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लाभानां श्रेय आरोग्यम्

Of all the gifts,
the most precious is health

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FROM THE PAGES OF VĀGBHAṬA - LXXIV

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Abstract: There are one hundred and seven marmas (vital spots) in the body. Their exact location, serious consequences when they are injured, etc. are explained in this chapter.

अथातो मर्मविभागं शारीरं व्याख्यास्याम: ।
इति ह स्माहुरोत्रेयादयो महर्षय: ।

(Athāto marmavibhāgaṁ śārīraṁ
vyākhyāsyāma: ।
iti ha smāhurotreyādayo maharṣaya: ।)

Now we shall comment on Maṛmavibhāga, the fourth chapter of Śārīrasthāna, in which all the maṛmas (vital spots) in the body are studied in detail thus spoke the sage Ātṛeya and other ācāryas.

सप्तोत्तरं मर्मशतं तेषामेकादशादिशेत् ।
पृथक्सक्थ्नोस्तथा बाह्वोस्त्रीणि कोष्ठे नवोरसि ।। १ ।।
पृष्ठे चतुर्दशोर्ध्वं तु जत्रोस्त्रिंशच्च सप्त च ।

(Saptottaram marmaśatam
teṣāmekādaśādiśet ।
pṛthaksakthnostathā bāhvo-
strīṇi koṣṭhe navorasi ।। 1 ।।
Pṛṣṭhe caturdaśordhvam tu
jatrostrimśacca sapta ca ।)

There are one hundred and seven maṛmas in the body. Out of them, eleven are located in each leg and hand (total forty-four in the extremities); three are located in the abdomen, nine in the chest, fourteen in the back, and thirty-seven above the clavicle.

मध्ये पादतलस्याहुरभितो मध्यमाङ्गुलिम् ।। २ ।।
तलहृन्नाम रुजया तत्र विद्धस्य पञ्चता ।

(madhye pādatalasyāhu-
rabhito madhyamāṅgulim ।। 2 ।।
Talahṛnnāma rujayā
tatra viddhasya pañcatā ।)

In the middle of the sole, facing to the middle finger, is located the maṛma talahṛt. Any injury to this maṛma will cause severe pain and consequent death.

अङ्गुष्ठागुलिमध्यस्थं क्षिप्रमाक्षेपमारणम् ।। ३ ।।
तस्योर्ध्वं द्व्यङ्गुले कूर्च: पादभ्रमणकम्पकृत् ।

(aṅguṣṭhāgulimadhyasthaṁ
kṣipramākṣepamāraṇam ।। 3 ।।
tasyordhvaṁ dvyṅgule kūrca:
pādabhramaṇakampakṛt ।)

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Between the big toe and the first finger is situated the kṣipṛamaṛma. If it is injured, there will be ākṣepaka (spasmodic contractions), which will lead to death. Two aṅgulas above the kṣipṛa, there is kūṛcamaṛma. Its injury creates deviation and shivering to the foot.

गुल्फसन्धेरध: कूर्चशिर:शोफरुजाकरम् ।। ४ ।।
जङ्घाचरणयो: सन्धौ गुल्फो रुक्स्तम्भमान्द्यकृत् ।

(gulphasandheradha: kūrca-
śira:śopharujākaram ।। 4 ।।
Jaṅghācaraṇayo: sandhau
gulpho rukstambhamāndykṛt ।)

The maṛma named kūṛcaśiras is located just below the ankle joint. If it is injured, there will be swelling and pain in that spot. The joining spot of calf and foot is termed as gulphamaṛma. Injury to this maṛma will cause pain, stifness and sluggishness.

जङ्घान्तरे त्विन्द्रवस्तिर्मारयत्यसृज: क्षयात् ।। ५ ।।

(jaṅghāntare tvindravastir-
mārayatyasṛja: kṣayāt ।। 5 ।।)

Indravastimaṛma is in the middle part of the calf muscle. Its injury leads to death due to severe blood loss.

जङ्घोर्वो: सङ्गमे जानु खञ्जता तत्र जीवत: ।
जानुनस्त्र्यङ्गुलादूर्ध्वमाण्यूरुस्तम्भशोफकृत् ।। ६ ।।

(Jaṅghorvo: saṅgame jānu
khañjatā tatra jīvata: ।
jānunastryaṅgulādūrdhva-
māṇyūrustambhaśophakṛt ।। 6 ।।)

Jānumaṛma is located at the joint of calf and thigh. If it is hurt, causes lameness (according to Aruṇadutta, injury to this maṛma is fatal. If by any chance the person survives, he will be lame). Āṇimaṛma is located three aṅgulas above the jānumaṛma. Its injury causes stiffness and swelling of the thighs.

उर्व्यूरुमध्ये तद्वेधात्सक्थिशोषोऽस्रसङ्क्षयात् ।
ऊरुमूले लोहिताक्षं हन्ति पक्षमसृक्क्षयात् ।। ७ ।।

(Urvyūrumadhye tadvedhāt-
sakthiśoṣoऽsrasaṅkṣayāt ।
ūrumūle lohitākṣaṁ
hanti pakṣamasṛkkṣayāt ।। 7 ।।)

In the middle part of the thighs, there is a maṛma named uṛvī. Its injury will cause severe blood loss and emaciation of the thighs. In the base of the thigh, there is lohitākṣamaṛma, injury to this may cause hemiplegia due to blood loss.

मुष्कवङ्क्षणयोर्मध्ये विटपं षण्ढताकरम् ।

(Muṣkavaṅkṣaṇayormadhye
viṭapaṁ ṣaṇḍhatākaram ।)

Viṭapamaṛma is located in between the scrotum and groin. Its injury may cause impotency.

इतिसक्थ्नोस्तथा बाह्वोर्मणिबन्धोऽत्र गुल्फवत् ।। ८ ।।
कूर्परं जानुवत्कौण्यं तयोर्विटपवत्पुन: ।
कक्षाक्षमध्ये कक्षाधृक् कुणित्वं तत्र जायते ।। ९ ।।

(itisakthnostathā bāhvor-
maṇibandhoऽatra gulphavat ।। 8 ।।
Kūrparaṁ jānuvatkauṇyaṁ
tayorviṭapavatpuna: ।
kakṣākṣamadhye kakṣādhṛk
kuṇitvaṁ tatra jāyate ।। 9 ।।)

The maṛmas in the legs are thus enumerated. In the hands also, the number and site of location are the same. But some of them differ in their names and also in the nature of effects they make when injured. The maṛma, termed

as gulpha in the leg, is called maṇibandha in the hand. Instead of jānu, it is named kūṛpara in the hand. Both, if injured may cause to make the person cripple with distorted hands. The maṛma in between the axila and collarbone is termed as kakṣadhṛk (kakṣadharā). Its injury also causes distortion of hands.

स्थूलान्त्रबद्धः सद्योघ्नो विड्वातवमनो गुदः ।

(Sthūlāntrabaddha: sadyoghno
viḍvātavamano guda: ।)

The vital spot guda (anus) through which the flatus and faeces are discharged is connected with the large intestines. Any injury to this leads to sudden death.

मूत्राशयो धनुर्वक्रो वस्तिरल्पास्रमांसगः ।। १० ।।
एकाधोवदना मध्ये कट्याः सद्यो निहन्त्यसून् ।
ऋतेऽश्मरीव्रणाद्विद्धस्तत्राप्युभयतश्च सः ।। ११ ।।
मूत्रस्राव्येकतो भिन्ने व्रणो रोहेच्च यत्नतः ।

(mūtrāśayo dhanurvakro
vastiralpāsramāṁsaga: ।। 10 ।।
Ēkādhovadanā madhye
kaṭyā: sadyo nihantyasūn ।
ṛate'śmarīvraṇādviddha-
statrāpyubhayataśca sa: ।। 11 ।।
Mūtrasrāvyekato bhinne
vraṇo rohecca yatnata: ।)

The maṛma situated in mūtṛāśaya (the receptacle of urine) is named vasti. It is located in the middle part of the pelvis. Curved like a bow, this maṛma is with less muscle tissues and blood vessels with downward orifices. Injury to this maṛma is fatal except the incision made for the extraction of the urinary calculi. There also, if incised on both sides, it is dangerous. Even if incised on one side, may develop a wound with urine leakage, and is very difficult to heal.

देहामपक्वस्थानानां मध्ये सर्वसिराश्रयः ।। १२ ।।
नाभिः, सोऽपि हि सद्योघ्नो द्वारमामाशयस्य च ।
सत्वादिधाम हृदयं स्तनोरःकोष्ठमध्यगम् ।। १३ ।।

(dehāmapakvasthānānām
madhye sarvasirāśraya: ।। 12 ।।
Nābhi:, so'pi hi sadyoghno
dvāramāmāśayasya ca ।
satvādidhāma hṛdayam
stanora:koṣṭhamadhyagam ।। 13 ।।)

In the centre of the body, and in between the āmāśaya and pakvāśaya, there is located a maṛma named nābhi, which is the abode of all siras. Injury to this also is fatal. Between the breasts, chest and abdomen, at the opening of the stomach, is the hṛdayamaṛma, which is the seat of satva, rajas and tamas. This maṛma, if injured, will cause sudden death.

स्तनरोहितमूलाख्ये द्यङ्गुले स्तनयोर्वदेत् ।
ऊर्ध्वाधोऽस्रकफापूर्णकोष्ठो नश्येत्तयोः क्रमात् १४ ।।

(Stanarohitamūlākhye
dyaṅgule stanayorvadet ।
ūrdhvādho'srakaphāpūrṇa-
koṣṭho naśyettayo: kramāt ।। 14 ।।)

Stanarohita and stanamūla are two maṛmas, the former is located at two aṅgulas above the breasts, and the latter, two aṅgulas below. Injury to the former may cause accumulation of blood in the koṣṭha (internal cavity including all the organs of thoracic and abdominal cavities) and injury to the latter, accumulation of kapha. In both the conditions, the victim succumbs to death.

अपस्तम्भावुर:पार्श्वे नाड्यावनिलवाहिनी ।
रक्तेन पूर्णकोष्ठोऽत्र श्वासात्कासाच्च नश्यति ।। १५ ।।

(Apastambhāvura:pārśve
nāḍyāvanilavāhinī ।
raktena pūrṇakoṣṭhoऽtra
śvāsātkāsācca naśyati ।। 15 ।।)

On both sides of the chest, there are two nāḍis, which are the carriers of vāyu and are termed as apastambha maṛma. Injury to these may cause accumulation of blood in the koṣṭha and the person may die due to shortness of breath and cough.

पृष्ठवंशोरसोर्मध्ये तयोरेव च पार्श्वयो: ।
अधोंऽसकूटयोर्विद्यादपालापाख्यमर्मणी ।। १६ ।।
तयो: कोष्ठेऽसृजा पूर्णे नश्येद्यातेन पूयताम् ।

(Pṛṣṭhavaṁśorasormadhye
tayoreva ca pārśvayo: ।
adhoṁऽsakūṭayorvidyād-
apālāpākhyamarmaṇī ।। 16 ।।
Tayo: koṣṭheऽsṛjā pūrṇe
naśyedyātena pūyatām ।)

In between the backbone and chest, on either sides, and below the shoulder joints, are located the apālāpāmaṛmas. If these are injured, blood will accumulate in the koṣṭha, gradually it will turn into pus and the person may die.

पार्श्वयो: पृष्ठवंशस्य श्रोणीकर्णौ प्रति स्थिते ।। १७ ।।
वंशाश्रिते स्फिजोरूर्ध्वं कटीकतरुणे स्मृते ।
तत्र रक्तक्षयात्पाण्डुर्हीनरूपो विनश्यति ।। १८ ।।

(pārśvayo: pṛṣṭhavaṁśasya
śroṇīkarṇau prati sthite ।। 17 ।।
Vaṁśāśrite sphijorūrdhvam
kaṭīkataruṇe smṛte ।
tatra raktakṣayātpāṇḍur-
hīnarūpo vinaśyati ।। 18 ।।)

On both sides of the backbone, above the buttocks, towards the earlike bone of the hip, there are two maṛmas attached to the backbone, named kaṭīkataruṇa. Injury to this may cause blood loss, and the person becomes pale and disfigured and dies.

