12.88			12.74			12.73			12.58			13.56

Ranges: 11.16 - 13.56 Mean: 12.58 Standard deviation : 1.89

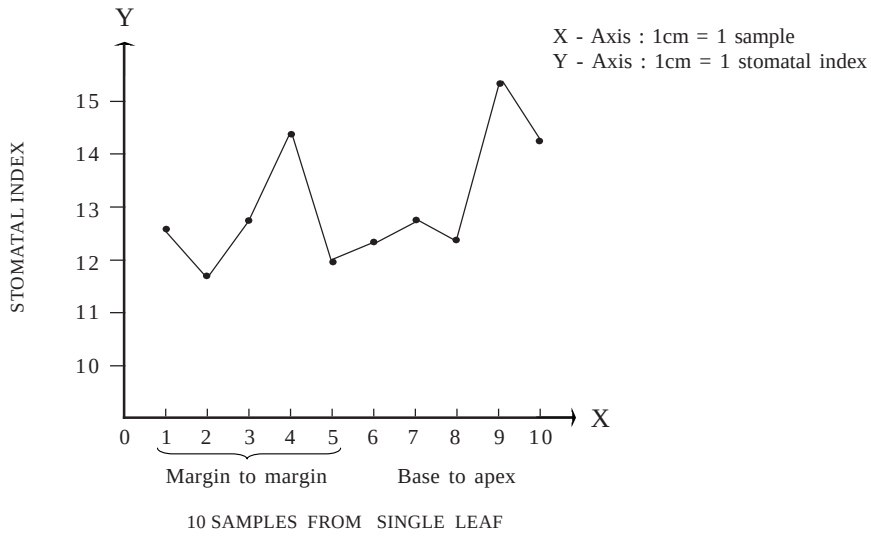

Fig. VIIa. *Rotula aquatica* Lour. - Stomatal index - Lower Epidermis

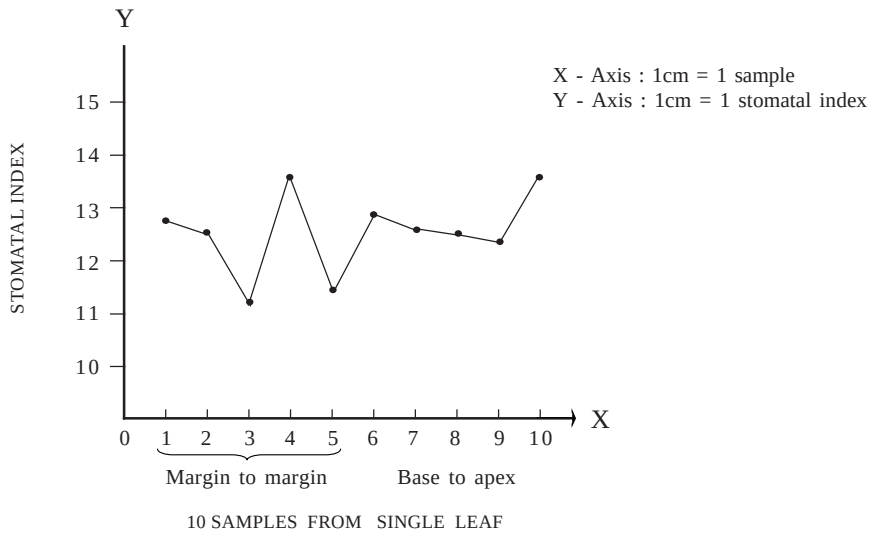

Fig. VIIb. *Rotula aquatica* Lour. - Stomatal index - Upper Epidermis

Table III : *Rotula aquatica* Lour.: - Palisade ratio

Leaf No	I				II				III				IV				V			
No. of Pieces	i	ii	iii	iv	i	ii	iii	iv	i	ii	iii	iv	i	ii	iii	iv	i	ii	iii	iv
Readings	9	7	6	7	5	5	9	6	7	4	6	2	5	5	6	4	8	5	8	5
	5	6	7	5	6	5	4	4	8	6	7	5	4	5	3	5	5	4	6	3
	5	3	4	3	7	5	4	5	3	4	3	9	6	4	6	8	4	4	3	4
	6	4	5	6	3	7	3	4	8	3	2	4	4	3	5	6	3	7	6	6
	9	4	4	5	4	6	5	4	7	3	3	4	8	4	3	5	6	6	5	3
Average	6.8	4.8	5.2	5.2	5.0	5.6	5.4	4.6	6.6	4.0	4.2	6.6	5.4	4.2	4.6	5.6	5.2	5.2	5.5	4.2
Leaf average	5.5				5.15				5.35				4.95				5.05			

Range : 4.95 - 5.35 Mean : 5.11 Standard deviation 1.66

Table IV : *Rotula aquatica* Lour: - Vein-islet number

Leaf No	I				II				III				IV				V			
No. of Pieces	i	ii	iii	iv	i	ii	iii	iv	i	ii	iii	iv	i	ii	iii	iv	i	ii	iii	iv
Readings	7	5	4	6	7	7	6	8	5	6	6	5	7	5	7	7	7	7	6	7
	6	5	7	5	8	5	5	7	6	5	5	5	8	4	7	6	6	7	5	5
	8	7	6	7	6	4	7	6	5	7	5	8	6	6	7	5	7	6	7	6
	5	6	5	8	7	6	5	7	8	7	6	8	5	7	6	5	7	8	6	8
	6	5	7	7	8	7	8	6	7	8	7	7	7	6	8	4	8	8	8	8
Average	6.4	5.6	5.8	6.6	7.2	5.8	6.2	6.8	6.2	6.6	5.8	6.6	6.6	5.6	7	5.4	7	7.2	6.4	6.8
Leaf average	6.1				6.5				6.3				6.2				6.9			

Range : 6.1 - 6.9, Mean : 6.4, Standard deviation 1.13.

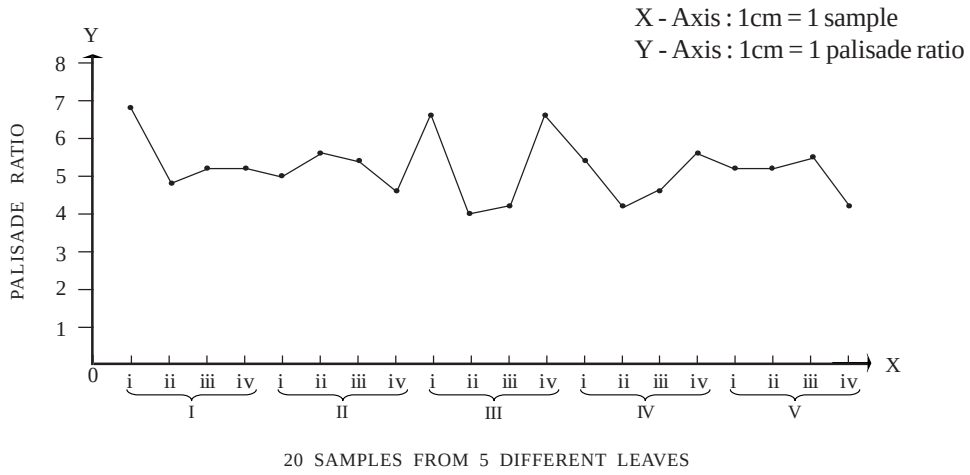

Fig. VIII. *Rotula aquatica* Lour. - Palisade ratio

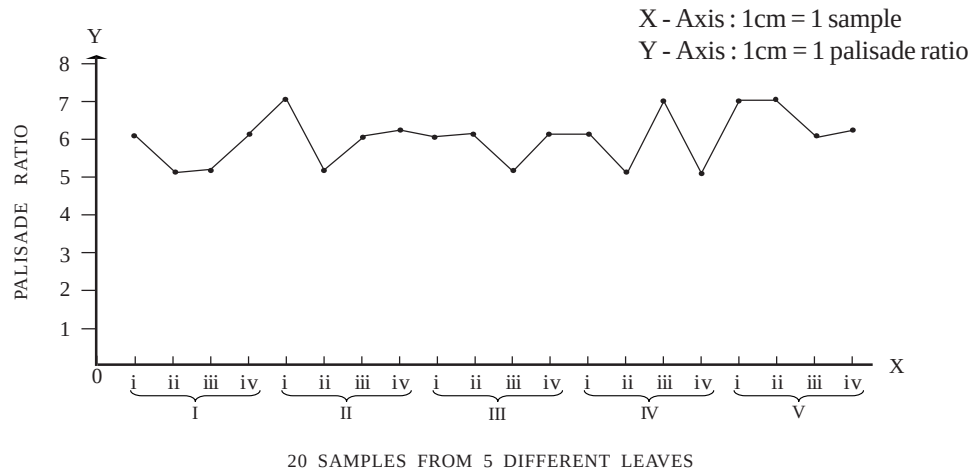

Fig. IX. *Rotula aquatica* Lour. - Vein-islet Number

buds will give maximum sprouts. Cuttings may be planted directly in polybags containing potting mixture and kept under shade. Regular watering is necessary.

In nature new plants arise from horizontal branches, which produce adventituous roots at the region of contact with the soil.

The roots of two year old plant can be collected, washed thoroughly, cut into 2.5 cm. Long pieces, dried in the shade for two weeks and stored in gunny bags.

Chemical studies

The diuretic action of roots is attributed to the presence of allantoin (0.5%, in air-dry roots). A sterol named rhabdiol (C35H60O, mp. 210º) has also been isolated from the roots (Wealth of India, 1972).

Result and discussion

Natural regeneration of this plant remarkably decreases with the increasing consumption and unscientific extraction. So, more emphasis should be given to the conservation of this plant in their natural habitat and ex-situ conservation by cultivation.

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The authors are grateful to Dr. P.K. Warrier, The Managing Trustee & Chief Physician (Project Leader) for giving us encouragements and extending the necessary facilities for the work. The constant encouragement and helpful suggestions received for Sri. K.K. Nair I.F.S. (Retd.), Local consultant of the project, Dr. C. Ramankutty, Sr. Manager, Publications, A.V.S, Kottakkal, Dr. Indira Balachandran, Research Officer, A.V.S. Herbal Garden, Kottakkal and Dr. G.P. Mukundan, Manager, A.V.S. Herbal Garden, Kanjirapuzha are greatfully acknowledged. We are thankful to Mr. V.K. Uthaman, Computer Assistant who did the typing work.

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A BENEFICIAL BITE

Lal Krishnan*

Abstract: Ayurveda describes different types of bloodletting. Among them, *jalookava-charana* (leeching) gains more attention irrespective of the system which is practised. Here, the author details the historical background, procedure of leeching and zoological and anatomical aspects; the mechanical leech is also dealt with.

The art of healing is one of the oldest intellectual properties of human beings originated out of constraint, need, self-protection and the urge to help. The most primitive forms of medicine can be seen in the removal of and protection against parasites and invading objects, observed in animals as well as in humans. Feelings, similar to those experienced for invading observable foreign bodies, may have served as a basis for the primitive concept of 'invisible foreign bodies' causing disease and first attempts to cure may have been similar to the removal of observable foreign bodies as findings on prehistoric sculls have shown. The ability of humans to observe, learn and memorize increased their knowledge of the use of natural substances and methods supporting healing, and those most successful in applying these methods became medicine men or women. The development of consciousness, on the other side, increased the search for the meaning of life and death and initiated the establishment of religions. Because of the close relationship between life, death and disease, medicine and religion soon became closely connected and methods to cure mixed with religious rituals. On behalf of the findings regarding the history of medicine, the rational thinking over the health matter were firstly formulated and elaborated in the Indian subcontinent. Here the relationship was described well. The postulations regarding the living matter were rationally described on basis of the life-promoting forces pervading over the earth, the sun, rain and wind. To describe the existence from birth to death, on the basis of these worldly forces, the ancient saints used the Indian ontology, i.e. *sankhyam*, *nyayam*, *poorvameemamsa*, *uttarameemamsa*, *tarka*, etc. By using the above postulations they formulated the pentad elemental theory, which were then being the cardinal postulates of ayurveda. Again, the things were mutate and presents yet another postulates known as *tridosha* theory (humeral theory). When we search through the history of medicine all along, we will find that the beginning of all medical system were based on this one and only pristine theory. Wherein, all the life bearing organisms attained a disease state by because

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of the humeral disharmony, caused due to the bad food habits, activity, and also due to genetic maladjustments. To bring back this unfair situation to a finely tuned consonance ayurveda admonishes about the cause of a particular situation and also advises various treatment modalities, which include the purificatory traits such as *vamana, virechana, nasya*, etc. Apart from the above said means, surgical and para-surgical procedures and various means to practice it also were mentioned.

When we consider surgical practice in ayurveda, the foremost measure described in the literature is *raktamoksha*, as a purificatory mode of advise towards the diseased. In this, the blood is let out from the diseased by various means which cures the diseased. On par with humeral theory, it says if a particular disease pathogenesis does not favorably respond with medication and other traits, ayurveda advocates, 'Let the noxious blood be let out', it will cure the disease or otherwise it will make a clear pathway towards further treatment modalities. Often the blood letting alone is practiced as a single trait; however, it is practised along with other procedures also. This particular means is practised by various ways such as - *prachanam* i.e. by pricking the diseased site, *siravyadham* i.e. by direct cutting of the superficial vein (phlebotomy or venesection), *achooshanam* i.e. by sucking the blood, by using leeches (*jalooka*), by dried bottle gourd (*alabu*), small earthen pot (*ghati*), horn of animals (*sringa*), etc.

When we consider all the above means of blood letting, usage of leeches in this particular procedure (*jalookavacharanam*), gains more attention irrespective of the system which is practised. The search through the documented history of this particular technique reveals its efficacy that all the medical systems were aware about it much before. It is well documented that in 18th century AD, approximately 42 million leeches were imported into France for medicinal use. And around the same time 30 million leeches were imported annually to America from Germany. The usages of leeches were also described in the Egyptian tomb wall painting from the 18th Dynasty (1567-1308 BC). The Greeks and Romans also practised leech therapy several centuries BC. John Hunter, in his *A treatise of Blood, Inflammation and Gunshot Wounds*, discusses the use of leeches and cautions against their use in gun shot wounds. The use of leeches was widespread in Europe during the 17th century and peaked during the first part of the 19th century, largely due to the influence of Broussais, Napoleon's military surgeon. Based on French import records, over a billion leeches were imported into France during the 19th century; because of the extensive use, in 1910 the medicinal leech was thought to be extinct in Britain. In 1884, Haycroft of Wales isolated hirudin, the anticoagulant elaborated by leeches. It was not until 1955; however, that hirudin was chemically analyzed and found to be a small peptide consisting of 65 amino acids with specific antithrombin activity. Renewed interest in leeches has been developed over past several years, particularly in microsurgery in modern medicine. The extensive use made this creature extinct. And in this context, Dr. Roy Sawyer, an American scientist established the worlds first leech farm which bred over 50,000 leeches per month.