पृष्ठवंशं ह्युभयतो यौ सन्धी कटिपार्श्वयो: ।
जघनस्य बहिर्भागे मर्मणी तौ कुकुन्दरौ ।। १९ ।।
चेष्टाहानिरध:काये स्पर्शाज्ञानं च तद्व्यधात् ।

(Pṛṣṭhavamśam hyubhayato
yau sandhī kaṭipārśvayo: ।
jaghanasya bahirbhāge
marmaṇī tau kukundarau ।। 19 ।।
Ceṣṭāhāniradha:kāye
sparśājñānaṁ ca tadvydhāt ।)

On both sides of vertebral column, at the outer part of the buttocks, there are two junctions of hip and flank. These are kukundaramaṛmas. Injury to these maṛmas makes the lower body immobile devoid of sensation of touch.

पार्श्वान्तरनिबद्धौ यावुपरि श्रोणिकर्णयो: ।। २० ।।
आशयच्छादनौ तौ तु नितम्बौ तरुणास्थिगौ ।
अध:शरीरे शोफोऽत्र दौर्बल्यं मरणं तत: ।। २१ ।।

(pārśvāntaranibaddhau yā-
vupari śroṇikarṇayo: ।। 20 ।।
Āśayacchādanau tau tu
nitambau taruṇāsthigau ।
adha:śarīre śophoऽtra
daurbalyam maraṇam tata: ।। 21 ।।)

Attached to the middle part of the flanks, above the earlike bones of the hips, concealing the internal āśayas (receptacles - āmāśaya,

pakvāśaya, etc) there are nitambamaṛmas, which are situated on cartilages. Injury to these maṛmas will create swelling in the lower body, fatigue and finally death.

पार्श्वान्तरनिबद्धौ च मध्ये जघनपार्श्वयो: ।
तिर्यगूर्ध्वं च निर्दिष्टौ पार्श्वसन्धी तयोर्व्यधात् ।। २२ ।।
रक्तपूरितकोष्ठस्य शरीरान्तरसम्भव: ।

(Pārśvāntaranibaddhau ca
madhye jaghanapārśvayo: ।
tiryagūrdhvam ca nirdiṣṭau
pārśvasandhī tayorvyadhāt ।। 22 ।।
Raktapūritakoṣṭhasya
śarīrāntarasambhava: ।)

The two maṛmas, pāṛśvasandhis are situated between hips and flanks, as attached to the centre of the flanks, horizontally and upwardly. When they are injured, the koṣṭha will be filled with blood and the person dies.

स्तनमूलार्जवे भागे पृष्ठवंशाश्रये सिरे ।। २३ ।।
बृहत्यौ, तत्र विद्धस्य मरणं रक्तसङ्क्षयात् ।

(stanamūlārjave bhāge
pṛṣṭhavaṁśāśraye sire ।। 23 ।।
Bṛhatyau, tatra viddhasya
maraṇam raktasaṅkṣayāt ।)

On the backside of the stanamūlamaṛma, attached to the backbone, are situated the two bṛhatī siras, i.e. two bṛhatīmaṛmas. Injury to these may cause death due to loss of blood.

बाहुमूलाभिसम्बद्धे पृष्ठवंशस्य पार्श्वयो: ।। २४ ।।
अंसयो: फलके बाहुस्वापशोषौ तयोर्व्यधात् ।

(bāhumūlābhisambaddhe
pṛṣṭhavaṁśasya pārśvayo: ।। 24 ।।
Aṁsayo: phalake bāhu-
svāpaśoṣau tayorvyadhāt ।)

At the base of the arms, on either side of the backbone, there are two maṛmas named amsaphalakas. Injury to these maṛmas may cause numbness and emaciation to the arms.

ग्रीवामुभयत: स्नाव्नी ग्रीवाबाहुशिरोन्तरे ।। २५ ।।
स्कन्धांसपीठसम्बन्धावंसौ बाहुक्रियाहरौ ।

(grīvāmubhayata: snāvnī
grīvābāhuśirontare ।। 25 ।।
Skandhāmsapīṭhasambandhā-
vamsau bāhukriyāharau ।)

There are two tendons attached to the shoulders and the basement of shoulders (binding the shoulders with the shoulder basements) on both sides of the neck - between neck and the top of the arms. They are amsamaṛmas. Injury to these may cause dysfunction of the arms.

कण्ठनाडीमुभयत: सिरा हनुसमाश्रिता: ।। २६ ।।
चतस्रस्तासु नीले द्वे मन्ये द्वे मर्मणी स्मृते ।
स्वरप्रणाशवैकृत्यं रसाज्ञानं च तद्व्यधे ।। २७ ।।

(kaṇṭhanāḍīmubhayata:
sirā hanusamāśritā: ।। 26 ।।
Catasrastāsu nīle dve
manye dve marmaṇī smṛte ।
svarapraṇāśavaikṛtyaṁ
rasājñānaṁ ca tadvydhe ।। 27 ।।)

There are four siras on both sides of the throat (larynx) attached to the jaws. Of these, two siras named nīlās and manyās are considered as maṛmas. Injury to these maṛmas causes loss or defect of voice and insensibility of tastes.

कण्ठनाडीमुभयतो जिह्वानासागता: सिरा: ।
पृथक् चतस्रस्ता: सद्यो घ्नन्त्यसून्मातृकाह्वया: २८

(Kaṇṭhanāḍīmubhayato
jihvānāsāgatā: sirā: ।

pṛthak catasrastā: sadyo
ghnantyasūnmātṛkāhvayā: ।। 28 ।।)

There are four siras connected with tongue and nose on each side of the throat (total eight). These are called mātṛkā siras, and injury to these may cause sudden death.

कृकाटिके शिरोग्रीवासन्धौ, तत्र चलं शिर: ।
अधस्तात्कर्णयोर्निम्ने विधुरे श्रुतिहारिणी ।। २९ ।।

(Kṛkāṭike śirogrīvā-
sandhau, tatra calaṁ śira: ।
adhastātkarṇayornimne
vidhure śrutihāriṇī ।। 29 ।।)

There are two kṛkāṭīkāmaṛmas on the joining of spots of the head and neck. Their injury may cause continuous trembling of the head. Beneath the back of the ears, at the depressed spot are located the vidhuramaṛma, which if injured will make deafness.

फणावुभयतो घ्राणमार्गं श्रोत्रपथानुगौ ।
अन्तर्गळस्थितौ वेधाद्गन्धविज्ञानहारिणौ ।। ३० ।।

(Phaṇāvubhayato ghrāṇa-
mārgam śrotrapathānugau ।
antargaḷasthitau vedhād-
gandhavijñānahāriṇau ।। 30 ।।)

On both sides of the nostrils, adjacent to the orifices of the ears, inside the throat, are situated the phaṇamaṛmas. Any injury to these may cause to loss the sensation of smell.

नेत्रयोर्बाह्यतोऽपाङ्गौ भ्रुवो: पुच्छान्तयोरध: ।
तथोपरि भ्रुवोर्निम्नावावर्तावान्ध्यमेषु तु ।। ३१ ।।

(NetrayorbāhyatoSpāṅgau
bhruvo: pucchāntayoradha: ।
tathopari bhruvornimnā-
vāvartāvāndhyameṣu tu ।। 31 ।।)

Apāṅgamaṛmas are located at the outer side of the eyes, beneath the eyebrow tail ends; the depressed spots above the eyebrow are āvaṛtamaṛmas. Any injury to these maṛma will make the person blind.

अनुकर्णं ललाटान्ते शङ्खौ सद्योविनाशनौ ।

(Anukarṇam lalāṭānte
śaṅkhau sadyovināśanau ।)

At the ending side of the forehead, adjacent to the ears, there are śaṅkhamaṛmas. These maṛmas, if hurt, cause sudden death.

केशान्ते शङ्खयोरूर्ध्वमुत्क्षेपौ, स्थपनी पुन: ।। ३२ ।।
भ्रुवोर्मध्ये, त्रयेऽप्यत्र शल्ये जीवेदनुद्धृते ।
स्वयं वा पतिते पाकात्सद्यो नश्यति तूद्धृते ।। ३३ ।।

(keśānte śaṅkhayorūrdhva-
mutkṣepau, sthapanī puna: ।। 32 ।।
Bhruvormadhye, trayeSpyatra
śalye jīvedanuddhṛte ।
svayaṁ vā patite pākāt-
sadyo naśyati tūddhṛte ।। 33 ।।)

There are two utkṣepamaṛmas at the end of the hairs i.e. above the śaṅkhamaṛmas. Sthapanīmaṛma is between the eyebrows. Injury to these three maṛmas may cause quick death if the injurious foreign body is extracted at once. Otherwise the person can survive with it intact, or it will fall off automatically after the inflammation process.

जिह्वाक्षिनासिकाश्रोत्रखचतुष्टयसङ्गमे ।
तालुन्यास्यानि चत्वारि स्रोतसां, तेषु मर्मसु ।। ३४ ।।
विद्ध: शृङ्गाटकाख्येषु सद्यस्त्यजति जीवितम् ।

(Jihvākṣināsikāśrotra-
khacatuṣṭayasaṅgame ।
tālunyāsyāni catvāri

srotasām, teṣu marmasu ।। 34 ।।
Viddha: śṛṅgāṭakākhyeṣu
sadyastyajati jīvitam ।)

In the palate, there are four orifices (śrotas) at the joining place of the tongue, eyes, nose and ears; there are four openings of these orifices termed as śṛṅgāṭakas. Injury to these maṛmas causes sudden death.

कपाले सन्धय: पञ्च सीमन्तास्तिर्यगूर्ध्वगा: ।। ३५ ।।
भ्रमोन्मादमनोनाशैस्तेषु विद्धेषु नश्यति ।

(kapāle sandhaya: pañca
sīmantāstiryagūrdhvagā: ।। 35 ।।
Bhramonmādamanonā-
śaisteṣu viddheṣu naśyati ।)

On the skull there are five joints, spreading horizontally and upwardly. These are sīmantamaṛmas. If these are injured, it will lead to giddiness, insanity, dementia and death.

आन्तरो मस्तकस्योर्ध्वं सिरासन्धिसमागम: ।। ३६ ।।
रोमावर्तोऽधिपो नाम मर्म सद्यो हरत्यसून् ।

(āntaro mastakasyordhvam
sirāsandhisamāgama: ।। 36 ।।
Romāvarto'dhipo nāma
marma sadyo haratyasūn ।)

Inside the cranium, at the topmost part, there is the adhipatimaṛma, the exact spot of which can be identified by the whirling of hair on the crown of head. Its injury causes sudden death.

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PHARMACOGNOSTIC STUDIES ON ĀKĀRAKARABHA - A VĀJĪKARAṆA DRUG

Dilip K. Jani *et al*[1]

Abstract: Ākārakarabha is a well known drug used in āyuṛveda as vājīkaraṇa (for acquiring virility), and is useful in erectile dysfunction (ED) and premature ejaculation (PE). Besides its popularity, it is also a controversial drug. Roots of two species viz. *Anacyclus pyrethrum* and *Spilanthes acmella* of family Asteraceae are used as ākārakarabha. In view of its controversy, pharmacognostic studies involving macroscopic, microscopic, powder and preliminary physicochemical studies have been made to bring out the salient distinguishing features.

Introduction

Āyuṛvedic system of medicine dates back to Vedic ages has been an integral part of Indian culture. According to Suśṛuta, the foremost aim of āyuṛveda is to maintain health and cure the diseased[1]. Āyuṛvedic texts have mentioned the use of innumerable plants and their preparations in the treatment of various diseases. Samhitas and Nighaṇṭus have contributed many new drugs to Indian Materia Medica. Ākārakarabha is one of the important drugs in āyuṛveda used in vājīkaraṇa i.e. for improving virility and in the treatment of erectile dysfunction and premature ejaculation[2].

Roots of two plant species viz. *Anacyclus pyrethrum* and *Spilanthes acmella* belonging to family Asteraceae are profusely used as the source of ākārakarabha[3]. The former is the native of Algeria and part of North Africa and introduced into Europe[4], while the latter is native of India[5]. Some physicians are of the view that vilāyatī ākārakarabha i.e. *A. pyrethrum* is the real source, while several traders intermix *S. acmella* as a substitute. It is also used as its substitute and some times adulterant in the drug[6]. In view of the existing ambiguity it is proposed to study the drug pharmacognosti-cally. Available literature reveals information on pharmacognostic studies of *A. pyrethrum*[8] while that of *S. acmella* is lacking. Hence presently pharmacognostic studies on both have been carried out and their distinguishing features are presented.

Materials and methods

The authentic samples of roots of *A. pyrethrum* were obtained from Jamnagar, Gujarat and

S. acmella from Wardha, Maharashtra. The dried roots were boiled in water and fixed in 1:1 (50% Glycerol: 50% Ethanol) for a week. The roots were cut into small pieces 2 cm each. Then they were sectioned at 15-20 µm on wood microtome (sliding) Spencer type. The sections were then stained with safranine and light green, and mounted in Canada balsam. Small chips of root were macerated in Jeffrey's maceration solution[7] to obtain separated elements. The dimensions of elements in sections as well as macerations were recorded.

The raw drugs viz. roots of *A. pyrethrum* and *S. acmella* were powdered and used for determination of ash value, acid insoluble ash and water soluble ash according to Āyuṛvedic Pharmacopoeia[8]. Preliminary physicochemical and fluorescence tests along with TLC studies have been done following standard procedures[9,10].

Methanol extracts of *A. pyrethrum* and *S. acmella* were applied on silica gel G coated, 4 mm thickness plates. A solvent system used, as mobile phase is cyclohexane: ethyl acetate (9:1) and H_2SO_4 is employed as spraying reagent.

Observations

Anacyclus pyrethrum

Macroscopic**:** - Roots 0.75 to 1.5 cm thick, muddy brown, cylindrical, tapering, surface wrinkled vertically; fracture irregular without splinters; often with scars of rootlets.

Microscopic: - In T.S. phellem is few layered, cells tangentially elongated in vertical rows, barrel shaped, 27-55 µm (38) long and 19-25 µm (22) in width; contents dense, tanniniferous, in few with crystals.

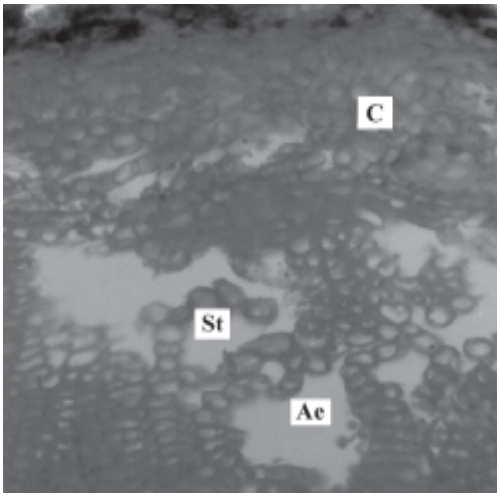
Cortex is extensive, cells oblong to barrel shaped in outer region while polygonal to spherical inside. Elongated cells 140-160 µm (151) long and 65-75 µm (70) in breadth, spherical cells 43-63 µm (54) in diameter. Walls thin to slightly thick, cortex slightly dense; rosette crystals few, 16-35 µm (26) in diameter, interrupted by oleoresin ducts. Secondary phloem is extensive with phloem parenchyma, medullary rays, fibers and sieve cells; medullary rays 1-3 seriate with slightly dense contents; fibers long, thin, smaller with simple pits. Secondary phloem extends into woody region as deeply undulated incursions (Fig. I b&d).

Vessels/Tracheids - Diffuse, numerous, mostly in clusters, few in radial rows and tangentially aligned, rarely solitary; mostly apotracheal, few paratracheal, 8-38 µm (24) in diameter, polygonal, 65-173 µm (113) long, wall 4-5.5 µm (4.8) thick; tailed or truncate; tails either on one side or on both sides; pore scalariform to simple; walls with scalariform thickening, few bordered. Tracheids few to many, 93-140 µm (118) long and 11-16 µm (13) in width, walls scalariform to reticulate (Fig. Ie).

Fibers - Short to slightly long, 119-313 µm (222) long and 5.5-12 µm (9) in width; non-libiriform, non-septate, walls thick, lignified, pits simple, oblique. Centrally, pith is parenchymatous with polygonal to rounded walls contents dense in few (Fig. IIf).

Powder studies

Microscopy**:-** Rosette crystals either whole or broken fragments; cortical tissue with dense contents; cork tissue with tannins and inulin



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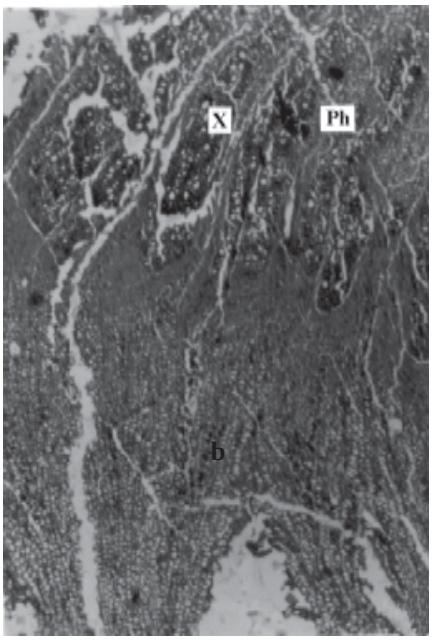

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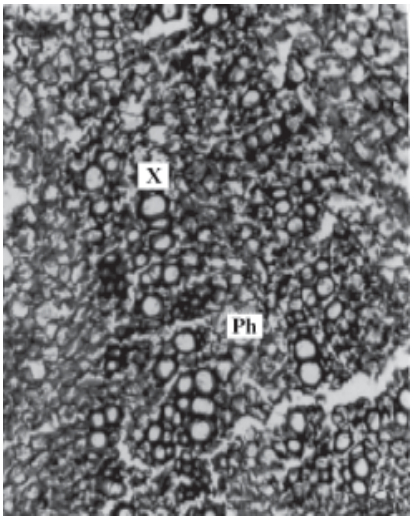
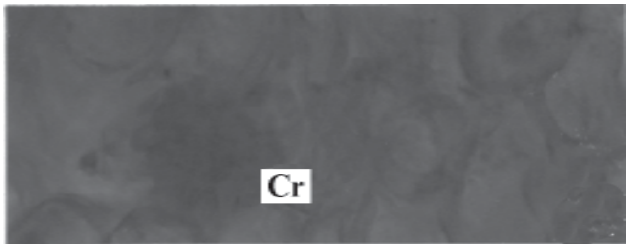


c

Fig: I. **a - c** Microscopic & Macroscopic characters

a T.S. root of *S. acmella* showing aerenchymatous cortex X 116, **b** T. S. root of *A. pyrethrum* showing intermittent secondary xylem, phloem X 58, **c** T. S. root of *A. pyrethrum* with patches of secondary xylem in phloem X 202,

Ae Aerenchymatous tissue **St** Stone cells **V** Vessels **C** Cortex **X** Xylem **Ph** Phloem



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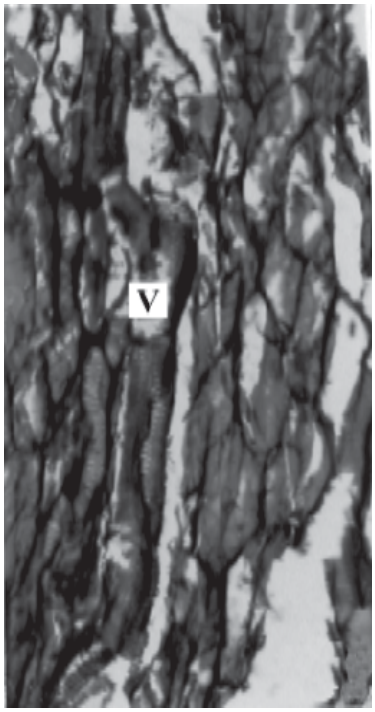

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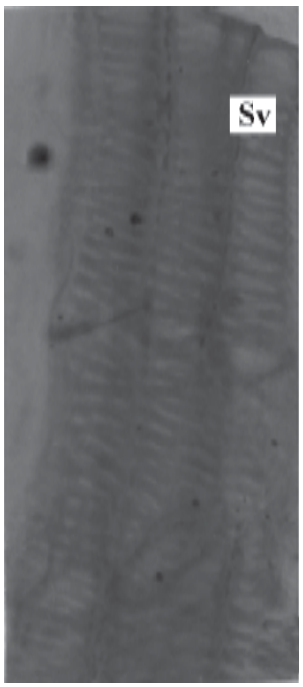


f

Fig: I. **d - f** Microscopic & Macroscopic characters

d A spherocrystal at periphery in *A. pyrethrum* root X 154. **e** L. S. root of *A. pyrethrum* showing vessels with reticulate, scalariform and bordered pits X 535 **f** Group of vessels of *A. pyrethrum* root in maceration with reticulate and scalariform pits X 567