Pioneering the use of leeches in modern plastic

and reconstructive surgery can be attributed to two Slovenian surgeons; Derganc and F. Zdravic from Ljubljana who published a paper in the British Journal of plastic surgery in 1960 which describes leech assisted tissue flap surgery. The successful use of leeches in the treatment of venous congestion in skin grafting has increased the investigation and use of leech. This tiny creature may well provide the only solution to such a vexing problem as venous congestion which usually happens with reattachment microsurgery. The appendages reattached include fingers, hands, toes, ears, noses, etc. The difficult part of the reconstructive microsurgery is keeping the reattached tissue healthy while tiny blood vessels repair themselves. Without an appropriate supply of blood, the tissue would die. If left alone, the tiny blood vessel will become clogged by the normal process of scab formation disrupting blood flow. The blood deprived tissue will die soon. To prevent this, the leech is applied near the attachment site; by the release of the anti coagulant hirudin the blood is prevented from clotting. The leech also release an anti septic that prevent the tiny wound from becoming infected. Even after the leech is removed from the attached site the effect of hirudin will last for hours. This yields plenty of time for new blood vessels to form in the reconstructed site.

Zoological and anatomical aspects of leeches

Ayurvedic literature consists of extensive description about variety of leeches, mode of usage, etc. When we go through the literature, we come across the description of various medicinal leeches like *krishna, karbura, alagarda,* etc. and non medicinal toxic leeches like *kapila, pingala,* etc. The leech variety *Hirudo medicinalis* is scientifically cited as the medicinal creature and it is named so because of its ability to produce the valuable medical substance *hirudin*. According to ayurveda the procedure of *raktamoksha* used by leeches can be practiced in various diseases which usually include the skin diseases such as eczema, psoriasis, in venous thrombosis, on healing ulcers especially diabetic carbuncle, in rheumatoid and gouty arthritis, hemorrhoids, fistulas, in various type of eye diseases, etc. Virtually there are no much disagreements in using leeches in almost all disease.

The medicinal leech belongs to a group of legless invertebrates (animals without skeleton) called Annelids. *Annulus* is the Latin for ring (this means, the body is divided in to separate segments connected by a continuous gut, a nerve and a blood vessel); the body of *Hirudo medicinalis* is cylindrical dorsoventrally flattened and divided in to 32 or 33 segments; the dorsal side is dark brown, bearing 6 longitudinal reddish or brown stripes. It has a posterior and anterior disk shaped suckers. The anterior sucker comprises three sharp jaws that make a wound shaped like a Mercedes-Benz symbol (‘Y’ shaped) through which the creature inject a local anesthetic hirudin, a vasodilator and other physiologically active substances. These substances are elaborated by the perioral unicellular salivary glands. The hirudin mainly stops the blood from coagulating and the animal feed the blood without any interruption until they are full, in usually about 30 - 60 minutes, After intake of 10 ml – 30 ml blood the leech may increase 8 - 11 times of its initial body size. Leeches feed only once in every six months; this is about how long the blood takes to be fully digested. It secretes an antibiotic

which prevents the growth of other bacteria and accordingly retards putrefaction so that blood can be stored for long periods. Digestion and absorption take place predominantly in the leech intestine, blood being passed into this region a little at a time from the crop. Deficiency of digestive enzyme in leeches is compensated by enzymes produced by endosymbiotic microflora compensate deficiency of digestive enzyme in leeches.

Leeches are hermaphrodites, each individual being both male and female. Among the 32 segments, segments M5 and M6 are specialized for male and female function respectively. Below the skin lie three layers of muscle fibers. The outer layer consists of circular muscle fibers and the inner layer of longitudinal muscle fibers. The intermediate layer is formed by two thin sheets of crossed oblique muscle fibers. The body cavity is traversed by a fourth set of fibers, the dorsoventral muscles, which insert into the dorsal body wall at one end and into the ventral body wall at the other. Contraction of each type of muscle works against the hydrostatic skeleton provided by the fluid-filled leech body tube to change the body shape: contraction of the circular fibers causes lengthening; contraction of the longitudinal fibers causes shortening, and contraction of the dorsoventral fibers causes flattening and lengthening. The effect of contraction of the oblique fibers depends upon which other types of fibers happen to be contracting. During longitudinal fiber contraction (i.e. in a shortened animal), oblique fiber contraction produces elongation; during circular fiber contraction (i.e. in a fully extended animal), oblique fiber contraction produces shortening; when no other fibers are contracted, contraction of the oblique fibers stiffens the body wall at an intermediate body length. A fifth set of muscles, the annulus erector muscles, are composed of short longitudinal fibers that traverse a single annulus just below the epidermis. Contraction of the erectors raises the annuli, forming a series of sharp ridges that make the epidermis resemble the surface of a washboard.

Nervous system

The nervous system of leeches reflects the segmental body plan; it consists of a ventral nerve cord of 32 segmentally iterated ganglia**.** The foremost anterior ganglia are fused to form the anterior brain (or 'head ganglion' consisting of a super & sub esophageal ganglion) and seven most posterior segmental ganglia are fused to form the posterior brain. The segmental ganglia are linked via an unpaired, median connective, called 'Faivre's nerve', and two paired, lateral connectives. The connectives contain, in addition to interganglionic axons, several longitudinal muscle fibers, whose contraction or distension is coordinated with changes in body length caused by the body wall musculature.

Natural habitats

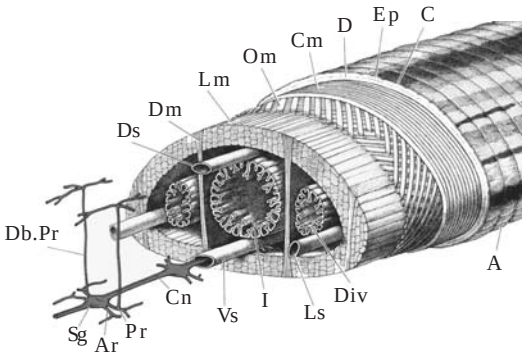
Leeches survive in and out of water. They move in water by contracting their longitudinal muscles that appear wave like which allow it to move forward. On land they perform looping type of movement; they tend to prefer ponds with muddy bottoms containing reeds, frogs, etc. Leeches possess number of sense organs to detect the feeding opportunities. Colored dots segmented receptors on their body are sensitive to water and/or ground movements/ vibration. Eye spots or occlli are light sensitive cells found all part of the leeches. Leeches are extremely sensitive to light and shadows

passing above them. The eyes of a leech found only on the leech's head and are made of occlli. There are other cells on a leech that are sensitive enough to detect even tiny amount of substance such as skin, oil, blood, etc.

Leeches are hermaphrodite, having both male and female pores and cross fertilizing. The fertilized eggs are deposited in a cocoon, secreted by the clithelium, the cocoon is buried in mud or affixed to submerged object; the young ones emerge as small copies of the adult ones.

Application over the diseased parts

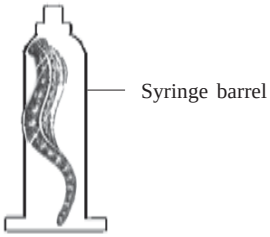
Ancient ayurvedic literatures advocate that the leeches for medicinal purpose should be gathered from fresh water ponds in order to avoid the contamination. It can be captured by immersing a piece of flesh tied at the tip of a rope in to the pond, and when the leeches get attached to it, can be collected. The leeches so collected are transferred into the water which mixed with turmeric powder, mustard paste, butter milk, etc; this procedure is meant for to detoxify the leeches. Prior to the attachment on the diseased part, the area is thoroughly cleaned and scrubbed well. The leech is retrieved from the container using a dressing forceps (non-toothed) and is transferred in to a barrel of 6 ml syringe case, position the leech so that the anterior sucker faces the base of the syringe case. The use of the syringe barrel ensures the desired placement on the site. It is important to use a leech that exhibits feeding behavior to ensure successful leeching. Thin active leeches are more likely to attach eagerly. If the leech is not readily attach, prick the area by a needle to release the blood and promote the attachment. Once the leech is attached it will likely to remain there until fully distended. They detach themselves after enough feeding. Sprinkling salt water or a pinch of turmeric or



A cut-away diagram of a mid-body segment, showing the layers of muscles in the body wall and the major internal organs

Db.**Pr** Dorsal branch Posterior root; **Ds** Dorsal sinus; **Dm** Dorsoventral muscle; **Lm** Longitudinal muscle; **Om** Oblique muscle; **Cm** Circular muscle; **D** Dermis; **Ep** Epidermis; **C** Cuticle; **Sg** Segmental ganglion; **Ar** Anterior root; **Pr** Posterior root; **Cn** Connectives; **Vs** Ventral sinus; **I** Intestine; **Ls** Lateral sinus; **Div** Diverticulum; **A** Annulus

any irritants like spirit, iodine solution, etc. will help to detach it from the site. The used leeches are discarded via sluice or incinerator; after the detachment, there will be slight



Application of leech over the site

bleeding from the bitted site as the action of hirudin lasts for some more time. The wound is then cleaned and dressed with proper anti septic measures.

Hirudin

Hirudin is an anti coagulant peptide that occurs naturally in the salivary glands of the medicinal leech. Its anticoagulant activity comes from the chemical ability to inhibit Thrombin; a serene protease catalyzing the final step in the blood coagulation cascade. The inhibitory action of hirudin on thrombin has highly valuable therapeutic use in modern medicine. As thrombosis in the form of heart attacks and stroke is a leading cause of death in modern society, hirudin holds many advantages over the commonly used anticoagulants such as heparin. It is said that hirudin does not interact with other blood proteins or the thin epithelial lining of blood platelets and unlike, heparin, can act upon bound thrombin. The most important feature of hirudin as a therapeutic is that it is a weak immunogen and thus is very unlikely to provoke an adverse action in patients during treatments. It is very difficult to obtain large quantities of this protein from its natural sours for the use in pharmaceuticals. This has lead to recombinants forms produced in both yeast and bacteria.

Apart from the blood sucking ability, the leeches have the ability to regenerate their neural tissues even after the neural tissue is severely damaged. Human and other vertebrates do not possess this type of neural regeneration. Researches are going very rapidly in western

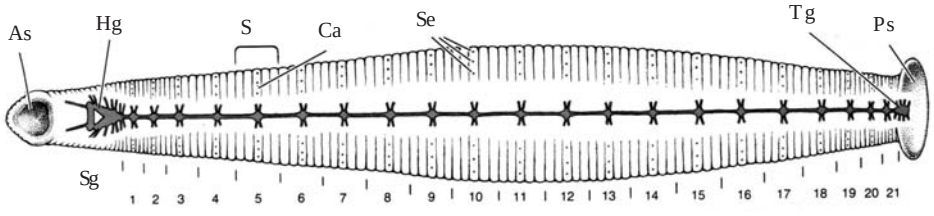


Diagram of the external body, with an outline showing the position of the central nervous system.

As Anterior sucker; **Hg** Head ganglion; **S** Segment; **Ca** Central annulus; **Se** Sensillae; **Tg** Tail ganglion; **Ps** Posterior sucker; **Sg** Segmental ganglia

universities to find any chances to introduce this special ability in other vertebrates.

Mechanical leech

As the various uses of leeches in various diseases provoke the U.S. researchers to develop a mechanical leech in order to avoid the unpleasantness of crawling of a parasite over the body, the researchers at the University of Wisconsin-Madison and Willians Middleton Memorial Veterans Administration Hospital has been invented a mechanical leech.

Apart from all the above facts about *Hirudo medicinalis*, it is a fact that this particular species is extinct, because of large amount of exploitation of its natural habitat. On the same reason the Western countries were formed various type of Biodiversity action plan against this valuable creature. Also there is lot of leech breeding centers functioning in Western countries in order to provide adequate supply to the hospitals there.

Mechanical leech
Developed by US researchers

Once upon a time in India especially in Kerala there were plenty of leeches in paddy fields, ponds, etc. But now-a-days it is very difficult to find them. This is the high time to protect this valuable creature.

SOME IMPORTANT MEDICINAL PLANTS OF THE WESTERN GHATS, INDIA
- A Profile

A scientific volume composed by Dr. P.K. Warrier, Prof. V.P.K. Nambiar and Dr. P.M. Ganapathy on the findings of the five-year-long research work supported by the International Development Research Centre, Ottawa, Canada. This work, elegantly brought out with illustrations, provides a detailed profile of 20 medicinal plant species found in the Western Ghats and stands as a model for the much wanted research methodology in the field of ayurvedic studies.

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TOURISM AND AYURVEDA

M.R. Vasudevan Namboodiri*

Abstract: There are merits in linking ayurveda to tourism. It gets global acceptance which will help the ayurvedic treatment and industry to flourish. The disadvantage is that ayurveda's status as a therapeutic system will be diminished to a soft entertainment.

Ayurveda is an ancient system of medicine evolved around 600 BC in India. It is considered to be an *upaveda* of *Atharvaveda* which, itself encompasses a wealth of scientific knowledge. This baseline along with the support from contemporary physicians has helped this unique branch of medicine to achieve the glorious position that it occupies today.

It is wholly a naturalistic system of medicine which defines as a perfect balance of the *dosha*s, *dhatu*s, *mala*s and a blissful mind. In this system of medicine, patient is given prime importance than the disease. It is aimed to make body free of diseases with due consideration to both. By eliminating the etiological factors, the normalcy of the body is restored. After curing the symptoms, body is subjected to a variety of rejuvenative procedures. This helps to revitalise the weak tissues by boosting the immune system. It should be noted that there are a number of drugs that promotes immunity. Thus this system of medicine emphasises not only on curing the diseases but also on the prevention of ailments.

Ayurveda can be broadly categorized into 8 divisions viz., *salyatantra*, *salakyatantra*, *kayachikitsa*, *bhootavidya*, *kaumarabritya*, *agadatantra*, *rasayanatantra* and *vajeekaranatantra*. Among these, *kayachikitsa* deals with almost all diseases affecting the body, partially or otherwise. This branch provides information regarding diseases, various methods of diagnosis and systemic examination of the patient. On the treatment side it provides a wide variety of medicaments to be prescribed on the basis of *doshik* predominance of the disease with respect to seasons, climate, time, etc.

Ayurveda and Kerala

Kerala, has always stood with its head high in preserving ancient traditions, beliefs, and culture. It is believed that ayurveda has been transmitted from Atreya to *acharya*s like Dhanvantari, Charaka, Susruta, Madhava, Nagarjuna, etc. Though it is progressing at a snail's pace in the northern states of the country, owing to ecological and environmental factors, it has tremendously gained momentum in Kerala.

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Kerala's unique climate, abundance of forests rich in medicinal plants and the cool monsoon season are best suited for a salubrious living than any where else.

Kerala preserves the ayurvedic tradition intact. It is practised with absolute dedication according to the classical textbooks. The traditional physicians commonly referred to as *paramparya vaidya*s, have developed a variety of treatments special to Kerala. These treatment modalities have great potential in curing diseases and restoring the health. All the physicians now invariably use these procedures in the management of diseases, with special emphasis to the prevention of diseases.

The *panchakarma* therapy, one of the major contributions of ayurveda, deserves special mentions in this context. This therapy is fairly unknown to other parts of the country and hence people from all over the globe frequently visit the ayurvedic centres in Kerala. The *panchakarma* include 5 procedures, i.e. therapeutic vomiting, purgation, cleansing enemas and nasal application of herbal concentrations.

The selection of medicines is highly dependent on the disease, patient, and his physical constitution. *Pizhichil*, *njavarakkizhi*, *dhara*, *udvarttanam*, *talapotichil*, *kateevasti*, *urovasti*, *talam*, *ksheeradhooma* and *kalarichikitsa* are some of the commonly employed treatment procedures. Along with the cure of the illness, these treatments aim at providing mental, physical and spiritual well being to the patient.

Role of Kerala in tourism

Kerala with her natural beauty blessed with amiable climate, has always attracted foreigners even from time immemorial. The "Tourism vision 2025" the draft tourism policy of the Government released recently, envisaged development of the state as an up market high quality tourist destination through optimal usage of resources with focus on conserving and preserving the heritage and environment. It proposes to promote and market Kerala tourism products at the national and international level thereby making the state a premier global tourist destination. The promotion of tourism, the draft says, will be based on the carrying capacity of the destinations. Preservation of art, culture and heritage of the state will be part of the policy objectives. New innovative tourism products, lesser known destinations, art forms, ancient monuments and handicrafts will be developed. The *panchayatiraj* institutions and non-governmental organisations are intended to be involved in the development of the tourism infrastructure and tourism awareness. Also the approval of tourism units by the Tourism Department will be made mandatory to guarantee quality services.

Role of ayurveda in tourism

It is statistically estimated that about 1,89,941 foreigners have visited Kerala during the year 1998; 2,02,173 in 1999 and about 2,09,933 in 2000. More than half of them visited the state in the monsoon season (June to Nov.). The most frequently visited districts of the state are Thiruvananthapuram and Ernakulam.

Year	Thiruvananthapuram	Ernakulam
1998	86035	56199
1999	96536	55546
2000	82803	55819

From the statistical data it is found that the foreigners visiting the state were not coming here for merely for sight seeing. They also wanted treatment for various ailments, which were either not responding to modern system of medicine or declared incurable otherwise. Information regarding an alternate system of medicine now-a-days has invited them for a change of treatment. Besides this, inquisitiveness towards ayurveda could be the main reason for the rush of tourists to ayurvedic hospitals and health resorts in Kerala. But these treatments if not carried out under strict supervision of experienced and skilled physicians are sure to cause untoward effects to the patient.

Meditation and yoga, the two important relaxation techniques, of psychotherapy is found to be beneficial for treatment of various psychosomatic disorders. The unwholesome diet, indiscriminate use of preservatives and habituating agents like tobacco and alcohol are mainly responsible for most of the diseases. Ayurveda considers mind and body as interlinked, i.e. any physical illness is able to influence mind and any mental stress can influence body. This mind-body relationship manifested as psychosomatic diseases is a common problem among foreigners who are used to strenuous work schedule. On identifying these facts based on the clinical history and the symptoms they are often advised to undergo *sadvritta* and *svasthavritta*, an important sphere of ayurveda for achieving mental calmness. Expert ayurvedic physician should emphasise the importance of diet and deed (*ahara* and *vihara*) in causing disease. It is because the fundamental principle of ayurvedic management lies in the avoidance of causative factors.

But now-a-days, there are complaints that many foreigners are being cheated by some illicit practitioners. A number of ayurvedic massage parlours have popped up now. They are mainly located in and around tourist locales and are usually run by unqualified practitioners. Well furnished and full fledged massage parlours are common scene in Kovalam, Papanasom, Varkala, Vizhinjam, Kumarakom, and other major tourist destinations. These parlours often render the services by carrying out unscientific treatment modalities and that too in a capsule form. They intend on easy money making from the foreigners sacrificing the sanctity and ingenuity of this science. It is a dismal fact that, ayurvedic practice has now degenerated to a fallible treatment procedure promising the patient everything, but ultimately providing nothing. Under the name of *panchakarma*, oleation and sudation are repeatedly done here, which is unwarranted. These two procedures are carried out by various processes like *abhyangam*, *dhara, pizhichil, pizhinjutataval, elakkizhi, potikkizhi,* etc. These parlours administer only external medicaments. They may temporarily give a feeling of comfort, but definitely will not weed out the disease. When the ayurvedic treatment is carried out in a crooked way it does not help the patient to cure the disease. This kind of unscientific practice should be banned, other wise a great stream of traditional medical knowledge would diminish to just a package of treatment modalities, for minting money at the cost of the health of the individual. Unless such practices are restricted, Ayurveda would have a bleak future wiping away the name and fame this system has earned over the years. It is high time to pay heed to the call in this era of globalisation, and save this invaluable science from the hands of money-mongers.

Merits and demerits of linking ayurveda to tourism

There are various advantages in relating ayurveda with tourism such as 1. Ayurveda can have a wide exposure, 2. it can become popular as a system of medicine in the international level, 3. more number of foreigners get attracted to Kerala for seeking ayurvedic treatments (including *Keraleeyachikitsa*), 4. ayurvedic pharmacies can market their products internationally and thus can reap the benefits of globalisation and 5. the economy of the state can be improved.

However, there are disadvantages also, like 1. ayurveda may be defamed if misused or carried out unscientifically and 2. ayurveda practitioners may not be recognised in full worth when the science is being practised in hotels or beach resorts instead of being practised in hospitals.

What should be done?

1. It is highly essential that ayurvedic massage parlours should be restricted.
2. It is necessary to carry out the revamping from the grass root level. A suitable area should be selected which should be maintained in accordance to the Eco-Tourism policy.
3. The infrastructure of treatment centres should be improved. Routine laboratory investigations for blood, urine and stool must be done before and after the treatment. Updated laboratories should be made available near the centers.
4. All the massage parlours should be controlled by an authority/council which under strict vigilance supervises them to function efficiently.
5. The massage parlours under the council can be graded in A, B, C groups. A group with luxury comforts, B with moderate and C with minimum essential facilities, so that patients can have their options.
6. Essential quality of each parlour is a must, and there must be a well-qualified registered ayurvedic doctor for the supervision. Other supporting staff should also possess necessary qualification and experience.
7. The working time should be uniformly fixed in all massage parlours.
8. The council should inspect the clinics in between and should check whether the activities carried out conform to prescribed norms.

Since the tourists have limited time, they prefer short treatment packages at any cost. But this cannot be encouraged. They must be made aware of the implication of the procedure before starting the treatment. The methodology and duration of the treatment should be detailed. Since most of the ayurvedic treatments require more than 3 weeks, they should be instructed to stay back till the whole process is completed in the prescribed time. Since ayurveda gives specific treatments/medicines for almost all diseases, it is better to inform them about the internal and external medicaments.

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IMPOTENCY
(Part - III)

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Abstract: Continued from the previous issue. This part contains the details regarding drug-induced and disease-induced varieties of impotency.

Impotency can also occur as a side effect of prolonged use of certain medicines. The exact mechanisms whereby drugs alter sexual function is not fully known. Before going into the details of individual classes of drugs having a role in sexual dysfunction, it is needful to look through the epidemiological aspects.

Epidemiological aspects

When evaluating reports of adverse effects of drugs on sexual function, it is important to be aware of factors that influence studies of these effects. Many drugs affecting sexual function are given for disorders such as hypertension, psychic ailments, etc. that may themselves be associated with impaired sexual function. Also, the prevalence of sexual dysfunction in an ill population is probably higher than the accepted prevalence within the normal population.

Single case reports are difficult to assess, even if a causal relationship seems clear. Thus controlled studies are the only valid method to assess the exact effect of drug on sexual function. Also, it is necessary to take account of possible confounding variables like age, smoking, consumption of alcohol and disease for which the drug is prescribed.

Drugs causing impotence

Individual drugs causing sexual dysfunction are generally predictable on the basis of the known pharmacology of the drug and they are dose-related.

Anti-hypertensive drugs

The prevalence of impotence is significantly greater in treated hypertensive patients than in matched controls (Medical Research Council working party 1980). Some antihypertensive drugs more likely to cause sexual dysfunction than others are the adrenergic neuron blockers like methyldopa and clonidine, bethanidine, debrisoquine and guanethidine. In case of methyldopa and clonidine decreased sympathetic activity is most likely the cause. Propranolol causes impotence by reducing penile blood flow. Pure alpha - adrenoreceptor antagonists seem to produce mainly failure of ejaculation.

In case of thiazide diuretics the mechanism is unknown. Among potassium sparing diuretics,

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spironolactone causes a dose related adverse effect on potency, but the process is not fully understood.

Psychotropic drugs

Impotence is a usual associate of psychiatric illness. Hence, it is difficult to establish the frequency which occurs by drug therapy of psychiatric illness.

a) Anti-depressants:

Most of the tricyclic antidepressants and monoamine oxidase inhibitors have been reported to cause impotence. The suggested mechanisms involved include anticholinergic activity, potentiation of noradrenergic vasoconstriction and effects on central nervous system. The tertiary amines and alpha adrenergic antagonists can delay or inhibit ejaculation.

b) Anti-psychotic drugs:

Among phenothiazines, thioridazine is the drug most frequently reported. It can cause failure of both erection and ejaculation. Phenothiazines have anticholinergic and alpha adrenoreceptor antagonist activity. Benzodiazepines and other sedative or hypnotic drugs have no direct effect, but their sedative effect may reduce sexual arousal and may lead to impotence in some patients.

Sex hormones

Loss of libido and impotence occur predictably in men treated with oestrogens. Those commonly used and resulting in impotence are hydroxy progesterone caproate for benign prostate hypertrophy, cypoterone acetate (dose related) and some analogues of leutinising hormone releasing hormone, currently being tried in treatment of prostatic carcinoma.

Alcohol

Acute effects of alcohol abuse include the impairment of erection with no loss of libido, whereas chronic alcoholism is associated with a low serum level of testosterone, loss of libido and impotence.

The exact mechanism is unknown, but diminished sexual function occurs independently of the presence of alcoholic liver disease. The suggested mechanisms include its direct inhibitory effect on testicular steroidogenesis, effects on hypothalamius and the suspected neuropathic component.

Other drugs

Cimetidine and ketoconazole produce impotence by anti-androgen activity. Opiates produce fall in testosterone, but potency returns during periods of abstinence. The effect of dysopyramide is related to its anticholinergic activity, but there is no evidence with other anticholinergic drugs.

Many drugs have been reported to cause sexual dysfunction. But usually, single case reports and the evidence for casual relationship are poor.

Some ayurvedic drugs are also claimed to cause disorders of sexual function. *Ahiphena* (opium) and *bhanga* (cannabis) are two examples which are *pittavardhak* in pharmacological action. Alcoholic impotence also can be included in the *pittajaklaibya* described by Susruta.

Pittaja klaibya

This is also called *rasajanya*. The *pittaprakopaka dravya* consumed by a person, fails to nourish *sukra* and it is opposite to the *guna*s of *sukra*; *sukra* gets depleted which in turn causes *klaibya.* The *dravya*s which are *katu*, *amla* and/or *lavanarasa*, *ushnaveerya* if consumed in increased amount, causes this.

Madya is said to be of properties just opposite to that of *sukra*, and of its *upadhatu ojas*; it causes not only sexual and fertility disorders, but serious ailments in other systems also.

The stages of *mada* as explained in the classical texts to describe the sexual excitement in the first stage, which is replaced by a total debility in the final stage.

Abhiphena is denoted as *pumstvanashaka* by Bhavamisra. Opiate addition is commonly associated with decreased libido and impotence; but sexual activity may return during periods of abstinence. Opiates suppress pituitary L.H. secretion and produce a fall in serum testosterone levels. They also produce hyperprolactinaemia.

Prolonged use of *bhanga* is also *kamava-sadaka* (that which causing loss of sexual desire and power). Use of cannabis is reported to be the cause of erectile failure in most of the cases. Not only these two but the other *pittala* drugs also can cause similar effects by prolonged use.

Testosterone levels may be low and estradiol levels may be elevated in patients taking large amounts of marijuana, heroin or methadone.

Impotency secondary to penile diseases

Penile disease with no associated hormonal deficiencies, including priapism, penile trauma and peyronies disease can cause impotence, due to fibrosis of the sinusoidal spaces of the corpora cavernosa, corporeal artery occlusion or neurogenic mechanisms.

Peyronie's disease

This affects about one percent of male population predominantly in middle age. The aetiology is unknown although an episode of trauma (hitting or bending) resulting in localised bleeding within the penis may be the starting point.

The disease is characterised by the appearance of thick plaques usually along the dorsum of the penile shaft associated with angulation of the erect penis and in the early stages pain on erection. Histologically, an inflammatory infiltrate associated with fibroblast activity is found beneath the tunica albuginea. This results in collagen deposition which on maturation forms the fibrous plaques.

The process of disease is slow, and in some cases it may resolve spontaneously; in other patients, it tends to stabilize over about 12 months. This disease has also been associated with other disorders such as Dupuytren's contracture and fibrous degeneration of the external ear cartilage.