Cr Crystals (Rosette) **V** Vessels **Sv** Scalariform vessels

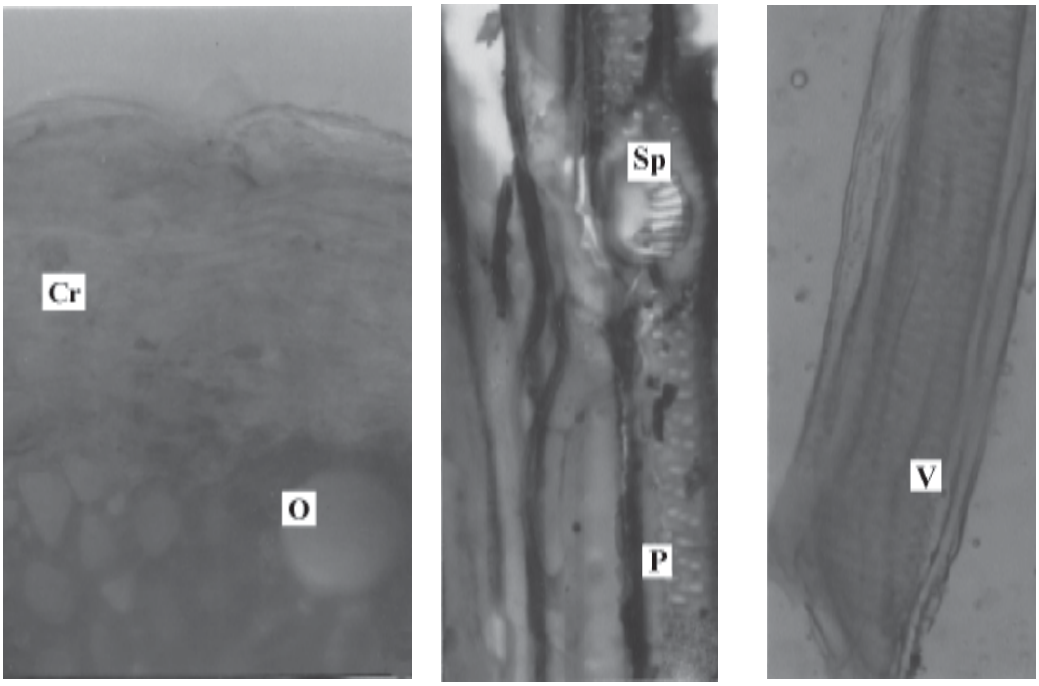
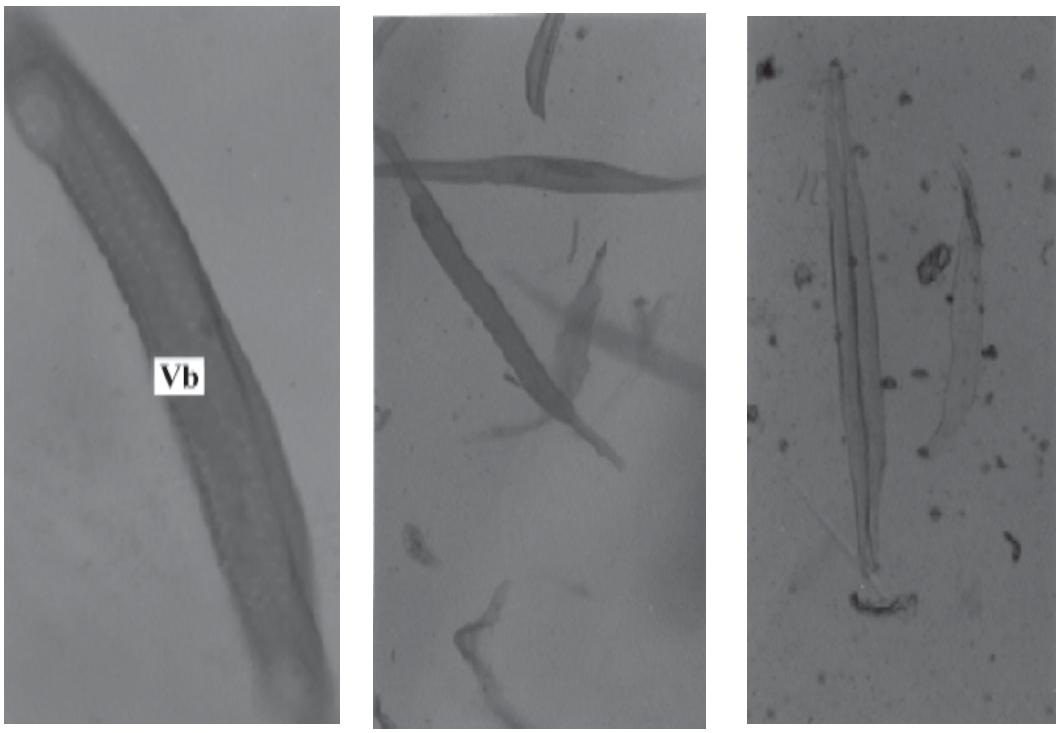


Fig: II. **a - c** Microscopic & Macroscopic characters

a T. S. Rootlet of *S. acmella* showing rosette crystals in cortex and oil canal X 296; **b** L. S. root of *S. acmella* (enlarged) showing bordered pits to vessel and scalariform perforation X 608; **c** Macerated vessel element attached to fiber of *S. acmella* X 500.

Cr Crystals (Rosette) **O** Oil canal **Sp** Scalariform perforation
P Bordered pits **V** Vessels



d **e** **f**

Fig: II. **d - f** Microscopic & Macroscopic characters

d Long vessel element of *S. acmella* X 364; **e** Fibers and fiber tracheids of *S. acmella* X 417; **f** Fibers and fiber tracheids in maceration of *A. pyrethrum* X 365.

Vb Vessels with bordered pits

grains; masses of dark oleoresins; fragments of vessels or tracheids with scalariform and reticulate thickenings; some pieces of fibers with lignified walls.

Organoleptic characters

Color: Light chocolate brown,
Touch: Slightly coarse
Taste: Astringent, tingling
Odor: Strongly pungent, aromatic

Preliminary tests (phytochemical)

Alkaloids and coumarin glycosides are present while saponins, tannins, triterpenoids, flavonoids absent.

Fluorescence tests

Fluorescence tests of the root powder extracts of acetone, chloroform, ethanol, ethyl acetate, methanol, distilled water and powder as such have been carried out (Table 1).

Spilanthes acmella

Rootlet

Macroscopy**:-** Rootlets 1-3 mm thick, creamish brown, cylindrical, slender, wiry, fibrous, tapering, fracture splintery, smooth.

Microscopy:- in T.S. outermost epidermis unilayered, cells tabular to barrel shaped, cells 16-49 µm (30) long and 11-16.5 µm (14.6) wide; cuticle slightly thick, walls thin. Hypodermis is 8-10 layered cortex, cells polygonal to tangentially elongated, 16-63 µm (24), long and 5.5-16 µm (10) wide; walls thin, contents slightly dense with rosette crystals, tannins in few, interrupted with oil canals (Fig. IIa)

Wood is scanty, diffuse porous, extending into primary xylem region. Vessels/Tracheids - Diffuse, mostly solitary, few in radial rows and rarely clusters; pores longer at centre, polygonal or spherical 22-55 µm (38) in diameter, 108-227 µm (165) high, wall 3-4 µm thick; tailed to truncate; tails either on both sides or towards one side; few tracheids with long tails; perforation simple, oblique, pits bordered, in 2-3 rows in tracheids, while 5-8 rows in vessels; polygonal to spherical, alternate; Axial parenchyma is scanty surrounding the vessels,

TABLE 1

Fluorescence study

Solution	*Anacyclus pyrethrum*		*Spilanthes acmella*	
	Ordinary light	UV light	Ordinary light	UV light
Acetone	Brownish-yellow	Green	Greenish-yellow	Green
Chloroform	Turbid	Light green	Green	Light green
Ethanol	Light brownish	Light green	Brownish-yellow	Light green
Ethyl Acetate	Brownish-yellow	Light green	Green	Light green
Methanol	Brownish-yellow	Green	Light brownish-yellow	Light green
Distilled Water	Brownish	Light green	Turbid brown	Light green
Powder as such	Brown	Light yellow	Light brown	White

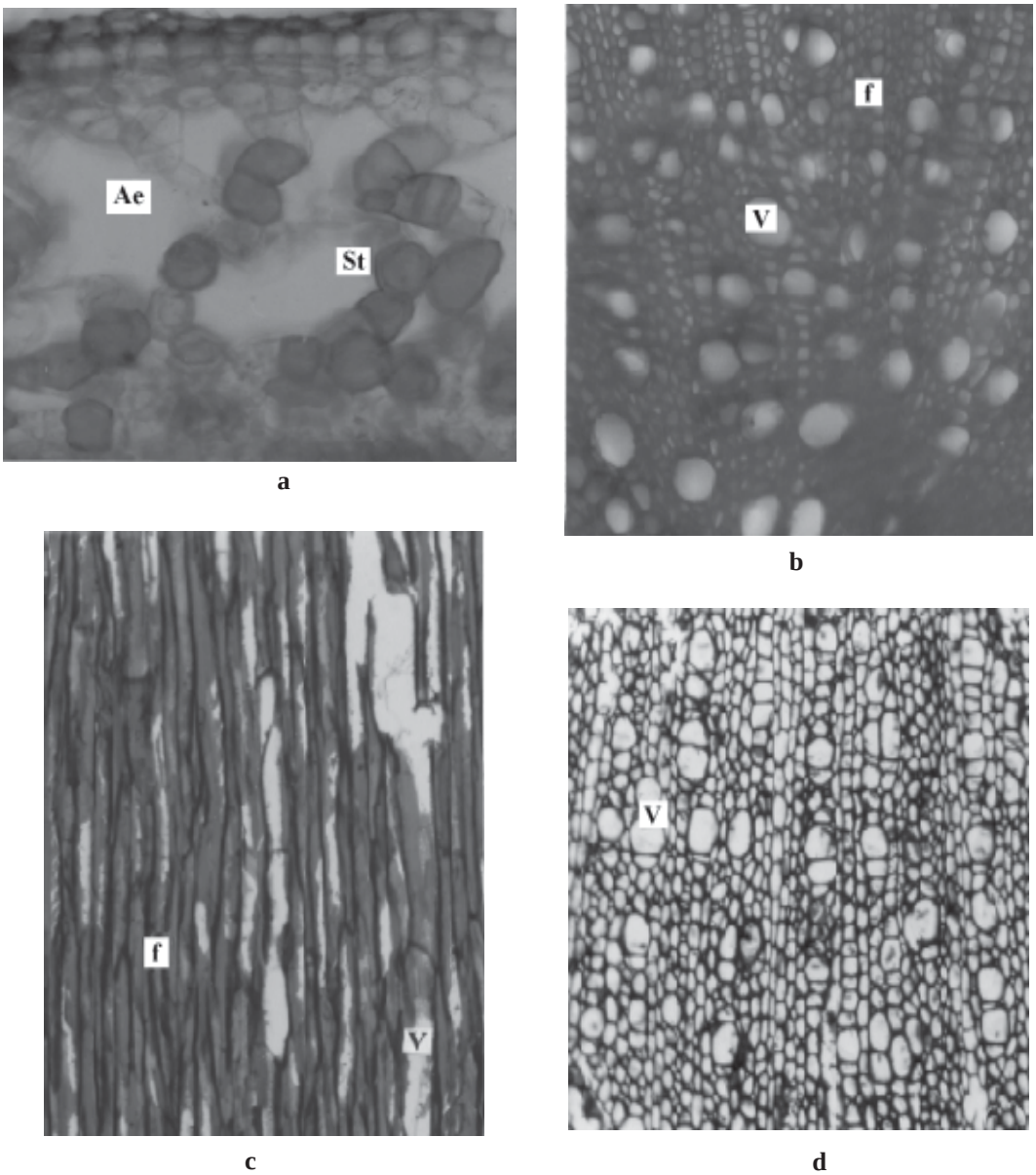


Fig: III. **a - d** Microscopic & Macroscopic characters

a T. S. Root of *S. acmella* with aerenchymatous cortex, Stone cells and Secondary phloem X 119;
b T. S. Rootlets of *S. acmella* with Secondary xylem X 185;
c T. L. S. Root of *S. acmella* X 129; **d** T. S. Root (wood) of *S. acmella* X 127.

Ae Aerenchymatous tissue **St** Stone cells **f** Fibers **V** Vessels

polygonal to elongated, walls thin, pits simple, contents scanty. Fibers - fairly abundant, non-libiriform, non-septate, walls 3.5-4.5 µm thick, 248-475 µm (332) long and 16-27 µm (22) wide; pits simple, oblique. Medullary rays 1-2 seriate, walls thin, contents scanty (Fig. IIIb).

Root

Macroscopic:- 0.5-1.5 cm thick, cylindrical, tortuous, gray to brownish, tapering, with secondary and tertiary rootlets, fracture fibrous, creamish white inside, surface smooth.

Microscopic:- In T.S. epidermis is 1 layered, cells barrel shaped or tabular, 42-75 µm long and 32-54 µm (40) wide, often interrupted by corky tissue; walls slightly thick, contents dense, in some with tannins; 1-2 layered parenchymatous hypodermis is present followed by aerenchymatous zone with air spaces in between, cells arranged in reticulate manner. Cortex is a scanty, cells polygonal to round, contents dense with starch grains. Sclereidal stone cells are abundant, polygonal with thick laminated radial walls; 54-108 µm (73) in diameter, contents scanty. Secondary phloem is 15-20 celled thick, consisting of phloem parenchyma, medullary rays, fibers and sieve cells. Medullary rays 2-3 seriate with slightly dense contents (Fig. III.a,c&d).

Vessels diffuse, numerous, mostly in radial multiple of 2-6, in clusters or tangentially aligned, rarely solitary; pores polygonal to spherical, 16-41 µm (27) in diameter, 97-120 µm (108) in length, walls 2.75-5.5 µm (4.1) thick, tailed or truncate, few conspicuously tailed; perforation simple or scalariform. Intervascular pits bordered, spherical to oval 4-6 µm in diameter, alternate. Tracheids - Few, 194-313 µm (253) in length and 16-27 µm (21) in width, tailed, pits bordered in 2-3 rows. Fiber tracheids - Few 248-367 µm (318) in length and 14-27 µm (21) in width, pits bordered, 2-3 rows.