Priapism

Priapism is a painful persistent erection, not associated with sexual desire. It can occur at any age, although commonly between 20 and 50 years. There are two types of priapism:

1. Ischaemic (low flow) in which the associating illness are Haematological malignancies, Anticoagulants, autonomic neuropathy, drugs-trazdone, papaverine (1M), PGE_1 and Idiopathic.
2. Nonischaemic (high flow). Penile or perineal trauma is the associating illness in this case.

In low flow priapism there is prolonged venous occlusion that results in reduced oxygen saturation of the blood in corpora, as a result pain develops and within a short period ischaemic necrosis of cavernosal smooth muscle ensues. In high flow priapism arterial cavernosal shunts develop within the corpus cavernosum, ischaemia does not usually occur and it is not usually painful. Most of the patients will regain their potency, provided the priapism is aborted within 12 to 24 hours; but beyond 36 hours recovery is highly unlikely and impotence frequently follows.

There is an identical term for impotency secondary to local disease of the penis used by *Susruta* and also in later books. It is referred

to as *medhrarogajanyaklaibya*. Susruta has not described which all *medhrarogas* are causing *klaibya* there.

The *suka doshas* described in the classical texts refer to some affections primarily of the penis. Among the *suka doshas*, Susruta describes *mamsapaka*, *mamsarbuda*, *tila-kalaka* etc. which seems to destroy the *medhramamsa* in severe stage and may cause sexual impotency.

While explaining the *guhyarogas* Vagbhata describes *medhrarsas*. This disease, caused by the settlement of vitiated *doshas* in the *rakta* and *mamsa* of the *linga*, is characterised by external or internal *mamsakeelakas*. There will be excessive pruritus, oozes and bleeding. This disease can cause *pumstvanasa* in its chronic stage.

In *Charakasamhita* there is an elaborate description of local penile disease causing *dhvajabhanga*.

Dhvajopaghataja klaibya

Charaka describes this as the total functional impairment of the penis due to local penile diseases. The specific aetiologic factors in the susceptible individual cause a vitiation of *tridoshas*, which specifically acts on penis or *dhvaja* also called *upastha* to result in *upaghata* or total functional impairment of the *karmendriya - upastha*. In *sutrasthana*, while describing *indriyapradoshajavyadhis*, Charaka emphasizes the chances of *upaghata* of respective *indriyas* by the vitiated *doshas* acting specifically on them. Thus, *dhvajopaghataja* (*dhvajabhangaja*) *klaibya* can be considered as the resultant *klaibya* from *upaghata* of *upastha* the *karmendriya*.

Clinically, the disease can be subdivided into 5 types. It shows a variety of symptoms ranging from a local inflammation resulted from trauma to *viseerana* or *kotha* (necrosis) of the penis and testes.

Even some skin affections resulted from poor hygiene can cause a transient difficulty in performing sexual act with local pain or swelling on penis. *Sukadoshas* also can be included in this group. Penile trauma (*sephasabhighata*) causes local penile swelling and pain or even results in serious ailments like priapism and peyronie's disease. The penile or perineal trauma may result in high flow priapism. But the symptoms (ischaemic necrosis) seen in the severe low flow priapism also simile with that of *dhvajabhangajaklaibya* especially *sannipatika*.

The conditions in *dushtayoni*, *putiyoni* and *parisrutayoni* may be used to represent the different stages met with in the infectious diseases of the female genital tract. Coitus with a partner, having venereal diseases is not advisable. Such conditions may result in transmission of disease to male partner too. Certain sexually transmitted diseases like syphilis and Herpez genitalis are capable of affecting sexual power. The sacral autonomic insufficiency (bowel, bladder and sexual dysfunction) is a major complication of Type-2 Herpez simplex virus (HSV - 2) infection, but it is fortunately reversible.

Psychogenic impotence (Functional impotence)

The relative frequency of organic as opposed to psychogenic causes of erectile impotence is still debated. Nevertheless anxiety and depression are common causes of impotence, other psychological factors such as disinterest in the partner, fear of sexual incompetence, marital discord, guilty consciousness on deviant sexual attitudes, worry, fatigue and ill-health often operate to reduce sexual impulse.

Furthermore, any experience that hinders the ability to be intimate, that leads to a feeling of inadequacy or distrust or that develops a sense of being unloving or unlovable, etc. may result in impotence. The World Health Organization has published 'ICD-10' diagnostic criteria for sexual dysfunction not caused by organic disorder or disease. The criteria for failure of genital response (erectile dysfunction) are adapted from it.

In ayurvedic terminology, *manasikaklaibya* refers to the inability to get erectile power because of *manakshata* (psychic ill-health). Susruta emphasizes *ahridyabhava*s as causatives of *manakshata*. These *ahridya-bhava*s are explained by Vagbhata as *bhaya, streenamakousala, streedoshadarsana,* etc. *Acharaya* Hareeta has included the *manasika* division of *klaibya*.

Men usually do not admit the humiliating experience of impotency, instead may feel shy to reveal the fact and often hide it under a variety of disguises or self deceptions.

There are five kinds of sexual abnormalities under the name *napumsaka*s described in the *Sarirasthana* of Susrutasamhita. All these are caused by loss of power of erection. Among the five, *shanda* is incurable with no *sukra* at all. The four others are curable. But they do not necessitate a medical therapy, and are presented as some sexual perversions which enable them to attain the erectile ability. Thus, it is clear that there is no underlying organic causation. .

These should be considered as a type of psychogenic *klaibya*. The examination of the patients may reveal some underlying psychogenic problems and a sexual counseling may be of value.

In an ongoing relationship, erectile impotence may reflect difficulties between partners, particularly if the man cannot communicate his needs or his angry feelings in a direct and constructive way. Unfortunately successive episodes of impotence are reinforcing with man, becoming increasingly anxious about his next sexual encounter.

Regardless of the original aetiology of the dysfunction, his anticipatory anxiety about achieving and maintaining an erection interferes with his pleasure in sexual contact and his ability to respond to stimulations and thus perpetuating the problem.

***Khara sukraja* (*sukrastambhaja klaibya*)**

The person who does celibacy (*brahmacharya*) for a long period is affected; after that, when he wants to have sexual intercourse he fails to get an erection. If strenuously he gets an erection, then he cannot maintain it, and also he has ejaculatory failure. It seems the psychological factors are having a major role in this case. The most reliable factor is a performance anxiety. Poor or unskilled techniques may further increase the problem.

***Jarajanya klaibya* (senile impotency)**

Senile impotency is explained only in Charakasamhita, though Hareeta mentions *klaibya* as a consequence of ageing. The causative factors are the normal decaying that is related to the aging process. The *sukra* shows a decline with increase of age.

Not only *sukra* but all the *dhatu*s in the body shows depletion. The old man because of his loss of taste, impaired digestion, etc. is reluctant to consume proper diet, he is easily become fatigue, the immune power deteriorates and all the sense organs develop impairment of function. His general debility plays an important role in the pathogenesis of various old age diseases.

The *sukra* which goes on depletion with increase of age fails to perform the normal

functions. The affected person with loss of virility shows associated mental depression, pallor, weakness and increased susceptibility to diseases.

Clearly, the incidence of impotence increases after the age of 50 to 55 years. This fact was originally found by Kinsey, who attributed it to the aging process and psychological factors related to aging. He estimated that a few men (2 to 4 percent) are impotent at the age of 35, but 77 percent are impotent at 80. More recently, it has been estimated that, the incidence of impotence in young men is about 8 percent. However, this sexual dysfunction may first appear later in life. Masters and Johnson report a fear of impotence in all men over 40 which, researchers believe, reflects the masculine fear of loss of virility with advancing age.

Beginning at about age 60 means plasma total bio-available testosterone concentrations declines. Nevertheless, though statistically lower than levels in young men, the concentrations of testosterone in elderly men usually remain within the normal range, the cause of decreased testosterone level is likely the decreased leydig cell numbers in the testes. There is also a decline in somniferous tubule function and decreased sperm production in elder men.

The Plasma luteinising hormone and F.S.H. levels are usually increased in old age and an increase in the rate of conversion of androgen to oestrogen in peripheral tissues resulting in a decrease in the effective ratio of androgen to oestrogen. These latter endocrine changes may play a role in the development of prostatic hypertrophy and gynaecomastia those are commonly met with in old age.

Although there is gradual decline of sexual function along with aging, there is no convincing evidence that hormonal changes have any direct bearing on that. Also, impotence is not an inevitable consequence of

ICD -10 DIAGNOSTIC CRITERIA FOR FAILURE OF GENITAL RESPONSE

A. The general criteria for sexual dysfunction must be met.

General Criteria:

- G1. The subject is unable to participate in a sexual relationship as he or she would wish.
- G2. The dysfunction occurs frequently, but may be absent on some occasions.
- G3. The dysfunction has been present for at least 6 months
- G4. The dysfunction is not entirely attributable to any of the other mental and behavioral disorders in ICD-10, physical disorders (such as endocrine disorder) or drug treatment.

B. Erection sufficient for intercourse fails to occur when intercourse is attempted. The dysfunction takes one of the following forms:

1. Full erection occurs during the early stages of lovemaking but disappears or declines when intercourse is attempted (before ejaculation if it occurs)
2. Erection does occur, but only at times when intercourse is not being considered. .
3. Partial erection, insufficient for intercourse, occurs.
4. No penile tumescence occurs at all.

aging. Having an available sex partner is related to continuing potency in the aging man, as are a history of consistent sexual activity and the absence of vascular disease.

Sukrakshayaja klaibya

Charaka's description seems to denote a very serious ailment that is dealt with after Susruta's description. According to Susruta, *sukrakshyaja klaibya* is the loss of erectile power (*dhvajabhanga*) as a result of excessive sexual act, without restoring the health of *sukradhatu* by the use of aphrodisiacs. (*vrishyoushadhi*s) According to the text, the erectile dysfunction caused by sexual excess will show physical symptoms such as erection not firm enough for penetration, general weakness and nervous exhaustion. Penis remains cold and small. There will be psychic problems such as excessive anxiety about health, fear of death, and an increase in sexual thoughts, despite a decline in sexual function.

Vagbhata has implemented a safe sex schedule. The violation of this schedule can lead to an excessive depletion of *sukra* and *ojas* and thus result in *klaibya*: Hence, this schedule can be considered as a preventive measure, to avoid this above explained *klaibya*. The concept of *sara purusha* seems to have some application in this context.

The *sara* refers to the health status of the particular *dhatu* in relation to the *bala* of the patient. The *sukra sara* (*pravara*) *purusha* will have a higher virile capacity than *madhyama sara* and *avarasukrasara*. The person should do sexual act based on the capacity offered by his general health and virile power. The safe sex schedule should be modified and advised after evaluating the *sara* of the patient, if needed.

Charka's description of *sukrakshayajaklaibya* (*kshayajanyaklaibya*) is different from that of Susruta and others. This refers to a severe state of depletion of *rasadi saptadhatu*s which may become fatal. The causes include both psychogenic factors and some dietary abnormalities. All these primarily lead to a depletion of *rasadhatu* followed by *anulomakshaya* of the whole *dhatu*s ending with the *sukra*, the last one. Or, in other words, all leads to a state of nutritional deficiency that affects the whole systems of the body (heart, lungs, kidneys, gastrointestinal tract, etc.) either by protein energy malnutrition or by a much severe state of starvation. The important thing is the effect of this on immunological function. Virtually all the components of immune system are adversely affected in rough proportion to the degree of nutritional impairment. Hence, an enhanced susceptibility to infections is observed in this condition.

In nutritional deficiencies like moderate to severe protein energy malnutrition, primary gonadal dysfunction is common including decreased levels of circulating testosterone and oestorgen, and impairment in reproductive potential, impaired secretion of L.H.R.H. (Luteinising Hormone Releasing Hormone) from hypothalamus also play a role in impaired reproduction. These changes in the pituitary gonadal axis can be viewed as an adaptation since the availability of energy and protein substrate is more critical for immediate survival than is the need for sexual satisfaction and reproduction. The same reasoning seems adaptable for any condition - without a specific organic lesion causing impotency - that results in a general deterioration of health.

(to be concluded)

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CONCEPT AND MANAGEMENT OF HYPERTENSION IN AYURVEDA

Vijay Kumar Srivastava* and B.N. Upadhyay**

Abstract: Hypertension is a common disease now, but no any disease in classical ayurvedic texts exactly co-relates with it. *Charka* gives us opportunity to comprehend the nature of the disease on the basis of *dosha*, *dooshya*, *srotas* and *adhisthana* and to treat accordingly. So we depict a conceptual pathogenesis (*samprapti*) of hypertension and plan its ayurvedic treatment, which has given much beneficial results.

Introduction

The term hypertension is synonymously used for increased arterial blood pressure, and most of the persons may have suffered by it during their lifetime. From ayurvedic point of view no any disease in the classics can exactly simulates with hypertension. But it does not mean that the ailment was not observed in those days, certainly it was but could not have come to light due to lack of equipments like sphygmomanometer. *Charaka* provides us opportunity to comprehend the nature of the disease by detailed evaluation of *vikaraprakriti*[1], *adhisthana* and *samuthana-visesha* and recommends treating them accordingly. So, in the forgoing illustration we have drawn the conceptual pathogenesis of hypertension and the plan of its treatment.

Ayurvedic view

On the basis of involved *dosha*, *dooshya*, *adhisthana* and *lakshana*, it is sure to say that hypertension is a *vatavyadhi* especially *avritavata vyadhi* and to make it clear we begin with *nidanapanchaka*.

Nidana (aetiology)

I. *Beejadosha*s (genetic predisposition) are mostly due to *vata* predominance and hypertension has some genetic influence.

II. Blacks are more prone to develop hypertension because of *vata* predominance; perhaps they have some physiological machinery to save more sodium and water inside them.

III. Blood pressure in winter season goes on to higher side because of the vitiation of *vata* and *kapha* which may create peripheral vasoconstriction and minimum sweating, so retain salt and water inside the body.

IV. High salt consumption causes *kleda-vriddhi* i.e. rise of plasma volume by increased dirty water proportion and results into high B.P.[2]

V. *Vriddhavastha* is most favourable period

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for vitiation of *vata*; hypertension too is a disease of old age.

VI. Any kind of mental stress (*chinta*, *soka*, *bhaya*) may leads to *vataprakopa* (sympathetic stimulation) and also causes corruption in *rasavahasrotas*[3].

VII. *Dhamanipratichaya* is a *kaphananatmaja* disorder producing hypertension with increased arteriosclerosis.

***Poorvaroopa* (premonitory signs) and *roopa* (clinical manifestation)**

Indistinct manifestations of the sign and symptoms of these ailments constitute their *poorvaroopa* as initially hypertension is a symptom-less disorder[4] whereas clearly manifested sign and symptoms are termed as *roopa*. For *vata* disorders, it is very specific that occasionally there is slight alleviation of the clinical features (*apaya*), and patient feels lightness of the body (*laghuta*) during the course of illness. But the disease still continues, for *vataja* disorders are almost incurable. Similarly clinical features of hypertension are transient in nature and the patient feels well when the symptoms alleviated[5]

The clinical features found in hypertension are *sirasoola* (headache), *daurbalya* (fatigability), *nidralpata* (insomnia), *siraghoornam* (dizziness), *chittavasada* (lack of concentration), *gatrasuptata* (numbness in body), *spandana* (palpitation) and *bhrama* (vertigo). Apart from these, most of the clinical features that develop as complications like hypertensive cardiopathy, neuropathy, nephropathy, etc. are not well described in the chapter of *vatavyadhi* except *pakshaghata*, *ardita*, etc. but Charaka informed them[6].

Upasaya

Restriction of salt in the diet lowers down the blood pressure, so it will comes under *hetu vipareetaharaupasaya*.

***Samprapti* (Aetio-pathogenesis)**

Total evaluation of disease from *nidana* to *lakshana* is designed in *samprapti*.

I. ***Dosha***

All the three *dosha*s are vitiated to produce essential hypertension, but dominated by *vata* and *kapha*.

Vata: - In any *vatavyadhi*, some what all the five variety of *vata* get entangled, but one or more of them are especially involved. In the case of hypertension, probably *vyanavayu* is affected because *vyanavayu* is located in the heart, and with each beat circulates in the body through plasma circulation (*rasa samvahana*). It also spreads blood and sweat to different regions of the body, when aggravated mostly it produces generalised disorders[7]. During the course of illness, when any other type of *vata* gets vitiated as *prana*, *apana*, etc. they gave synergetic effect to *vyanavayubala* and increases the B.P. E.g. when a hypertensive patient also suffers from constipation (due to vitiation of *apanavayu*) or excess gas formation in abdomen followed by indigestion (due to vitiation of *samanavayu*), his clinical condition become worse.

Kapha: - The *kapha* so aggravated is probably the *avalambakakapha*, because it is situated in the heart and provides nutrition to other *kaphatulya* substances of the body[8].

II. ***Dooshya***

Dooshya is one of the most important factors for completion of *samprapti*. *Rasadhatu* is the content of *rasavahisrotas* and its volume expansion may build the ground for completion of *samprapti* and *sira* forms the channel of

circulation and when it is hardened by *kaphadosha* leads to *margavarodha* and vitiation of *vyanavayu*. *Sveda* bears the *kleda* while *mootra* eliminates this *kleda*[9], their functional impairment may leads to the pathogenesis of hypertension.

III. ***Srotas***

Mainly *rasavahasrotas* is involved where the prime change of increased blood pressure occurs; because it has two routes, heart and *rasavahi dhamanis*. *Srotodusti* is mainly of *sanga* (obstructed) type.

IV. ***Adhisthana***

Here, *hridaya* and *sarvasareeragata dhamaneeya* are the sites of affliction.

Samanya samprapti

Over indulgence of etiological factors leads to *doshaprakopa*, predominantly *vata-kapha prakopa* and *kleda vriddhi*. This *kleda vriddhi* in turns vitiates *rasadhatu* and *sira*. Aggravated *vatadosha* produces *dhamani sankocha* and *kaphadosha* yields *dhamani pratichaya*, leading to *srotovaigunya* (*sanga*) in *rasavahasrotas*. When *rasadhatu* flows through *rasavahasrotas* under influence of *vyanvayu* (*srotovaigunya*) causes hindrance to flow, and raises the *vyanavayubala* to facilitate the *rasasamvahana*. This additional *vyanavayubala* can be recorded by a sphygmomanometer. However, this raised *vyanavayubala* is not enough to produce clinical manifestations, hence initially symptom less. Although the increase in *vyanvayubala* correctly, but slowly, tackles the situation for the benefit of body due to continuous *nidanasevana* and *dosha-dushya sammurcchana*, despite of raised *vyanavayubala*, *rasadhatu* is unable to provide sufficient nutrition to the peripheral tissues[10]. At this stage, some transient clinical features of involved organ with deficient *rasatarpana* may observe. At the end when raised *vyanavayubala* crosses the threshold of any particular system e.g. vascular, cardiac, neurological or renal, complication may arise and represent with clearly manifested sign and symptoms.

Chikitsasiddhanta

The following are the treatment plan of hypertension on the basis of above mentioned *samprapti*[11]:

1. *Nidanaparivarjana*: All *nidana* which are predisposes to hypertension should be avoided like excess salt and fatty diet.
2. *Doshapratyanikachikitsa*: Since the main *dosha*s *vata* and *kapha*, *vatahara* drugs like *dasamoola*, *rasna*, *rasona*, etc. and *kaphahara* drugs like *maricha*, *sunthi*, *pippali* etc. should be used.
3. *Kledoharachikitsa*: In hypertension, *kledoharachikitsa* is advised, *mutra virechaniya*-drugs like *gokshura*, *punarnava*, *trinapanchamoola*, etc. and *svedajanana*-drugs like *vatsanabha*, *sobhanjana*, etc. can be used.
4. *Dhamanipratichaya*: Can be treated by *medohara* and *lekhaniya* drugs like *guggulu*, *vacha*, *haridra*, etc.
5. *Vatanulomakachikitsa*: For treating *vilomagati* of *vata* (excess gas formation, constipation, etc.), *vatanulomaka* and *mriduvirechana* drugs should be used e.g. *haritaki*, *trivrit*, *kutaki*, etc.
6. Stress: Can be relieved by ayurvedic mental relaxant drugs like *brahmi*, *mandooki*, *sankhapushpi*, etc.
7. *Hridya*: Drugs like *arjuna* can be used to

avoid cardiac complications, which are very frequent in hypertension.

Conclusion

Hypertension is not well described in ayurveda, but on evaluating the *vikaraprakriti*, and *nidanapanchaka* it is found to be an *avrita vataroga*. It can be named as *kaphavrita siragata vyanvayu*, in which *rasadhatu, sira, mutra* and *sveda* are vitiated. *Srotas* is *rasavahasrotas, srotodushti* is *sanga,* and *adhisthana* is *hridayarasavahi dhamani*s. Sphygmomanometer can be termed as *vyana-vayubala mapak yantra*. Treatment of hypertension, over above mentioned guidelines, have given much beneficial results.

References:

1. विकारनामाकुशलो न जिह्रीयात् कदाचन ।
   न हि सर्वविकाराणां नामतोऽस्ति ध्रुवा स्थितिः ।।
   (च. सू. १८/४४)
2. लवणं रक्तं वर्धयति ।
   लवणो रसः पाचनः क्लेदनो दीपनश्च्या..।
   (च. सू. २६/४२-३)
3. गुरुशीतमतिस्निग्धमतिमात्रं समश्नताम् ।
   रसवाहीनि दुष्यन्ति चिन्त्यानां चातिचिन्तनात् ।।
   (च. वि. ५/१३)
4. अव्वक्त लक्षणं तेषां पूर्वरूपमिति स्मृतम् ।
   आत्मरूपं तु तद्व्यक्तमुपायो लघुता पुनः ।।
   (च. वि. २८/१९)
5. गते वेगे भवेत् स्वास्थ्यं सर्वस्वात्क्षेपकादिषु ।
6. एवं विधानि रूपाणि करोति कुपितोऽनिलः ।
   हेतु स्थान विशेषाश्च भवेद्रोगविशेषकृत् ।।
   (च. चि. २८/२३)
7. कृत्स्नदेहचरो व्यानो रससंवहनोद्यतः ।
   स्वेदासृक् स्रवणाश्चापि पंचधा चेष्टयत्यापि
   (संवहन-प्रेरणम्)
   कुद्धश्चकुरुते रोगान् प्रायशाः सर्वदेहगान् ।।
   (सु. नि. १-१८)
8. हृदयस्थान्नवीर्याच्च तत्स्थ एवाम्बुर्कमणाम् ।
   कफधामनां च शेषाणां यत्करोत्यवलम्बनम् ।।
   (अ.हृ.सू. १२/१५)
9. मूत्रस्य क्लेद वाहनं - स्वेदस्य क्लेद विधृतिः ।
   (अ. हृ. सू. ११/५)
10. स रसः तु व्यानेन विक्षिप्तः सर्वान धातून् प्रतर्पयेत् ।
    (सु. नि. १/१८)
11. Role of an ayurvedic compound drug and *vastichikitsa* in the management of hypertension, Vijay Kumar Srivastava, M.D. *Kayachikitsa* Thesis-2000, I.M.S., B.H.U., Varanasi.

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PLASTIC SURGERY AND AYURVEDA

Champa Pant*

Abstract: India's contribution in the advancement of plastic surgery is incredible. Roots of plastic surgery are seen in ayurveda. Although plastic surgery is in an advanced stage, the ayurvedic concept of plastic surgery is still serving as the foundation for modern plastic surgery.

Introduction

The word plastic means 'capable of being moulded or changed'. Plastic surgery is that speciality which deals with restoration of defects, congenital or acquired and improves aesthetic effect of all organs.

Often boundary lines of this branch of surgery are vague. Plastic surgery encroaches upon almost every other surgical domain and just how far it would extend into each allied field is a matter for individual surgeons to determine, depending upon his knowledge, imagination and skills.

Susruta was the most eligible, intelligent, imaginative and skilled among all the pupils of Bhagwan Dhanvantari, the God of medicine. That's why he could compose *Susrutasamhita*, the great book on surgery. At every step of any procedure, be it a minor operation like abscess drainage or a complicated one, he has specified special care for cosmetic reasons. This care starts from giving an incision and ends the care and treatment of scars.

Prevention of a bad scar

A bad scar may be avoided by a good incision. An adequate incision given neatly with a sharp scalpel along the Langer's lines or natural creases will not only produce minimum scar but possibilities of keloid formation will also be minimized. Susruta advocates a neat and adequate incision along the direction of hair growth on the body given at proper site[1].

According to Susruta although the incision should be adequate, it should not be unnecessarily long. For the exposed parts of the body which are cosmetically important landmarks like face, lips, eyebrows, cheeks, abdomen and axilla, he has advocated *tiryak* (oblique) incision to avoid *mamsakanda* (keloid) formation and other complications[2]. According to Susruta for perfect suturing, the bites of needle should too close nor too far from wound margins[3]. If needle bites are too close to the margins it will tear the margins adding to deformity. Secondly chances of union will be remote if needle passes through necrotic

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margins instead of adjoining healthy tissue. It is important to avoid any additional disfigurement by leaving ugly stick marks.

Proper approximation of both wound margins is important to assure good union and to avoid a scar. Susruta also advocates meticulous wound opposition[4].

Treatment of a bad scar

The prevention and treatment of a bad scar are among most important problems that confront the plastic surgeon. Scar is the future of wound. According to Susruta, wound care is very important. He has described sixty procedures for wound care. Among them about ten procedures are for the treatment of a bad scar. It is very astonishing that Susruta has preferred medicinal preparation over surgical procedures for treating bad scars. It seems that he was capable of treating bad scars by using only medicines. He has catagorized bad scar as follows:

a. **Depressed scars (*avasadita*)**

Depressed or *avasadita* scars are those which are depressed below the level of surrounding tissue. If necessary the subcutaneous tissue are restored by a flap of skin with subcutaneous fat. Susruta has preferred *utsadanidravya* e.g. *apamarga* (*Achyranthus aspera*) and *asvagandha* (*Withania somnifera*) locally for restoring depressed area. A nutritious diet in the form of animal fat and protien is said to be restorative for such scars in ayurveda.

b. **Hypertrophic and keloid scars (*utsadita* and *mamsakanda*)**

A hypertrophic scar is one in which there is excessive fibrous tissue formation within the original limits of the wound. This excessive tissue is extended beyond the original limits in *mamsakanda* (keloid). Nowadays radium therapy is used. Injection of cortisone is sometimes effective. Otherwise excision of the entire keloid and replacement by a skin graft usually improves the condition. Susruta advocates either excision *(cheddana*) or scraping (*lekhana*) for *mamsakanda*[5].

Medicinal preparations for hypertrophic scar consist of *avasadaniyadravya* like *tutham*. *Ksharakarma* and *agnikarma* are also indicated.

c. ***Diryamanavrana***

Diryamanavrana or extensive unstable scars result from wide spread loss of surface epithelium which is replaced by scar tissue instead of being replaced by true skin. These scars have tendency to break down and ulcerate recurrently. Susruta has advocated scraping (*lekhanakarma*) for *diryamanavrana*[6]. The *lekhana* permits the scar to thicken and acquire stability.

Davis has suggested relaxation incisions made parallel to the long axis of scar. The resultant gaping may be grafted later if necessary.

d. **Extensive soft scar (*mriduvrana*)**

Soft (*mridu*) scar is treated by *darunakarma*. Many drugs like *amla*, *haritaki*, *bibhitaki* along with resins are used for the purpose. Now-a-days repeated excision of soft scars is done. If a graft is necessary, a free or pedicle skin graft is used. Minor concealed deformities are left as such.

e. **Bald scars**

Hair loss in a scar resulting from destruction of hair follicles may be an embarrassment especially on eye brows and the scalp. The condition may be improved by using *roma-sansanian* preparations e.g. *rasaut* (a

preparation of *daruharidra* with goat's milk and tusk carbon) are applied over the area. Now-a-days such bald spots in scalp are improved by implanting small islands of hair bearing area and permitting the hair to grow long.

f. **Discoloured scar**

A black scar is treated by *pandukarma*. For this, *rohiniphala* (fruits of a variety of *haritaki*) is kept in goat's milk for seven days then grinded and applied over the black area. For a pale scar *krishnakarma* is done to darken it. *Bhallataka* oil with animal toe carbon is dusted over the area.

Reconstructive operations in ayurveda

I. **Nasoplasty**

The aesthetic importance of nose is great because of its position on the face. Diseases and injuries causing disfigurement of nose are very common. Since time of Susruta, the skill of surgeons was evaluated by their ability to perform nasoplasty, ear reconstruction and hare-lip reconstruction[7].

Now-a-days corrective procedures for a disfigured nose comprises shortening of the nose, correction of deflected, twisted nose, reconstruction (subtotal and total) of absence nose, correction of the cleft tip of the nose, wide nostrils and deformities of columella.