Fibers long, non-libiriform, non-septate, 259-497 µm (360) long and 16-22 µm (19) wide; of different morphoforms viz. a) wide at centre and long tapering in either sides b) wide branched at the ends; walls 3-4.5 µm thick. Axial parenchyma - Scanty, as cells surrounding vessels or tracheids; oval to spherical, walls slightly thick, pits simple.

Medullary rays 1-2 seriate, heterocellular, heterogenous, uniseriate rays 4-6 celled high, biseriate up to 8 celled high, mostly of procumbent cells and terminal upright, walls fairly thick, contents scanty. Centrally pith is parenchymatous, made up of polygonal to spherical cells (Fig. II. b&e and Fig. III. a,c&d).

Powder studies

Microscopy**:-** Starch grains of various sizes and shapes; stone cells isolated, cortical cells containing starch grains; broken fragments of vessels and tracheids with bordered pits; few cork cells containing tannins; few broken isolated fibers.

Organoleptic characters

Color:	Light greenish yellow
Touch:	Slightly coarse
Taste:	Astringent, tingling
Odor:	Pungent, Choking

Preliminary tests (phytochemical)

Tannins, alkaloids and coumarin glycosides are present but saponins, triterpenoids, flavonoids are absent.

Fluorescence tests

Fluorescence tests of the root powder extracts of acetone, chloroform, ethanol, ethyl acetate, methanol, distilled water and powder as such have been carried (Table 1).

Results and discussion

A. pyrethrum

A comparative study of the *A. pyrethrum* roots presently studied and those described in pharmacopoeia[8] reveal that macroscopically and organoleptically the roots of the both are similar. Microscopically the cork is similar but it has been described to develop from sclerenchyma. Further the cork cells are found to contain tannins besides the crystals of calcium-oxalate. The phelloderm or secondary cortex is quite extensive enclosing rosette crystals and resin ducts in between. Sclerenchymatous cells were reported in the cortex but have not presently been found. The secondary phloem also possesses crystals of calcium oxalate and resin ducts. Further the phloem is extended into the wood as undulated incursions. Wood is scanty as alternating patches with phloem. The vessels and tracheids are described in detail (loc cit.). Scalariform pits are also found besides bordered pits in the walls of tracheids and vessels. Medullary rays are 1-3 seriate but have also been described as multiseriate. Fibers are short, non-libiriform and slightly thick walled. Besides presently the microscopical characters of powder are also presented.

S. acmella

The macroscopical and microscopical features of rootlets and roots of *S. acmella* have been studied. The rootlets are thin, long, creamish brown, with splintery fracture. Epidermis is one layered and hypodermis is 8-10 layered and parenchymatous. The wood is extensive, diffuse porous with 1-2 seriate medullary rays.

Roots in T.S are 0.5-1.5 cm in diameter, cylindrical, tortuous, brownish with fibrous fracture. Externally epidermis is one layered with tabular cells and at certain regions with corky tissue. Hypodermis is characteristic with aerenchymatous zone along with a layer of stone cells. Secondary phloem consists of phloem parenchyma, medullary rays and fibers. Wood is scanty, creamish brown and diffuse porous. Vessels are numerous, mostly in radial multiples with intervascular pits bordered. Medullary rays are mostly uniseriate and 6-8 celled in height. Centrally the parenchymatous pith is present.

The powder microscopic features are detailed (loc. cit.). The roots of both *A. pyrethrum* and *S. acmella* are profusely used as the source of ākārakarabha. Although both drugs are efficacious in vājīkaraṇa (including erectile dysfunction and premature ejaculation), pharmacognosti-cally they are not similar.

Preliminary phytochemical studies of root powder of both drug has been carried out and is found to be similar except by the presence of tannins in *S. acmella.*

The fluorescence analysis of powders and the extracts in various solvents also show similarity, except their powders under UV light is light yellow in *A. pyrethrum* and white in *S. acmella.* The Ethyl acetate extract under visible light is brownish yellow in *A. pyrethrum* and green in

S. acmella. Ethanol extract is light brownish in the former, and brownish yellow in the latter. The Chloroform extract is turbid in visible light for *A. pyrethrum,* while green in *S. acmella.*

The macroscopical and organoleptical features of *A. pyrethrum* are similar as described in Pharmacopoeia[8], except microscopically; the cork has been described to have developed from sclerenchyma, which is not true. Besides the microscopic study of the powder drug is presently reported. The macro and microscopic studies including powder microscopy along with organoleptic characters had been presented for *S. acmella* (loc. cit.).

Although both the drugs are used as the source of ākārakarabha, pharmacognostically they are distinctly dissimilar except with some similarities in organoleptic characters. The phytochemical studies show presence of tannins in *S. acmella,* whereas fluorescence analysis of the powdered drug reveals the difference under UV light, as well as their extracts with ethyl acetate, ethanol, and chloroform in ordinary light.

The data of ash values reveals that the total ash, acid insoluble ash and water-soluble ash are higher in *S. acmella* in comparison to *A. pyrethrum*, which indicates the presence of higher amount of inorganic matter in the former (Table 2)

The TLC studies of the methanol extract of *S. acmella* show five spots, whereas that of *A. pyrethrum* only three (Table 3). Further none of the spots in those two drugs possess identical *Rf* and colour. Hence the analysis of chemical data clearly reveals that the two drugs are dissimilar even though therapeutically similar.

TABLE 2
Ash value

Parameters	Quantitative values	
	S. acmella	*A. pyrethrum*
Total ash	12.7% w/w	5.2% w/w
Acid insoluble ash	5.5% w/w	0.55% w/w
Water soluble ash	3.1% w/w	2.4% w/w

TABLE 3
Thin Layer Chromatography

No. of spots		*A. pyrethrum*		*S. acmella*	
A.p	*S.a*	Rf	Colour	Rf	Colour
3	5	0.54	Gray	0.58	Gray
-	-	0.29	Yellow	0.2	Pink
-	-	0.11	Pinkish brown	0.11	Light brown
-	-	-	-	0.06	Yellowish brown
-	-	-	-	0.03	Pink

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STUDIES ON HYPOLIPIDEMIC ACTIVITY OF *TRIGONELLA FOENUM-GRAECUM* IN EXPERIMENTALLY INDUCED DIABETIC RATS

S.S. Allamwar and S.R.Rajurkar*

Abstract: *Trigonella foenum-graecum,* belongs to Leguminosae, is a most widely cultivated plant throughout the country. It is commonly known as methi. The seed powder of the plant has been investigated for its hypoglycaemic, antioxidant, antilipidaemic and other properties in different laboratory animals. This paper studies the effect of seed powder on lipid profile in normal and diabetic alloxan induced rats. The results showed significant reduction in triglyceride and cholesterol levels in the animals treated with the seed powder of *Trigonella foenum-graecum.*

Introduction

The research in India in last four to five decades has thrown new lights on therapeutic potentialities of medicinal herbs for various ailments. The plant *Trigonella foenum-graecum* is commonly known as methi in Hindi and fenugreek in English. The leaves of the plant is used as vegetable and the seeds have been used for numerous indications including labour induction, as digestive stimulant, general tonic to improve metabolism besides using in diabetics (Kritikar and Basu, 1933; Sawant, 1974). The seeds of the plant have been investigated for hypoglycaemic, antioxidant, antilipidaemic and other properties in different laboratory animals (Thakarns *et al*, 2003; and Valette *et al*., 1984). Detailed study therefore was made to study the effect of seed powder on lipid profile in normal and diabetic alloxan induced rats. The study was planned with the following objectives:

- To study the effect of fenugreek seeds powder on normal Wistar rats.
- To investigate the changes in the biochemical parameters like serum cholesterol, triglyceride, blood urea nitrogen (BUN) and alanine transaminase (ALT).

Materials and methods

The seeds of the plant, were procured from the local market, cleaned and made into a fine powder by grinding using domestic mixer. The powder was fed @ 2 g/kg body weight to experimental animals. Fifty weanling Wistar

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rats of both sexes were acclimatized to the experimental condition prior to the experiment. The rats were divided into five groups (10 in each).

Diabetes was induced in thirty rats using intra peritoneal injection of alloxan monohydrate (SD-Fine Chem. Ltd., Mumbai) @ 120 mg/kg body weight. The rats were then divided into 5 groups as shown below (Table 1):

TABLE 1

Groupwise treatment of normal and diabetic rats

Group*	Treatments
I	Normal (control)
II	Normal rats fed with fenugreek seed powder @ 2g/kg body weight
III	Diabetic control rats (Alloxan induced)
IV	Diabetic rats fed with fenugreek powder @ 2g/kg body weight
V	Diabetic rats treated with glibenclamide @ 600 µg/kg body weight

*10 rats in each groups

All the rats were maintained in standard laboratory conditions fed with commercial rat feed. Fresh and pure water was supplied ad-libidum to all the experimental animals. All the animals in the control and treatment groups were observed for general behaviour and blood biochemical alterations.

General behavior: - All the animals were observed for general behavior, activity and alertness prior and at the end of experimental period.

Bio-chemical estimation: - 2 ml of blood was collected from each animal from the orbital plexus taking all the aseptic precautions on day zero (0 day) i.e. prior to experiment but after confirmation of induction of diabetes in respective treatment groups. On the 60th day i.e. on completion of experiment, the serum was collected and assessed for the blood biochemical parameters, viz. Triglyceride, Cholesterol, ALT and Serum Urea Nitrogen using Auto Span reagent kits on auto analyzer slim (SEAC). All the data for blood biochemical parameter were analyzed by FRBD as suggested (Panse and Sukhatme, 1967).

Results and discussion

Blood biochemical observations

2 ml of blood was collected from the orbital plexus of each animal and the serum was processed for blood biochemical alterations on days 0 and on 60th of post treatment period.

Serum triglyceride level:- The mean serum triglyceride levels in control group rats were 79.57 + 1.69 and 80.14 + 1.99 mg/dl on day 0 and on the 60th day respectively. No statistically significant alteration was observed in the serum triglyceride level of control group animals. Group II animals showed statistically significant reduction ($P<0.01$) in the mean triglyceride level which was observed to be 84.97 + 1.89 mg/dl on 0 day and 69.6 + 2.62 mg/dl on the 60th day. Statistically significant elevation ($P<0.01$) in the mean triglyceride level (142.85 + 3.29 mg/dl) was observed on 60th day when compared to its 0 day reading (81.95 + 1.75 mg/dl) in diabetic and untreated (group III) rats. Statistically significant increase ($P<0.01$) in the mean serum triglyceride level was also observed in Group IV and Group V animals. An increase of mean serum triglyceride level from 80.23 + 0.65 to 110.67 + 4.26 mg/dl was observed in Group IV animals. However,

an elevation from 82.32 + 1.28 to 99.06 + 2.50 mg/dl was noticed in Group V animals treated with standard drug glibenclamide on 0 and 60th day (Table 2).

Serum cholesterol level: No statistically significant alteration was observed in control (Group I) animals where the serum cholesterol level was observed to be 70.38 + 1.29 and 71.23 + 1.27 mg/dl on 0 and 60th days respectively. Statistically significant reduction (P<0.01) from 70.55 + 2.43 to 57.15 + 2.03 mg/dl in the mean serum cholesterol level was observed in Group II animals on 0 and 60th day. Statistically significant elevation (P<0.01) in mean serum cholesterol level was observed in all the III, IV and V group animals. The diabetic untreated animals from Group III showed statistically significant increase (P<0.01) in serum cholesterol level which was observed to be 76.78 + 1.58 mg/dl on 0 day and 146.67 + 2.65 mg/dl on the 60th day i.e. at the termination of the experiment. Group IV rat showed an increased cholesterol level (88.73 + 2.14) mg/dl on 60th day compared to 74.21 + 1.92 mg/dl on 0 day of the experiment. Statistically significant elevation (P<0.01) was also observed in Group V animals and the levels were observed to be 79.48 + 1.59 and 97.87 + 2.18 mg/dl on 0 and 60th day respectively (Table 2).