The nasal repair described by Susruta appears to be sub-total nasoplasty as he has corrected it with full thickness skin graft only. Bone and cartilage graft to give a proper shape and support to newly constructed nose is not indicated[8].

Susruta's method of reconstruction of nose

According to Susruta, for the reconstruction of nose, the recipient area in nose is mapped with a tree leaf (now-a-days metal foil or piofilm is used for the purpose). The donor area is accordingly sized. The margins of recipient area are trimmed to assure proper union. Now a flap is taken from the cheek. It should remain connected with donor area with one of its margins. Two hollow tubes are inserted in the nasal cavities to support the newly constructed nose and to assure proper breathing. Then proper bandaging is done. When the flap unites with recipient area properly, its margin at the donor area is severed. Any remaining deformity is corrected (Fig I).

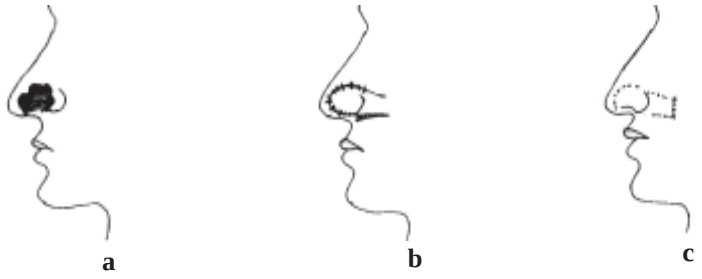

Fig. I

a. Subtotal loss of nose; **b**. Flap of adjacent cheek is taken and sutured at the recipient area. Flap is still in connection with cheek at one of its margins by a pedicle (P).
c. When flap is taken at recipient area the pedicle is severed

Flaps taken from adjacent cheek area has colour match, proper texture and less hair follicle. Its use avoids prolonged immobilization of arm and head as occurs in Italian graft. A large supply of skin is available. The main disadvantage of Susruta's method is scarring of donor area which sometimes may be even more noticeable than the original defect. Susruta did not make any provision for the resulting donor scar.

The advantages of cheek grafts may be acquired by using a forehead graft in which the resulting scar may be concealed by the hairline in women. However, the problem of resulting scar remains as such in men. Italian grafts in which flap is taken from the arm avoids such disfigurement but flap does not have proper colour and texture to match recipient area. Moreover prolonged immobilization of head and arm is very uncomfortable for the patient. Now-a-days skin from post-auricular area is preferred for a minor defect and for intermediate defects tube Pedicle grafts are taken from neck.

For traumatic amputation of the nose Vagbhata has indicated to suture it back in position as soon as possible[9]. For such amputations a six hour period is considered golden. If the lost part is obtained it should be sutured back in position within six hours of amputation to get better results.

II. **Reconstruction of ear**

The development of ear pinna occurs by the fusion of six tubercles around the external auditory canal in the fourth month of intrauterine life. Malformations of external ear such as microtia, anotia, unequal ears are common. Susruta has described these malformations and fifteen corrective procedures to repair them. These procedures are called *sandhana karma*[9].

Susruta had taken flap from cheek. Now-a-days it is taken from the postauricular region for cosmetic reasons. An intermediate thickness graft is used to cover the under-surface of flap and donor area. (Fig. II)

In Susruta's s method of ear and nose repair graft consists of full thickness of skin.

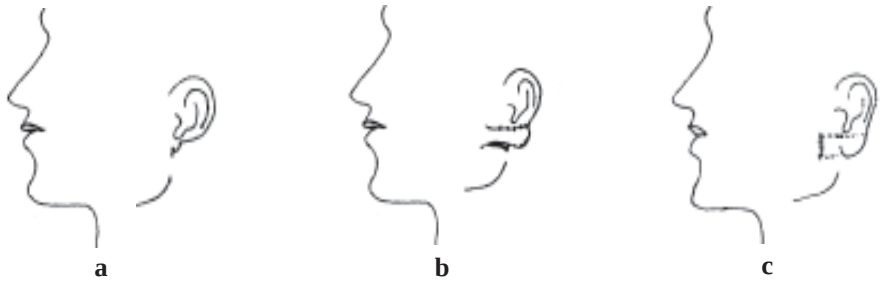

Fig. II

a. Ear lobule is absent.; **b**. Flap of adjacent cheek is taken and sutured at the recipient area. Flap is still in connection with cheek at one of its margins by a pedicle (P).
c. When healing is complete pedicle is severed and the remaining deformity is repaired.

Regarding this, two factors are important. First the nose and ear are cartilageneous and so partial thickness and intermediate thickness grafts are thin for the purpose. These grafts will contract during healing affecting the results. Secondly, full thickness grafts if used will fail to survive because they will need immediate nourishment which they will not get in a cartilage due to its low vascularity. Probably Susruta faced these problems too and that is why he made the provision that graft remains attached to donor site for nourishment until it develops its awn organ in body with success.

III. **Repair of cleft lip**

According to Vagbhata, for repairing a cleft lip, the margins of the harelip are trimmed and sutured properly[11]. Then necessary measures are taken to assure good healing. (Fig. III)

Now-a-days a Zigzag scar is made by applying Vean's incision during the reconstruction of unilateral cleft palate. It will avoid the shortening of lip. Except the pattern of incision unilateral incomplete harelip is repaired by a similar procedure. But unilateral or bilateral complete harelip extending to Alveolar process needs more skilled and finer procedures.

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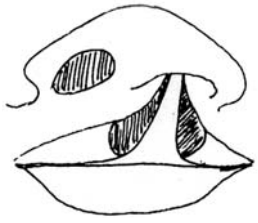
प्राप्तकालकृतश्चापि व्रणः कर्मणि शस्यते ।।
(सु. सू. ५/९)

2. तत्र भ्रूगण्डशङ्खललाटाक्षिपुटौष्ठदन्तवेष्टकक्षाकुक्षिवंक्षणेषु तिर्यक् छेदः उक्तः ।

अन्यथा तु सिरा स्नायुच्छेदनं, अतिमात्रं वेदना, चिराद् व्रणसंरोहो, मांसकन्दप्रदुर्भावश्चेति ।। – (सुसू ५/१३,१५)



a **b** **c** **d**

Fig. III

a. Unilateral cleft lip; **b**. Margins of cleft lip are trimmed and freshen.
c. Now margins are approximated and sutured properly.

3. नातिदूरे निकृष्टे वा सूची कर्माणि पातयेत् ।
दूराद्रुजो व्रणोष्ठस्य सन्निकृष्टे अवलुंचनम् ।।
(सु. सू. १५/२६)

4. तत्से व्रण समुन्नभ्य स्थापयित्वा यथास्थितम् ।
(सु. सू. १५/२०)

5. छेद्या.....मांसकन्द अधिमांसक: ।
(सु. सू. २५/३६)
लेख्या.....मांसकन्दी मांसोन्नतिरतथा ।
(सु. सू. २५/३०)

6. कठिनान् स्थूलवृत्तौष्ठान् दीर्यमाणान् पुन: पुन: ।
कठिनोत्सन्नमांसाश्च लेखनेनाचरेत् भिषक् ।।
(सु.चि. १/३८)

7. नाडीयोगं विनौष्ठस्य नासासंधानवद्विधिम् ।
य एवमेव जानीयात् स राज्ञ: कर्तुमर्हति: ।।
(सु. सू. १६/५८)

8. नासा प्रमाणं पृथिवीरुहाणां
पत्रं गृहीत्वा त्ववलम्बितस्य ।
तेन प्रमाणेन हि गण्डपार्श्वा–
दुत्कृत्य बद्धं त्वथ नासिकाग्रम् ।।
विलिख्य चाशु प्रति सन्दधीत
तत् साधुबन्धैभिषगऽप्रमत्त: ।
सुसंहितं सम्यगतो यथाव–
न्नाडी द्वयेनाभि समीक्ष्य बद्ध्वा ।

रूढंच सन्धानमुपागतं स्यात्
तदर्द्धशेषन्तु पुनर्निकृन्तेत् । (सु. सू. १६/४९–५३)

9. निवेशिते यथान्यासं सद्यश्छिन्नेऽप्ययं विधि: ।
(अ.सं.)

10. तद्यथा नेमिसंधानक उत्पलभेद्यको वल्लूरक असङ्गिमो गण्डकर्ण आहार्यो निर्वेधिमो व्यायोजिम: कपाट संधिको अर्धकपाटसन्धिक: संक्षिप्तो हीनकर्णो वल्लीकर्णो यष्टिकर्ण: काकौष्ठक इति ।
(सु. सू. १६/१०)

11. खण्डौष्ठस्य विलिख्यान्तौ स्यूत्वा व्रणवदाचरेत् ।
(अ.हृ. उ. २२/१)

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CONCEPTS OF *KRISHNAMANDALA ROGA* IN *SALAKYATANTRA*

Sanjay Kumar and M. Sahu*

Abstract: Ayurveda describes different types of eye diseases under *akshiroga*s. Here, the author gives a detailed description of corneal affections, which come under *krishnamandala rogas*. He also tries to correlate the term mentioned by *acharya*s with modern terminology.

Ocular anatomy, as described in ayurvedic texts consists of five *mandala*s, six *sandhi*s and six *patala*s. *Krishnamandala* refers to the black circular portion, visualized with naked eye. It consists of a transparent anterior portion-cornea behind which lies a circular iris diaphragm which is dark, and its colour reflected through it. This transparency is the major characteristics of the cornea, which is lost due to injuries irrespective of its nature. Literally, *sukra* means white colour; the word *sukra* comes in ancient literatures when describing diseases of *krishnamandala* of the eye. This is an opacity named as *sukra*, which is appearing as a white cloud on the transparent cornea (*krishnamandala*). The following are various types of opacities (*sukra*) described:

1. ***Savranasukra***

निमग्नरूपं हि भवेत्तु कृष्णे सूच्येव विद्धं प्रतिभाति यद्वै ।
स्रावं स्रवेदुष्णमतीव रुक् च तत् सव्रणं शुक्रमुदाहरन्ति ।।
(सु. उ. ५/४)

The opacity due to and associated with fresh wound is called *savranasukra*. Here, the word *nimagna roopam*, as explored by Dalhana, is when it is difficult to see i.e. extreme degree of photophobia - (निमग्नरूपं अन्तःप्रविष्टरूपं ईषद्दृश्य–रूपमित्यर्थः ।).

Other symptoms are severe pain, hot secretions, etc. *Acharya* Videha also added word रक्तराजीनिभम् (reddish). This description indicates the features similar to those found in corneal ulcers.

Prognosis

हृष्टे समीपे न भवेत्तु यच्च न चावागादं न च संस्रवेद्धि ।
(सु. उ. ५/५)

विच्छिन्नमध्यं पिशितावृतं वा चलं सिरासक्तमदृष्टिकृच्च ।
द्वित्वग्गतं लोहितमन्ततश्च चिरोत्थितं चापि
विवर्जनीयम् ।। (सु. उ . ५/६)

The prognosis has been described according to the depth of layer involved. These layers named as *patala*s of *krishnamandala*, of which the first *patala* pathology is curable while deep layer *patala*s involved are incurable.

2. ***Avranasukra***

Avranasukra has been described as white cloud in a clear sky which is generally associated with less secretion and pain.

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शंखशुक्ळं कफात्साध्यं नातिरुक् शुद्धशुक्रकम् ।
(अ.सं. उ. १३/३०)

Vagbhata has described it as an opacity having feature like conch shell and named as *sudhasukra*; *sudhasukra,* it clinically seems, is healed corneal ulcer.

सितं यदा भात्यसितप्रदेशे स्यन्दात्मकं नातिरुगश्रुयुक्तम् ।
विहाय सीवाभ्रदळानुकारि तदव्रणं साद्ध्यतमं वदन्ति ।।
(सु. उ. ५/८)

The *acharya*s describe the prognosis both in terms of visual outcome as well as the maintenance of shape of eyeball.

3. ***Akshipaka***

संच्छाद्यते श्वेतनिभेन सर्वं दोषेण यस्यासितमण्डलं तु ।
तमक्षिपाकात्ययमक्षिकोपसमुत्थितं तीव्ररुजं वदन्ति ।।
(सु. उ. ५/९)

As name denotes it is the sepsis of eyeball. Here, *krishnamandala* due to vitiation of all *dosha*s looks white with severe pain.

Clinically it is seen as a purulent corneal ulcer associated with hypopyon caused by fulminant pseudomonas or other virulent organism. It is described as *tridoshaja* and incurable. Even after the advent of so many potent anti-microbial drugs, we strive to save eyeball physiologically and anatomically.

4. ***Ajakajatam***

अजापुरीषप्रतिमो रुजावान्
सलोहितो लोहितपिच्छिलाश्रुः ।
विदार्य कृष्णं प्रचयोऽभ्युपैति
तं चाजकाजातमिति व्यवस्येत् ।। (सु. उ. ५/१०)

When *krishnamandala* gets ruptured with prolapsed muscular tissue at that site, it appears as the excreta of goat. *Ajakajatam* is associated with pain, redness and thick discharge. Clinical picture resembles as iris prolapse in a perforated corneal ulcer. This also is a grave condition and has been described as incurable. This was true until the advent of corneal transplant procedure. However, even now it is a difficult situation.

5. ***Sirasukram***

सिराशुक्रं मलैः सास्रैस्तज्जुष्टं कृष्णमण्डलम् ।
सतोतदाहतन्द्राभिः सिराभिरवतन्यते
अनिमिन्तोष्णशीताच्छघनास्रस्रुच्चतत्त्यजेत् ।।
(अ.सं उ. १३/३२)

The entity is described in *Ashtangasangraha.* Here also the opacity lies in *krishnamandala* which is accompanied by new vascularization and due to unknown reason various types of discharges and pain sensation are present. Generally, these features are found in degenerative corneal diseases.

Conclusion

If we look at the over all pathological conditions described by Susruta and others about *krishnamandala* diseases, all reflect different diseases of cornea which are mainly ulcers. *Savranasukra* may lead to *avranasukra* or *sudhasukra* (favourable outcome) and may turn to grave situations like *akshipaka* and later on *ajakajatam,* etc. *Sirasukra* seems a degenerative disorder of cornea where vascularization plays a major role in the nourishment of cornea.

It is seen that often things are described in different pattern in ayurvedic texts. To understand them properly, we have to recollect them, place together and evaluate in the light of today's medical and other sciences. Then only we can understand the approach adopted by ancient sages and utilize our inherited wisdom, which is time tested.