The findings in the present investigation are similar to those reported by Khosla *et al*. (1995a), Venkatesan *et al*. (2003) and Annida *et al*. (2004). An increase in lipid profile (triglyceride and total cholesterol levels) observed in diabetic uncontrolled group may be because of excessive mobilization of fatty acids from adipose tissue because of availability of insufficient level of insulin. However, reduction in the triglyceride and cholesterol levels in fenugreek seeds and glibenclamide treated animals may correlate with the improved

TABLE 2

Effect of *Trigonella foenum-graecum* seed powder on serum triglyceride and choesterol levels of rats

Group* and Treatment		Serum cholesterol level in mg/dl (Mean + SE)		Serum triglyceride level in mg/dl (Mean + SE)	
		Pre-treat (0 day)	Post-treat (60 day)	Pre-treat (0 day)	Post-treat (60 day)
I	Normal (Control)	79.57 + 1.69	80.14 + 1.99	70.38 + 1.29	71.23 + 1.27
II	Normal + *Trigonella foenum-graecum* (@ 2 g/kg body weight)	84.97 + 1.89[a]	69.65 + 2.62[b]	70.55 + 2.43[a]	57.15 + 2.03[b]
III	Diabetic control (Alloxan induced)	81.95 + 1.75[a]	142.85 + 3.29[b]	76.78 + 1.58[a]	146.67 + 2.65[b]
IV	Alloxan diabetic + *Trigonella foenum-graecum* (@ 2 g/kg body weight)	80.23 + 0.65[a]	110.67 + 4.26[b]	74.21 + 1.92[a]	88.73 + 2.14[b]
V	Alloxan diabetic + glibenclamide (@ 600µg/kg body weight)	82.32 + 1.28[a]	99.06 + 2.50[b]	79.48 + 1.59[a]	97.87 + 2.18[b]

*Each group contained ten rats

a/b - Significant difference in row (P<0.01)

insulin status due to its hypoglycaemic action.

Serum alanine transminase (ALT): - The control group and animals in Group II and IV showed statistically non significant alterations in the mean serum ALT levels where the levels were observed to be 50.90 + 2.87, 53.83 + 3.26, 61.69 + 2.54 mg/dl on 0 day and 54.01 + 2.95, 54.96 + 4.24 and 64.62 + 2.06 mg/dl on 60th day. Statistically significant increase (P<0.01) in serum ALT level was observed in diabetic untreated animals from Group III where the elevation was observed to be 91.75 + 3.62 mg/dl on 60th day from 65.71 + 3.73 mg/dl on 0 day of the experiment. Statistically significant elevation (P<0.01) was also observed in diabetic and glibenclamide treated animals on the 60th day which was observed to be 78.28 + 3.50 mg/dl when compared to that on 0 day (62.79 + 2.36 mg/dl) (Table 3).

An increase in the ALT level in diabetic untreated group may be because of affection in liver metabolism. However, the increase in ALT level in Group V animals i.e. diabetic and treated with standard drug glibenclamide, may be because of the effect of glibenclamide on liver or use of drug alloxan for the induction of diabetes.

Serum urea nitrogen: - The Group I animals showed statistically non-significant change in the serum urea nitrogen on day 60th of post treatment period when compared to that on 0 day. The values where observed to be 20.57 + 0.63 and 21.67 + 0.62 mg/dl on 0 and 60th day respectively. Statistically significant reduction (P<0.05) level was observed in group II rats where, the values was reduced to 19.79 + 0.58 mg/dl on day 60th as compared to 22.92 + 1.0 mg/dl on day 0 of the experiment. Statistically significant increase was observed in Groups III, IV and V animals where, the serum urea nitrogen levels on day 60th were 38.09 + 1.78, 26.27 + 1.52 and 31.75 + 0.87 mg/dl when

TABLE 3

Effect of *Trigonella foenum-graecum* seed powder on serum ALT & urea nitrogen levels of rats

Group* and Treatment		Serum ALT level IU (Mean + SE)		Serum urea nitrogen level in mg/dl (Mean + SE)	
		Pre-treat (0 day)	Post-treat (60 day)	Pre-treat (0 day)	Post-treat (60 day)
I	Normal (Control)	50.90 + 2.87	54.01 + 2.95	20.57 + 0.63	21.67 + 0.62
II	Normal + *Trigonella foenum-graecum* (@ 2 g/kg body weight)	53.83 + 3.26	54.96 + 4.24	22.92 + 1.0^{b}	19.79 + 0.58^{b}
III	Diabetic control (Alloxan induced)	65.71 + 3.73^{a}	91.75 + 3.62^{a}	21.85 + 0.83^{b}	38.09 + 1.78^{b}
IV	Alloxan diabetic + *Trigonella foenum-graecum* (@ 2 g/kg body weight)	61.69 + 2.54	64.62 + 2.06	20.82 + 0.53^{b}	26.27 + 1.52^{b}
V	Alloxan diabetic + glibenclamide (@ 600µg/kg body weight)	62.79 + 2.36^{a}	78.28 + 3.50^{a}	22.45 + 0.97^{b}	31.75 + 0.87^{b}

*Each group contained ten rats

a - Significant difference in row (P<0.01); b - Significant difference in row (p<0.05)

compared to 0 day readings as 21.85 + 0.83, 20.82 + 0.53 and 22.45 + 0.97 mg/dl in Group III, IV and V respectively. The alterations were observed to be statistically significant ($P<0.05$) (Table 3).

An increase in the serum urea nitrogen level was observed reduced in normal rats fed with fenugreek seeds. An elevation in serum urea nitrogen level was observed in group III, IV and V rats. However, the serum urea nitrogen level in diabetic and fenugreek seeds treated rats (Group IV) was observed to be within physiological limits. An increase in the serum urea nitrogen level may be because of the drug alloxan used for induction of diabetes.

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EVALUATION OF DEHAPṚAKṚTI IN INFANT: WHY AND HOW?

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Abstract: Every individual has some specific physical and mental qualities and that is considered as the pṛakṛti. It can be defined as the state of the body, which is generally used to denote the psychobiological make-ups of an individual. Pṛakṛti can be classified according to the predominance of the doshas viz. vāta, pitta and kapha, which are considered as the three essential constituents of the living organism. This paper briefly discusses different parameters to evaluate pṛakṛti in infants and children.

Introduction

According to āyuṛvedic texts, the term pṛakṛti is referred to as the individual status of doṣasāmya and dhātusāmya with dominance of any particular doṣas[1]. It can be classified according to the predominance of the doṣas viz. vāta, pitta and kapha, which are considered to be the three essential constituents of the living organism. The natural predominance of any of these three doṣas presents the characteristics of the individual constitution, which are of seven types. Three types having dominance of each doṣa; three types having dual dominance (two doṣas); and one having equilibrium of all the three doṣas i.e. a) vātaja, b) pittaja, c) kaphaja, d) vāta-pittaja, e) vāta-kaphaja, t) kapha-pittaja and g) sama pṛakṛti . Similarly, according to Suśṛutasamhita, mahābhūtika pṛakṛti is also of five types viz. vāyavya (vāta), āgneya (pitta), āpya (kapha), pāṛthiva and nābhasa.

According to Caraka, when a doṣa is joined with homologus seasons, tissue elements and pṛakṛti, it becomes too powerful to be contested, and as such, causes the disease known as 'śantata' which is very difficult to be treated. Samapṛakṛti is the best of all, however, kaphapṛakṛti is also considered as the best, pitta is average and vāta is poor or hīna, more vulnerable; dvidoṣaja pṛakṛtis are considered more vulnerable.

If the physician does not take cognizance of the basic pṛakṛti of a patient, he is likely to misread in the diagnosis of the disease. Hence, first of all, pṛakṛti should be decided on the basis of parameters described in the various āyuṛvedic texts; in other words, if the patient of pittapṛakṛti is suffering from a disease of vāta, the line of treatment should be such that has the properties to pacify the vāta but does not aggravate the pittadoṣa.

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According to ācārya Suśṛuta, the combination of śukṛa and śoṇita is the cause of formation of foetus. Whatever doṣa is predominant in śukṛa/śoṇita or both is responsible for the formation of pṛakṛti of an individual. If one doṣa is in predominance, then that particular doṣajapṛakṛti is formed. If two doṣas are dominant then dvidoṣajapṛakṛti develops; and if all the three doṣas are in equilibrium then samapṛakṛti is formed. Any pṛakṛti once formed is forever, till death, and which is basically responsible for the physical and mental development of foetus as well as in the later life. If there is vātakṣaya in āṛttava and vātavṛddhi in śukṛa at the time of conjugation, there will not be predominance of vāta in foetus, but some sort of samapṛakṛti will be formed. If kapha is in predominance in both the śoṇita and śukṛa, the kaphaja pṛakṛti will be the outcome.

While describing the examination of rogī-parīkṣa (daśavidhaparīkṣa), Carakasamhita gives the foremost place to the determination of pṛakṛti of a patient before going into further details[2]. This indicates that for treatment or other purposes, evaluation of pṛakṛti is a major marker and shall provide guideline for the treatments. For instance, in case the patient is having pittapṛakṛti and develops any vātika disorder, the drug and diet having hot properties shall aggravate the situation. In other words, if such an effort is made, it will definitely subside vāta but, at the same time, it will vitiate the pitta. Thus, under such a condition, vāta palliating sneha and heavy diet and drugs are to be used so that vāta gets subdued and there is no aggravation of pitta.

Kāśyapasamhita has classified the age of a child as: a) gaṛbha - intra-uterine life starting from embryo till delivery, b) bāla - up to the age of 5 year and later on up to the age of 16 years as kaumāra. It has also been specifically mentioned that the whole period of childhood has dominance of kapha and during this period kapha disorders of a kaphapṛakṛti child can be managed easily. However, disorders dissimilar to the pṛakṛti may cause partial or much difficulty to cure.

The term bāla has been used for childhood age, because the bala (strength) of the body is comparatively low in that period, hence it is common that children suffer from various disorders more often than adults. So, assessment of pṛakṛti in infants and children is important for the management and prevention of disease.

Kāśyapasamhita, while emphasizing the importance of Kaumārabhṛtya, mentions that the childhood period is delicate and vulnerable because the body in this period is under process of quick and steady growth and development, and any slackness in growth and development may cause life time damage or slow pace of growth (both mental and physical)[2]. Hence, to assess the pṛakṛti of infants/children since from their birth is must to assess the normal growth and development, as well as for the purpose of judicious treatment. Diet has the most important role in optimum growth and development especially in infancy and childhood. However, by the assessment of pṛakṛti, even normal diet can also be proposed along with advice of wholesomeness (pathya).

Among the various parameters provided in ancient āyuṛvedic texts for assessment of vāta, pitta and kapha pṛakṛtis, one can finds that majority of they seems to be related to the adult age group. So, assessment of pṛakṛti during infancy or even in latter childhood period cannot be made perfectly, and there

seems to be dire need to evolve new parameters to assess the pṛakṛti of infants and children. For this, some parameters can be used based on mother's observations as well as through leading questions and thereby a comprehensive proforma can be structured (Table 1) as elaborated below:

Complexion

While examining the neonates, various types of complexions can be noticed in the day-to-day routine. Basically, there are three types of complexions that are generally observed viz. black, brown and wheatish. Hence, three main broad headings are to be considered to assess and establish the pṛakṛti in neonates. These three are further subdivided into three so as to envisage minute variations of complexion. Pinkish complexion is found in pittajapṛakṛti, and there could be three sub-divisions also i.e. rosy, pink and coppery. Wheatish complexion is usually found in kaphajapṛakṛti, and there can be three sub-groups i.e. off white, white and alba.

Body build

Although body build may change during later childhood or adult hood, certain distinct variations can be found at the time of birth. This criteria has to be based on gross observation like thin, medium and flabby. The thin category is further sub-divided into three i.e. mild thin, moderately thin and very thin; the medium is subdivided into three - below general, general and above general. In flabby also there are three sub-divisions mild flabby, flabby and very flabby.

Cry

Husky, pitched and heavy cries can be found according to the pṛakṛti, however further minute observation conveys three further sub-divisions like excessive, moderate and mild. These are predominantly found in vātaja pṛakṛti. Again, normal cry can be subdivided into three i.e. low, moderate and high pitched. Heavy pitched cry is observed in kapaja pṛakṛti; it also can be subdivided into mild, moderate and very high.

Activity

Some neonates belonging to vātajapṛakṛti are found to be very active, some in pittaja moderately active and low activity is seen in kaphajapṛakṛti. These are further sub-divided into three i.e. highly active, moderately active and poorly active.

Appetite

Appetite has been divided into three main groups - low, excessive and moderate. In the cases of vātajapṛakṛti, appetite may low; it will be excessive in pittaja and moderate in kaphaja pṛakṛti. These three main groups have been further divided into three sub-groups.

Status of stool

The type of stool may vary according to pṛakṛti. Stool is found to be hard in vātajapṛakṛti; and it is again sub-divided into very hard, hard and moderately hard. Some newborn passes loose stool mainly in pittajapṛakṛti; and these again sub-divided into three - solid, semi solid and loose. In kaphaja pṛakṛti the newborns generally pass normal stool, and they are sub-divided into three: occasionally loose, usually foamed and normal.

Sleep

It can be different in different pṛakṛtis. Some newborns have disturbed sleep, some have normal and others have excessive sleep. Disturbed sleep can be predominantly present in vātajapṛakṛti and they are again subdivided. Normal sleep is usually observed in pittaja

TABLE 1

Assessment prakṛti in children

Character	Vata		Pitta		Kapha	
Complexion	Blackish	- Black - Brown - Wheatish	Pinkish	- Rosy - Pink - Coppery	Whitish	- Off white - White - Alba
Body build	Thin	- Mild - Moderate - Very	Medium	- Below general - General - Above general	Flabby	- Mild - Flabby - Very
Cry	Husky	- Excessive - Moderate - Mild	Pitch	- Low - Moderate - High	Heavy	- Mild - Moderate - Very
Activity	Active	- Highly - Very - Moderate	Moderate	- Active - Average - Slow	Sluggish	- Slight - Very - High
Appetite	Low	- Very low - Average - Normal	Excessive	- Hungry - Very hungry - Voracious	Moderate	- Above - Moderate - Average
Status of stool	Hard	- Very - Hard - Moderate	Altered	- Solid occasional - Semi solid - Loose	Normal	- Occasional - Foamed usually - Normal
Sleep	Distrubed	- Instable - < 4 hours - < 6 hours	Normal	- 6 hours - > 8 hours - > 10 hours	Excessive	- > 12 hours - > 14 hours - > 16 hours
Reaction to hunger	Average	- Below - Average - Above	Severe	- High - Very high - Voracious	Normal	- Above - Normal - Below
Reaction to bedwetting	Severe	- Mild - Moderate - Very	Moderate	- Below - Average - Above	Normal	- Mild - Moderate - Non reactive
Weight gain	Low	- Very - Low - Inconsistent	Moderate	- < Average - Average - > Average	High	- High - Moderately - Very high
Reaction to external environment	Quick	- High - Very - Average	Moderate	- Slight - Average - Very	Slow	- Mild slow - Average - Very slow

pṛakṛti and it has also subdivisions. Excessive sleep is usually noticed in kaphajapṛakṛti and it is sub-divided according to total sleeping hours.

Reaction to hunger

Reaction to hunger is found to be different in different pṛakṛtis. It is usually observed inconsistent in vātajapṛakṛti. Severe reaction to hunger is observed in pittajapṛakṛti and normal reaction to hunger is found in kaphaja prakrit. All these main groups are sub-divided into three (Table 1).

Reaction to bed wetting

Some newborn baby are very reactive towards bed-wetting; they are usually belong to vātaja pṛakṛti, those who have normal reaction are pittajapṛakṛti, and some newborn are very low reactive and are categorized under kaphaja pṛakṛti. All these groups have their sub-divisions.

Weight gain

Low weight gain has been observed mainly in vātajapṛakṛti, inconsistent moderate gain in weight is observed in pitta, and in kapha pṛakṛti, very high weight gain is observed.

Reaction to external environment

The reaction of newborns towards external environment varies accordingly to the difference in pṛakṛti. It has been found that reaction to external environment is highly disturbed in vātajapṛakṛti , whereas pittajapṛakṛti neonates are moderately disturbed and those with kaphajapṛakṛti show very slow reaction to external environment.

Conclusion

This is an attempt to assess the pṛakṛti of children based on different parameters. The study has revealed consistent statistical correlation. However, more analysis and exploration are required to arrive at a better conclusion.

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CLINICAL APPROACH TO ASSESS ERECTILE DYSFUNCTION

M. M. H. Siddiqui[1] and Tanzeel Ahmad[2]

Abstract: Erectile dysfunction (impotence) is inability to attain and maintain penile erection, sufficient enough to permit satisfactory sexual coitus. An erection resulting from complex interaction between muscles, nerves and blood vessels is influenced by psychological, hormonal and behavioral factors. It may manifest in various ways like loss of sexual desire, absence of emission and inability to achieve orgasm. These complaints can be secondary to chronic or debilitating diseases, consequences of specific disorders of urogenital or endocrinal system or the result of psychiatric disturbances. It is mandatory in all instances to exclude organic causes. It is the need of the time to review and prove the practical wisdom possessed by ancient unani physicians by adopting and utilizing the present day scientific, clinical and pharmacological methods.

Introduction

Impotence is synonymously called erectile dysfunction; as the term impotence has significant negative overtones and has been used to describe a range of sexual problems, the specialists prefer the term erectile dysfunction to impotence.[1] Erectile dysfunction may be defined as the inability of a man to attain and sustain adequate erection. Usually, it is predominantly a psychological condition in which the defect does not lie in the structure but sometimes from diseases of genital organ, its blood supply, nerve supply or hormonal imbalance. In the unani system of medicine, this problem is considered as a disease due to two main causes i.e. psychological causes (*Asbab-E-Nafsani*) and organic causes (*Asbab-E-Uzwi*). Miscellaneous causes (*Asbab-E-Deegar*) include other factors, which do not come under the above two.[2] It means there is no contradiction between unani and modem concept. The satisfactory penile erection depends upon sexual urge, structural and functional integrity of genital organ, functions of certain organs specially spinal cord and the endocrinal system.

According to the report of a panel of specialists from U.S.A., about 30 million men in U.S.A. are affected with erectile dysfunction and according to Dr. Sudhakar Krishnamurthy, one in every 10 Indians suffers from some form of impotence in India. It should be kept in mind that the potency generally decreases after the age of 40 years.

Erection is primarily a neuralgic event which is controlled by the autonomic nervous system while the erection of the penis from a flaccid to an erect state is a vascular phenomenon. Erection is initiated by a decrease in arterial resistance resulting in increase arterial blood flow with a subsequent decrease in venous out flow.[3] Erectile dysfunction may manifest in three ways i.e. 1) Functional impotence, which has a psychological basis; 2) Anatomic impotence results from physically defective genitalia and 3) Atonic impotence, which involves disturbed neuromuscular function. The organic causes of erectile dysfunction can be grouped into endocrine, penile diseases, neurological and vascular (Table-1).

Depending on the causes, modern andrology offers many treatment options for erectile dysfunction like injection therapy, tumescence enhancement therapy, penile prosthetic implantation and microsurgical venous ligation. Though hormonal supplementation seems to be often used in endocrinal causes, they are not very common. In such cases the libido is affected rather than the capacity to perform sex. According to Dr. Krishnamurthy, there are no aphrodisiacs known to andrologists and the main treatment for organic impotence is surgery.[4] But, in the unani system of medicine there are so many drugs which are said to be aphrodisiacs and have been frequently used since ancient times with great success.

TABLE 1

Organic causes of erectile dysfunction

- Endocrine causes:- Testicular failure, Hyper prolactinemia.
- Penile diseases:- Peyronie's disease, Previous priapism and Penile trauma.
- Neurologic diseases:- Anterior temporal lobe lesion; diseases of spinal cord; loss of sensory input (Tabes dorsalis, diseases of dorsal root ganglia); diseases of nervi erigentes (redical prostatectomy/ cyctectomy, rectosigmoid operations); diabetic autonomic neuropathy/ various polyneuropathies.
- Vascular diseases:- Aortic occulusion; athero-sclerotic occulusion of pudendal/cavernosa arteries; arterial damage from pelvic radiation; venous leak; diseases of the sinusoidal spaces.

Methodology

In the unani system of medicine, the assessment of drug efficacy is only based on philosophical concepts, statements of sufferers and symptomatic observations of clinicians. This criteria of assessment does not provide sufficient scientific information that can establish the efficacy of drugs in modern days; so it is the demand of the day that their efficacy should be established (M. M. H. Siddiqui, *et. al*, 1995)[5] and a methodology for the evaluation of erectile dysfunction including physical examination and basic laboratory studies (Appendix I) should be applied as they are very much significant to reach an accurate diagnosis and a scientific study (Table 2)

Nocturnal Penile Tumescence Test: - Penile erection can be assessed with the use of a strain gauge attached to a recorder. Alternatively, the penis can be wrapped with gummed perforated paper. Failure to break the perforations on three successive nights suggests a negative Penile Tumescence Test.

Visual Sexual Stimulation Test:- A video tapped erotic material is played and the enquiry is made about the erection of penis. Erection suggests that the patient is potent.

Pudendal Arteriography:- It is indicated in arteriogenic impotence. It provides the most accurate assessment of penile arterial disease. The angiography is performed by injecting a radio-opaque material (Angiografin) in Pudendal arteries. But it should be performed under conditions of chemical erection (e.g. Papaverine injection) to identify the distal arterial lesion clearly.

TABLE 2

Methodology of evaluation

1. Basic laboratory studies:
   - Urine analysis
   - Haemogram
   - Semanogram
   - V.D.R.L
   - Serum Creatinine (Akaline picrate method by Span diagnostic)
   - Serum Cholesterol (CHOD-PAP method by Ranbaxy)
   - Serum Triglyceride (Enzymatic GPO method by Span diagnostic)
   - Blood Sugar (End point-o-Toludine method by Mitra & Bros.)
   - Serum testosterone level
   - Lutenising hormone level
   - Sperm production level
   - Thyroid function test
2. Additional investigatory techniques:
   a) Psychological impotence: - Nocturnal Penile Tumescence Test (NPT test), Visual Sexual Stimulation Test (VSS test).
   b) Organic impotence:- Pudendal Arteriograpgy, Penile/Brachial Index, Pulsed Doppler Analysis, Digital Cavernosography, Dynamic Cavernosography, Pharmaco-cavernosography.

Penile/Brachial Index:- It is used to estimate Penile Blood Flow. The penile systolic blood pressure as determined by Doppler technique is divided by the simultaneous determined Supine Brachial Systolic Pressure to obtain Penile/Brachial Index. An index of 0.6 is suggestive of vascular impotence.

Pulsed Doppler analysis and high resolution Ultrasonography: - It is used in conjunction with Intra-corporeal Papaverine injection to assess blood flow in the Cavernosa arteries.

Dynamic Cavernosography & Pharmaco-Cavernosography: - Cavernosography is initially performed in the flaccid state and then repeated after passive induction of an erection. This can be achieved by infusing saline into the Corpora Cavernosa at a rate of 300 ml/min (Dynamic Cavernosography), or by intra-carporeal injection of Pentolamine and Papaverine in addition to saline infusion (pharmaco-Cavernosography); the latter is more physiological. The visualization of draining veins is normal in flaccid state, but a significant leakage from one or more of the venous channels during an erection is consistent with a diagnosis of venogenic impotence.