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MANAGEMENT OF A CASE OF OVARIAN CYST - CLINICAL OBSERVATION

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Abstract: Incidence of the disease ovarian cyst is enormously increasing in day to day gynaecology practice. Its pervasion is obviously observed in women seeking medical advice for infertility as well as dysfunctional uterine bleeding. Majority of these cases could be treated either by hormonal therapy or surgical intervention. This article emphasizes on careful, simplified efficacious holistic approach in the management of ovarian cyst. Here the author shares her experience of the management of ovarian cyst where only ayurvedic medicines and diet restriction were advised to obtain desired results.

Introduction

Ovarian cyst is a major contributing factor in infertility and dysfunctional uterine bleeding. Therefore, a critical analytical study has been carried out to correlate it with *granthi*. Susruta refers to pathogenesis of *granthi* and states that *tridosha*s (*vata, pitta* and *kapha*), being vitiated by its own factors, vitiate *rakta, mamsa* and *medas* resulting in *granthi* or cyst[1]. A cyst is usually mean more or less rounded cavity with a distinct lining membrane, distended with some fluid or semisolid material.

Case history

A 30 year aged housewife came to our hospital on 18th November '99 with complaints of irregular menstrual cycles associated with menorrhagia since 3 - 4 years. No other systemic complaints were noted. All her vital data were normal. None of her sisters or mother had similar complaints. She has noticed irregularity in her menstrual cycles at an interval of 40-60 days with 8-10 days duration of painful, excessive menstrual flow. Physical examination revealed no significant abnormalities. Genital organs examination revealed suspicion of uterine fibroid and ovarian cyst. Patient was advised to undergo ultrasonography. USG report of 18.11.99 showed that multiple uterine fibroid (intramural) with cystic left ovary. According to western medicine intramural fibroids are asymptomatic. Therefore stress was laid in the management of ovarian cyst and following regimen was given.

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• *Pushpadhanvarasa*	-	1 tab twice daily (40 mg)
• *Kanchanaraguggulu*	-	1 tab thrice daily.
• *Avipattikara* (1.25g) *Amalaki* (1.5g) *Pravala* (30 mg) *Bola parpati* (40 mg) *Ashokachoorna* (120 mg) *Lodhrachoorna* (60 mg)	-	3 gm mixed with water thrice daily.
• *Maharasnadi kvatham*	-	10 ml thrice daily

Diet restrictions: Food items like potato, curd and sweets were restricted.

After two months, the patient was reported with regularity in her menstrual cycles but with complained of heaviness in the lower abdomen. *Varanadikashaya* was added in the prescription and advised to continue the medicines and diet restriction for 2 months.

After a period of 4 months, she had reported with regular cycle with normal menstrual flow. She was advised to continue the same medicines for 2 more months. After 6 months of treatment, she was advised to undergo USG. USG report had revealed that reduction in size of uterine fibroid and both ovaries were normal in size and echo texture.

Conclusion

A critical analytical study was carried out on this case and determined to treat this with ayurvedic medicines taking consideration to the involved *dosha*s and *dooshya*s as this ailment describes in ayurvedic treatises. The ayurvedic line of treatment for *granthi* and *arbuda* considered in this case and it was successful.

Reference:

1. वातादयो मांसमसृक् च दुष्टाः
   सन्दूष्य मेदश्च कफानुविद्धम् ।
   वृत्तोन्नतं विप्रथितं तु शोफं
   कुर्वन्त्यतो ग्रन्थिरिति प्रदिष्टः ।।
   (सु.नि. ११/३)

Bibliography:

1 *Susrutasamhita, Nidanasthana* and *Chikitsa-sthana,* commentary by Ambikadutta Shastri.

2 *Bhaishajyaratnavali, Chikitsaprakarana* (44th Chapter)

3. *Bhaishajyaratnavali, Vajeekaranaprakarana* (74th Chapter),

Book Review

PLANTS IN THE KERALA GARDEN

VAN RHEEDE'S
HORTUS MALABARICUS
ENGLISH EDITION

By
K.S. Manilal

Publishers
University of Kerala,
Thiruvananthapuram

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Rs. 20000 (in India),
US $ 950 (outside India)

Kerala University has brought out a prestigious edition of *Hortus Malabaricus* in twelve volumes which is the first English translation of the Latin version published in Amsterdam during 1678-1693.This is after a period of 325 years since the original work has been published. The word *hortus* means garden and *Malabar* was the common name for Kerala. Hence, we can render the title in English as *Kerala Garden*.

History

Hendrik Adriaan Van Rheede, the Dutch governor of Cochin during 1663-1977, fascinated by the rich bio diversity of our country, undertook a detailed study of its flora. His keen interest on the study of plants paved the way for the publication of this book. His way of collecting information on plants was unique. The plants collected by his attendants from various parts were brought to Cochin where expert artists were deployed to sketch the plant infinitesimally. Their growing nature, life cycle, pecularities, usage, medicinal value etc. were discussed with scholars and traditional physicians, and documented. As this was done in Malayalam, Father Mathew, an Italian Carmelite born in Nepale, well versed in Malayalam being here for around sixty years, helped in the translation to Portuguese. Later, this was translated to Dutch and Latin. The fact that this book is the unflagging and strenuous efforts of a team of 200 dedicated souls cannot go unnoticed. The King of Cochin and the ruling Zamorin of Kozhikode rendered all help to Van Rheede in bringing out this book.

Seven hundred forty-two plants belonging to six hundred ninety-one families have been illustrated in this book; among them, plants that have medicinal properties like *tengu* (*Cocos nucifera*), *kavungu* (*Areca catechu*), *pana* (*Borassus flabellifer*), *vazha* (*Musa paradisiaca*), *elanji* (*Mimusops elangi*), *konna* (*Cassia fistula*), *mailanchi* (*Lawsonia inermis*), *kanjiram* (*Strychnos nux-vomica*), etc. as well as other non-medicinal plants, trees and creepers finds a place in his book. Names of plant are given in Malayalam, Latin, Konkini and Arabic. The description incorporating a rough sketch of the whole plant followed by detailed sketches of leaves, stem, flower, fruit enables quick reference.

Linguistic study

The Malayalam script of this was first put in print at Amsterdam. The serpentining beauty of the 400 years back script has kept alive in

the book; also, the spoken form (*vamozhi*) of names of those days is used in the book. Most of the plant names still remain as the same, but some of the plants described in this book have doomed to extinction, so also some of the names have undergone changes that make it difficult to identify them. Plant names like *kallupulappan, pollacheera, vellicheera, karimpola, ilapola,* etc. are alien to us. *Kanakamparam* was popularly known as *manjakurunji* and *kachil* as *podavakizhangu* during that time.

Place-names are another peculiarity that attracts a student of sociology. The place of orgin of each plant is vividly described in the book. The book has reference to plants from Eastern Ghats, Karnataka, Kutak and Tamilnadu also. Most of the place-names of those times, like Reppolin (Idapalli), Paro (Paravoor), Varapoli (Varapuzha), Palorti (Palluruthi), Porka (Purakkad), Are (Aroor), Golgra (Kundara), Koyla (Kollam), etc. are interesting at the same time informative. In the Udayamperur Synod proceedings, the region Udayamperur is mentioned as Deampere but Van Rheede pronounces it as Oedeampere. This difference can be traced to the difference between the written form (*varamozhi*) and colloquial form (*vamozhi*). The place Kandanand was known by the same name; Eranakulam had more interesting names like Angecaimal, Ansjecaimal and Angecaimali.

Folk wisdom

Political history is all what we have today which throw light on a bygone era, but they lack in the details on social life. On the contrary, this book, apart from its botanical and medical importance, gives a glimpse on the customs, belifs and life style of those days; it is because the people who were engaged in gathering plants for the compilation of this book was locals. In those days, the knowledge on plants and its medicinal values were not confined to scholars; the rustics were also familiar with it.

This text holds reference to a number of non-medicinal plants; *otalanga* (*Cerbera odallam*) *kavalam* (*Sterculia balanghas*), *chakiri-kottam,* etc. belong to this class. The medicinal value of *mailanchi* (*Lawsonia inermis*) was known from early days, but the art of manicuring with it was not popular then. The use of toddy was also commonly known; Van Rheede even knew the difference in taste of tender and fermented toddy. The locals had rich knowledge about plants gained from personal experiences; they knew that even a cobra bite would not affect one who takes one or two *kanjirakuru* (*Strychnos nux-vomica*) daily for two years; the powder of arrowroot was considered as healthy food; again, a decoction prepared from *ampazham* (*Spondias pinnata*) relives gonorrhea.

Pineapple is referred to as *kappachakka*; probably it got the name as it came from abroad by *kappal* (ship); later, it came to be known as *kaitachakka* or *annarachakka.* The statement that the usage *kappachakka* is not prevalent today does not seem correct as pineapple is still known by that name in mid-Kerala. In the description about *plasu* (*Butea monosperma*) mention is made to its use in sacrifices but the name *chamata,* which was popular among Brahmins for *plasu,* is not used in the book. This shows that Van Rheede gave importance to layman's dialect in plant names. The story of Lord Krishna lying as a child on a peepul leaf sucking the index finger of his left leg has been referred to in the book where *arayal* (*Ficus religiosa*) has been described; this shows that the author was familiar to the social life of Kerala.

Itty Achutan

Itty Achutan was one of the prominent personalities among those who rendered services to the Governor in compiling this book. A physician by tradition he belonged to *chokavarna* (*ezhava*) of Kollada house in Karappally, near Chertala. His father and forefathers were great *vaidya*s. On invitation from the Governor, he reached Cochin and gave detailed description of each plant and its medicinal use as described in texts as well as from his rich personal experience. The Cochin born Manuel Carneiro, who was well versed in Portuguese, translated this to Portuguese for Van Rheede. Itty Achutan's medical knowledge is reflected all through the text. His handwritten promissory statement and plant names given by him are given in the book. Apart from Achutan the other three Keralites who helped Van Rheede were Konkana Brahmins - Rangabhatta, Vinayaka Pandithan and Appu Bhatta; among them, Vinayaka Pandithan knew Portuguese. As there are references to the medical books traditionally handed over to them, they also seem to be physicians. However, it appears that they were more engaged in the sale of medicines than treatment, for it was their attendants who collected medicinal plants from different parts.

The fact that Malayalam script was first put in print in the hand of Itty Achutan raises many questions. Generally, the tradition of ayurveda is traced back to Vedas particularly the Atharvaveda. Atharvaveda was less popular in Kerala. What was the source of Itti Achutan's inheritance of ayurveda as he belonged to a lower caste? What was the source of the books referred to by Iytty Achutan and Konkana Brahmins? Why Van Rheede did not seek the help of *Ashtavaidya*s?

Though Konkana Brahmins relation to foreigners can be traced to Goa the *ezhava*s do not seem to have any such relation; we can trace back the roots of ayurveda in Kerala to Bhela and Vagbhata.The common assumption here is that *vela*s are the descendants of Bhela while Vagbhata was a Bhuddist. *Ezhavas* acquired medical knowledge and culture from the Buddhists. This text gives a hint to the social setup, folk wisdom and its veritable sources.

The contributions of *Hortus Malbaricus* to the botanical research and study are innumerable. It flung open the doors to the rich flora of Kerala and new vistas in popularizing and applying biotechnology. Patenting ancestral knowledge would go a long way in preserving the rich bio diversity and floral wealth of the country. We are greatly indebted to the emeritus professor Dr.K.S.Manilal for his contributions in this direction. The English translation is the outcome of his strenuous effort over three decades. The challenge he undertook in his work was to give a detailed description of each plant, identifying and presenting it in a scientific manner mentioning species, family names and their present habitats.

This publication reminds that though the colonial rule has many negative points, it has positive sides too. No native would have ventured the compilation of such a work three centuries ago.

- K.G. Paulose

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EXCERPTS FROM CHIKITSAMANJARI – XLIII

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Abstract: In this issue, the clinical features and classification of *veesarpa* are described in detail. Various treatment modalities for different types of *veesarpa* are also dealt with.

TREATMENT OF *VEESARPA* (ERYSIPELAS)

Based on the cause, *veesarpa* is classified into eight viz. *vatika*, *paittika*, *slaishmika*, *vatapaittika*, *vataslaishmika*, *pittaslaishmika*, *vatapittaslaishmika* and *abhighataja* (secondary to injury). Depending on the tissue of origin, they are again classified to *bahya* (external), *abhayantara* (internal) and admixed (internal and external). The prognosis becomes unsatisfactory in the descending order.

Veesarpa caused by vitiated *vata* and *pitta* is capable of spreading fast, presents blisters and hence is called *agniveesarpa*. Vitiation of *sleshma* and *vata* causes nodular lesions like the beads of a garland and hence is called *grandhiveesarpa*. Vitiated *sleshma* and *pitta* causes *veesarpa* having the appearance of mud, foul smelling and is termed as *kardamaveesarpa.*

Veesarpa caused by the vitiation of any single *dosha* is curable and so also those caused by vitiation of two *dosha*s unless they are associated with secondary manifestations. *Veesarpa*, that originates secondary to injury and that caused by the triad of *dosha*s, have bad prognosis. *Veesarpa* invading or involving the vital points (*marma*s) is, as a rule, incurable. Deeper lesions, moist and foul smelling, where tendons, blood vessels and muscular tissue are extensively involved, have bad prognosis.

The first line of treatment of *veesarpa* is fasting and creation of dryness (*rookshana*). Bloodletting, emesis and purgation are to be done and avoid unction. *Veesarpa* can be treated with the administration of emetics and purgatives. Bloodletting is also recommended. All treatments should be based on the stage of vitiation of *dosha*s.

Purge the patient by administration of *Avipathichoorna*. Castor oil, in suitable doses, mixed with fresh milk can also be given. Prepare a *kashaya* with *nalpamaratol* (bark of four fig trees), add ghee to it, churn well, and separate the portion of ghee. Local application of this preparation relieves *veesarpa*. Ghee shall be prepared with the following as *kalka* and expressed juice of *doorva* (*Cynodon dactylon*) as *drava* and milk (double the quantity of ghee). In take of this *ghrita* relieves severe *veesarpa.*

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Gopatmaja	*Hemidesmus indicus*
Kamala	*Nelumbo nucifera*
Chandanam	*Santalum album*
Sevya	*Vetiveria zizanioides*
Kushtha	*Saussurea lappa*
Ksheeradru-mangura	Buds of: *Ficus racemosa* *Ficus microcarpa* *Ficus religiosa* *Ficus benghalensis*
Bisa	*Nelumbo nucifera* (stamen)
Utpalakanda	*Kaempferia rotunda*

A combination of sesame oil and ghee shall be used in the above preparation and apply locally. Alternatively, sesame oil alone may be used instead of ghee with the above detailed drugs. *Aanayatiyan* (*Elephantopus scaber*) mixed with milk or buttermilk ground to a paste shall be applied locally for itching.

A fine powder of *nellikka* (*Emblica officinalis*) and green gram, mixed to a paste with ghee, apply locally for a period of three days. The bark of *jambeera* (*Citrus lemon*) ground to a paste in buttermilk can also be applied locally for seven days for the cure of chronic ulcers. Wheal and itching also will be relieved by this application.

Medicated ghee or oil (preferably coconut oil) prepared with juices of the following and milk as liquid component relieves *veesarpa* when applied locally.

Nalpamara-kkurunnu	Tender leaves of: *Ficus racemosa* *Ficus microcarpa* *Ficus religiosa* *Ficus benghalensis*
Doorva	*Cynodon dactylon*
Gojihva	*Elephantopus scaber*
Parpatam	*Hedyotis corymbosa*

Panchavalkadi tailam is also effective in *veesarpam. Vata veesarpa*, if treated by irrigation with milk and gingilly oil with the scum of melted butter, will relieve immediately. Irrigation with ghee, coconut or sesame oil with milk on the region of *veesarpa* relives from pulsating pain, pricking and burning sensation.

A *kashaya* prepared by the root bark of *kanjiram* (*Strychnos nux-vomica*) and milk in equal quantities on irrigation relieves and clears all type of sores, reduces burning and prevents inflammatory changes; later, irrigate with *Gopatmajadi tailam*. Application of a paste made out of *ellu* (*Sesamum indicum*) with butter relieves pain and burning. When scabs shed off, apply breast milk and butter on the region. A paste made out of *Nannarikkizhangu* (root of *Hemidesmus indicus*) and fine powder of *Irattimadhuram* (*Glycyrrhiza glabra*), mixed with butter, on application relieves pain, oedema and other inflammatory changes.

Applying a paste made out of fine powder of *karaskara* (*Strychnos nux-vomica*) mixed with butter is said to be fine in scabs. *Satadhauta-ghrita* alone or mixed with fine powder of *agni* (*Plumbago indica*) relieves ruptured blisters. Scum of melted butter or *kashaya* prepared with *madhuka* (*Glycyrrhiza glabra*), on irrigation relieves blisters. Medicate milk by boiling with tender roots of *peral* (*Ficus benghalensis*). *kadalikanda* (*Musa paradisiaca*) and *yashti* (*Glycyrrhiza glabra*), churn well and extract butter from it; application of this on blister cures burning. Apply *Satadhautaghrita* mixed with butter for the cure of *agniveesarpa.*

Local application of the fine powder of *chandana* and *udumbara* (*Ficus racemosa*), mixed with butter or application of fine powder of *madhuka* in butter relieves *agniveesarpa*.

Prepare a medicated *kanji* by a *kashaya* made out of fine powders of *nalpamaratol*. Consumption of this mixed with ghee relieves *veesarpa.* All external applications should be predominating cold potency and mixed with ghee.

Intake of milk (boiled and cooled) mixed with *gopangana* (*Hemidesmus indicus*) or *yashti* relieves *veesarpa*.

Licking fine powder of *amrita* mixed with butter and sugar relives *veesarpa.* A *kashaya* prepared out of *doorva* and boiled with milk, on consumption alleviates *veesarpa*. Intake of medicated ghee with expressed juice of *doorva* also relieves *veesarpa*.

A *kashaya* prepared from the following relieves diarrhoea, *veesarpa*, thirst and fever.

Sariba	*Hemidesmus indicus*
Amalaka	*Emblica officinalis*
Sevya	*Vetiveria zizanioides*
Parpataka	*Hedyotis corymbosa*
Amrita	*Tinospora cordifolia*
Oushadha	*Zingiber officinale*
Duralabha	*Tragia involucrata*
Ambuda	*Cyperus rotundus*

A *kashaya* prepared from the following on consumption with small quantity of honey relieves *veesarpa*.

Katurohini	*Picrorhiza scrophulariiflora*
Kar	*Cyperus rotundus*
Katamkateree	*Coscinium fenestratum*
Madhukam	*Glycyrrhiza glabra*
Veppu	*Azadirachta indica*
Tirayamana	*Gentiana kurroo*
Koola	*Trichosanthes lobata*

Intake of *Jeevanthyadi kashaya* is also good for the relief from *veesarpa*. Consumption of a *kashaya* prepared from the following cures *veesarpa*.

Vasa	*Justicia beddomei*
Phalatraya	*Terminalia chebula*
	Terminalia bellirica
	Emblica officinalis
Patola	*Trichosanthes lobata*
Guloochi	*Tinospora cordifolia*
Arishta	*Azadirachta indica*
Rambha	*Musa paradisiaca*
Khadira	*Acacia catechu*

Fine powders of the following mixed well and ground to a paste shall be applied on *veesarpa*.

Sirisha	*Albizia lebbeck*
Rajanidvaya	*Curcuma longa*
	Coscinium fenestratum
Kushtha	*Saussurea lappa*
Yashti	*Glycyrrhiza glabra*
Mamsi	*Nardostachys grandiflora*
Bisa	*Nelumbo nucifera*
Tuti	*Elettaria cardamomum*
Balaka	*Plectranthus vettiveroides*
Chandana	*Santalum album*

Consumption of *Nimbadikashaya*, added with root barks of *nalpamaram* is advised to relieve *veesarpa.*

Medicated ghee shall be consumed if only *veesarpa* is in *nirama* stage and when *kapha* is reduced and polluted *vata* and *pitta* take an upper hand in the lesion. In other words, ghee is contra-indicated during the weeping nature of the lesion.

Thiktakaghrita, *Mahatiktakaghrita* or Ghee prepared out of *trayamana* (*Gentiana kurroo*) is advised in the cases of dry *veesarpa.*

Intake of ghee medicated with the *kashaya* of the following and milk as *drava* and fine powder of *yashti* as *kalka* relieves dry *veesarpa.*

Manjal	*Curcuma longa*
Maramanjal	*Coscinium fenestratum*

Nalpamaratol	*Ficus racemosa*
	Ficus microcarpa
	Ficus religiosa
	Ficus benghalensis
Madhuka	*Glycyrrhiza glabra*

Add one *kazhanju* (4 gm) of *kanmadam* (asphalt) and an equal quantity of sugar to the above *ghrita* at the time of consumption. This preparation relieves from burning, and heals dry *veesarpa*. It purifies blood and relives itching also.

In the preparation of *Tiktaka* or *Mahatiktaka-ghrita*, the *kashaya* taken as liquid component shall also include the root barks of *nalpamara*. The quantity of these root barks can be ⅓ or ½ of the drugs selected for the original *kashaya* depending on the nature of the lesion.

Three *kashaya*s prepared from the following cure *veesarpa* caused by the vitiation of *vata*, *pitta* and *kapha* respectively.

1.	*Musta*	*Cyperus rotundus*
	Arishta	*Azadirachta indica*
	Patola	*Trichosanthes lobata*
	Daru	*Cedrus deodara*
	Rajani	*Curcuma longa*
	Draksha	*Vitis vinifera*
	Bala	*Sida rhombifolia* ssp. *retusa*
	Nagara	*Zingiber officinale*
2.	*Trayanti*	*Gentiana kurroo*
	Utpala	*Kaempferia rotunda*
	Dhanvayasha	*Tragia involucrata*
	Dhanika	*Coriandrum sativum*
	Bhoonimba	*Andrographis paniculata*
	Sevya	*Vetiveria zizanioides*
	Ambu	*Plectranthus vettiveroides*
3.	*Sreshtha*	*Terminalia chebula*
		Emblica officinalis
		Terminalia bellirica
	Nimba	*Azadirachta indica*
	Kukoolaka	*Trichosanthes lobata*
	Kana	*Piper longum*

Grandhiveesarpa, caused by the combined vitiation of *kapha* and *vata* is initially treated on the same lines as of *rakttapitta*. Later, procedures such as *pindasveda* and *upanaha* (two methods of sudation) using drugs that are capable of normalizing vitiated *kapha* and *vata* are performed. Painful conditions of this disease are treated with irrigation of warm oil. At times, the nodule, hardened like stone, may not respond to treatment. The nodule has to be ripened by application of medicines or cured surgically. Repeated bloodletting is also advised. Internal and external treatments may be required in the presence of pus, burning and exudation.

Local application of *doorva*, *madhuka* and *tila*, ground to a paste and mixed with ghee relieves extensive *veesarpa* caused by the simultaneous vitiation of all *dosha*s. This condition may be associated with thirst and burning.

The following two *kashaya*s relieve *veesarpa*.

Patoladi:

Patola	*Trichosanthes lobata*
Darvi	*Coscinium fenestratum*
Pichumanda	*Azadirachta indica*
Tikta	*Andrographis paniculata*
Trayantika	*Gentiana kurroo*
Yashtimadhu	*Glycyrrhiza glabra*

Dhatryadi:

Dhatri	*Emblica officinalis*
Patola	*Trichosanthes lobata*
Musta	*Cyperus rotundus*

The medicated ghee, *manjal*, *maramanjaltol*, etc. detailed earlier indicated in dry *veesarpa* also can be given. *Panchavalkadi kalka*, detailed in the treatment of *kushtha* (various skin manifestations) can also be used.

Equal combination of oil and ghee shall be medicated with milk and the expressed juices of the following:

Doorva	*Cynodon dactylon*
Guduchi	*Tinospora cordifolia*
Tulasi	*Ocimum sanctum*
Kumari	*Aloe barbedensis*
Neeli	*Indigofera tinctorea*
Vishaghna	*Albizia lebbeck*
Munivriksha	*Sesbania grandiflora*
Bhrimghee	*Eclipta prostrata*

The solid components in the above preparation are given below:

Sariba	*Hemidesmus indicus*
Chandanam	*Santalum album*
Daru	*Cedrus deodara*
Choraka	*Kaempferia galanga*
Nata	*Valeriana jatamansi*
Asvagandha	*Withania somnifera*
Triphala	*Terminalia chebula*
	Emblica officinalis
	Terminalia bellirica
Trijata	*Elettaria cardamomum*
	Cinnamomum verum
	Cinnamomum tamala
Usira	*Vetiveria zizanioides*
Darvi	*Coscinium fenestratum*
Mriganabhi	Musk
Neerada	*Cyperus rotundus*
Karavi	*Nigella sativa*
Kunkuma	*Crocus sativus*
Balaka	*Plectranthus vettiveroides*
Utpala	*Kaempferia rotunda*
Kushtha	*Saussurea lappa*
Yashti	*Glycyrrhiza glabra*
Bisa	*Nelumbo nucifera*
Moorva	*Chonemorpha fragrans*
Parpataka	*Hedyotis corymbosa*

The above preparation relieves *veesarpa*, pustules and blister causing lesions. Blisters secondary to spider poisoning, *veesarpa* involving joints and itching are cured by this preparation.

Alternatively, expressed juices of *parpata* and *pachamanjal* (*Curcuma longa*) can also be added to the above as liquid component, especially when *kattavazha* (*Aloe barbedensis*) and *agastiyila* (leaf of *Sesbania grandiflora*) are not available. This preparation relieves pustules on the head and body.

Application of medicated oil prepared from the *kashaya* and *kalka* components detailed below, relieves *agniveesarpa*, various skin lesions associated with fever, *vatarakta* and lesions caused by vitiated *pitta.*

Kashaya:

Nalpamaratol	*Ficus racemosa*
	Ficus microcarpa
	Ficus religiosa
	Ficus benghalensis
Kallal	*Ficus arnottiana*
Rajani	*Curcuma longa*
Nannari	*Hemidesmus indicus*
Sevya	*Vetiveria zizanioides*

Kalka:

Yashti	*Glycyrrhiza glabra*
Rambha	*Musa paradisiaca*
Kuliru	*Curcuma longa*
Ramacha	*Vetiveria zizanioides*
Ruk	*Saussurea lappa*
Toyakanda	*Nymphaea nouchali*
	Nymphaea alba
	Nelumbo nucifera
	Kaempferia rotunda
	Monochoria veginalis

Add the juice of *doorva* to the above mentioned

kashaya and *kalka,* and prepare the medicated oil which is capable of relieving different types of *veesarpa* and itching of the head and body.

Prepare a *kashaya* with drugs of *Jeevantyadi* group and *nalpamaram* in combination; this preparation is capable of curing skin lesions. Another *kashaya* prepared from the following also possess the same properties.

Nalpamaratol	*Ficus racemosa*
	Ficus microcarpa
	Ficus religiosa
	Ficus benghalensis
Varattumanjal	*Curcuma longa*
Irattimadhuram	*Glycyrrhiza glabra*
Nannarikkizhangu	*Hemidesmus indicus*
Ramaccham	*Vetiveria zizanioides*
Chukku	*Zingiber officinale*

Intake of a *kashaya* prepared from *nellikka, patavala* (*Trichosanthes lobata*) and *mudga* (*Vigna radiata*) mixed with ghee alleviates *veesarpa*. A *kashaya* prepared out of *triphala* mixed with ghee is also effective. A *kashaya* prepared from the following or the powder of *triphala* relieves *veesarpa* caused by deranged *vata*.

Cherupan-chamoola	*Desmodium gangeticum*
	Pseudarthria viscida
	Solanum indicum
	Solanum xanthocarpum
	Tribulus terrestris
Chunda	*Solanum indicum*
Usira	*Vetiveria zizanioides*
Mukil	*Cyperus rotundus*

Firstly purification, then the treatment for *raktapitta,* and finally the treatment of *vrana* are the line of treatment in *veesarpa. Veesarpa* associated with cough, discoloration, fever, cutting pain, unconsciousness, vertigo, dry mouth, wasting, hyperacidity and persistent diarrhoea are usually fatal.

Specific medication for hiccough:

Fry up five or six garlic in ghee and when turn to brown take it out and fry *jeeraka* (*Cuminum cyminum*) in the residual ghee. Then, both garlic and *jeeraka* should be ground to a paste mixed with *uri* (96 ml) milk and reduce to half by boiling. This preparation, if consumed with residual ghee relieves hiccough.