Digital Cavernosography: - It is used to assess the abnormalities in the venous occlusive mechanism of the penis. In this technique one of the Corpora Cavernosa is punctured with a 21 G butterfly needle under sterile conditions without local anaesthesia. Digital Substraction Images during injection of 20 ml, Half Strength Low Osmality Contrast Medium (Loxaglate 320

Appendix - 1

General Interrogations:

Name	:	Father's name	:
Age	:	Sex	:
Religion	:	Occupation	:
Age at marriage	:	Address	:

Present Complaints with duration:

History of previous illness:

Mumps	Tuberculosis
Hepatitis/Jaundice	Hydrocele
Diabetes mellitus	Local trauma
Rheumatic fever	STD

Personal History:

Feeling regarding health	Healthy/weak
Appetite	Normal/Increase/ Decrease
Micturation (frequency)	Day/Night
Sleep	Normal/Disturbed
Habit	Smoker/Alcoholic/Homosexual/ Habitual for masturbation
Temperament	Cool/Short/Average
Mental state	Sharp/Dull/Average
Economical status	Poor/Good/Average
Living environment	Hygienic/Unhygienic
Field of interest	Sports/Farming/Sex literature & Films

Social History:

Age of Puberty	-
Habit of masturbation	Yes/No
Sexual desire	Increase/ Decrease/ Normal
Attitude towards own sex	Satisfied/Unsatisfied
Extramarital Sex	Present/Absent
Condition pre-coitus	Normal/Nervous/Hyper excited
Condition post-coitus	Feeling of Freshness/Weakness
Ejaculation	Normal/Premature
Emission	Present/Absent
Orgasm	Present/Absent
Priapism	Present/Absent

Cont...

Treatment History :

Anti histaminics	Cimetidine, Diphenhydramine
Anti hypertensives	Clonidine, Reserpine, Propranalol
Anti cholinergics	Atropine
Anti depressants	MAO inhibitors
Anti psychotics	Chlorpromazine, Haloperodol
Tranquilizers	Dazapam, Barbiturates
Addictives	Methadone, Heroin, Alcohol

Physical Examination:

Vital Signs: Pulse rate; respiratory rate; blood pressure; body temperature**.**

Neurological examination of lower abdomen & genitalia:

Spinal cord injury	Slip disc/# or Dislocation of vertebra
Spinal cord disease	Tabes dorsalis/ Dorsal root ganglia disease
Parasympathetic nerve disease	Following radical Prostatectomy/Cystectomy
Anal sphincter tone	Increase/ Decrease/ Normal
Perineal sensations	Present/Absent

Superficial reflexes:

Anal reflex	Present/Absent
Bulbo-Cavernous reflex	Present/Absent
Cremasteric reflex	Present/Absent
Abdominal reflex	Present/Absent

Tendon reflexes of legs:

Knee jerk	Increase/ Decrease/ Normal
Ankle jerk	Increase/ Decrease/ Normal
Clonus	Present/Absent

Test for sensations of legs:

Tectile sensation	Present/Absent
Pain sensation	Present/Absent

Special examination:

Condition of scrotum	Normal/ Enlarged/Small
Condition of testes	Normal/Small/Undescended
Condition of penis	Normal/Deformed/Ulcer/Phimosis/ Paraphimosis/Engorged penile veins
Position of meatus	Central/Diverted/Pinhole meatus

Length of penis:

In flaccid state	..... cm
In erect state	..... cm
Maximum erection time	..... min
Ejaculation time	..... min
Peyronie's disease	Present/Absent

or Lohexol 350) are obtained in PA. and 45° oblique projections.

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VAGINAL DOUCHING WITH KARAÑJAKVĀTHA IN NON SPECIFIC LEUCORRHOEA - A CLINICAL EVALUATION

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Abstract: Leucorrhoea is one of the commonest problems of women. Women suffer from leucorrhoea at least once in a while during their lifetime. Recurrence also is a common phenomenon and it occurs mainly due to infections by bacteri, fungi and protozoa. Usually it occurs in unhygienic conditions, but can also occur after some surgical procedures and at the time of delivery. This condition is described in āyuṛvedic classics by the term svetapṛadara as a symptom in various vaginal related diseases (yonivyāpat). Though there are different modes of treatment for yonivyāpat, the significant one is local therapy. Hence this study was conducted to find out some suitable drug for this procedure, and karañja (*Pongamia pinnata*) was selected and the study was carried out in 36 cases. On statistical analysis this therapy is found highly significant (P<0.001).

Introduction

Leucorrhoea is a very common and irritating condition in women. Around 30-40% of the patients attending the Gynecological OPD in routine practice are suffering from this disease, which is a symptom of various clinical conditions. Infections of vagina can be considered as yonidoṣa and in āyurvedic classics leucorrhoea is described as śvetapṛadara. Out of two types of leucorrhoea, the common type is caused mainly by *Tricomonas vaginitis* and *Candida albicans* and non-specific type is due to *Staphylococci*, *Streptococci* (both hemolytic and anaerobic) and *E. coli* bacteria. Alteration in the vaginal pH towards alkalinity always favors a non-specific infection.

Śvetapṛadara is described as a main feature under many yonivyāpats viz. śḷaiṣmiki, upapḷuta and vipḷuta. Characteristics described in the classics for sṛavas (discharges) are white (śveta), pale (pāṇduvarṇa), slimmy discharges (picchilasrava) with itching (kaṇḍu) and little pain (alpavedana). Modern concept of symptoms and signs are red, tender vagina with irritation, dysurea with variable colour, consistency and amount of the discharge per vagina.

Though there is an established line of treatment for leucorrhoea in the allopathic system of medicine, most of the drugs fail to cure the disease completely and recurrence is common. Many āyurvedic formulations have been evaluated clinically, and karañja is one of the new drugs taken up for the trial in this area, which is described under the Kaṇḍūghna daśaimani (anti-pruritic drugs) in Carakasamhita.

Material and methods

36 patients with excessive white discharge per vagina (WDPV) varying between 15-55 years of age, after ruling out specific vaginal infection through wet vaginal smear, were selected for the study from the Out Patient Department of S.B.M. Ayu. College Hospital, Hassan, Karnataka (Table 1). 6 cases dropped out from the study. All the patients were subjected to yonipṛakṣāḷana (vaginal douching) for two consecutive days. Fresh bark of karañja (*Pongamia pinnata*) was collected from a nearby village and chopped into small pieces, washed and dried well under shade and preserved in airtight containers. The kaṣāya was prepared every day freshly according to standard kaṣāya preparation method and administered in the lukewarm condition.

Inclusion criteria

- Age between 15-50 years
- Excessive white discharge per vagina
- Itching sensation in vagina/vulva
- Duration of illness not more than 6 months
- Cases of non-specific leucorrhoea

Exclusion criteria

- Specific leucorrhoea
- Sexually transmitted diseases
- Pregnancy

TABLE 1

Incidence of age

Sl. No	Age-group	Patients	
		No	%
1	16-25	10	27.77
2	26-35	16	44.44
3	36-45	08	22.24
4	46-55	02	05.55
Total		36	100.00

- Anemia
- Carcinoma of cervix
- Cervical erosion
- Cervical fibroid
- Pelvic inflammatory disease
- Endometrial carcinoma
- Genital Tuberculosis
- Vulvo vaginitis

Assessment criteria

- Good Response:- 75% - 100% relief in presenting clinical symptoms & signs were seen
- Fair Response:- 50% - 75% relief in presenting clinical symptoms & signs were seen
- Poor Response:- 25% - 50% relief in presenting clinical symptoms & signs were seen
- No response: - Below 25% relief or no relief at all, in presenting clinical symptoms and signs were seen.

Parameters adopted and gradation:-

Parameters adopted	Gradation
• White discharge per vagina	
- Severe: Continuous, profuse discharge	30
- Moderate: Excess, on and off discharge	15
- Mild: Scanty white discharge	7
• Congestion of cervix	
- Severe: Congestion all around the cervix	20
- Moderate: Congestion over upper lip or lower lip of cervix	10
- Mild: Congestion around the os of cervix	5
• Pruritus	
- Severe: Intense itching in vagina/vulva	10
- Moderate: Itching limited to vagina/vulva	5
- Mild: Slight itching in vagina/vulva	2
• Low backache	
- Severe: Excruciating pain even on rest	10
- Moderate: Pain during work	5
- Mild: On and off slight pain	2

- Dysurea
  - Severe: Burning micturition always 10
  - Moderate: Frequent burning micturition 5
  - Mild: Occasional burning micturition 2
- Lower abdomen pain
  - Severe: Forced to take rest and analgesics 10
  - Moderate: Perform work with difficulty 5
  - Mild: Dull pain 2
- Pain in external genitalia
  - Severe: Continuous intense pain 10
  - Moderate: On and off intense pain 5
  - Mild: Occasional dull pain 2

Result

Analysis was done mainly on the basis of amount of white discharge, cervical congestion and pruritus. Important parameter considered for this study was WD P/V. Out of 30 cases, 7 (23.33%) had severe discharge and 22 (73.33%) showed moderate discharge. The discharge was stopped completely in 5 (16.68%) cases after the treatment; it reduced to mild degree in 20 (66.64%) cases (Table 2).

Before the treatment, cervical congestion, the second significant parameter, was severe in 2 (6.66%) cases, moderate congestion in 6 (20.00%) and mild in 19 (63.34%) cases. After the treatment congestion completely disappeared in 18 (60.00%) cases and in 8 (26.66%) cases mild congestion was noted moderate congestion remained in 4 (13.33%) cases (Table 2).

Pruritis, the third parameter observed was severe in 2 cases (6.66%), moderate in 28 (93.34%). After treatment a complete disappearance of pruritus was observed in 7 (23.34%) cases and in 18 (60.00%) cases it was reduced to mild grade (Table 2).

On assessment of overall parameters, good response was found in 4 (13.33%) cases, fair response in 13 (43.43%) and poor response in 8 (26.66%) cases were observed. 5 cases (16.68%) did not show any response (Table 3). On statistical analysis efficacy of this treatment is found highly significant (P<0.001) (Table 4)

Discussion

Karañja, a commonly growing plant all over India, is also considered as an alternative source to nimba (*Azadirachta indica*). With the limitations of modem medicine in non-specific leucorrhoea, it is imperative to consider alternate medicines. Studies have been conducted on triphala (*Terminalia chebula, Emblica officinalis* and *Terminalia bellirica*), pañcavalkala kvātha (barks of *Ficus religiosa, Ficus benghalensis, Ficus glomerata, Ficus*

TABLE 3

Results of the study

Sl. No	Response	No. of cases	Percentage
1.	Good	4	13.33
2.	Fair	13	43.33
3.	Poor	8	26.66
4.	No Response	5	16.68
	Total	30	100.00

TABLE 4

Statistical analysis of overall parametrs

Description	Before treatment	After treatment	Difference BT&AT
MGS	4835.05	6118.8	1283.75
SD	+ 12.91	+ 14.52	+ 1.61
SE	2.35	2.65	0.3
- t (paired ‘t’ test)			10.48
P			<0.001

TABLE 2

Status of various parameters before and after the treatment

Sl. No	Clinical features	Before treatment		After treatment	
		No. of cases	Percentage	No. of cases	Percentage
1	White discharge P/v				
	- Severe	07	23.33	02	6.68
	- Moderate	22	73.33	03	10.00
	- Mild	01	3.34	20	66.64
	- No discharge	0	0	05	16.68
2	Cervical congestion				
	- Severe	02	06.66	00	00.00
	- Moderate	06	20.00	04	13.34
	- Mild	19	63.34	08	26.66
	- No congestion	03	10.00	18	60.00
3	Pruritus				
	- Severe	02	6.66	01	03.33
	- Moderate	28	93.34	04	13.33
	- Mild	00	00.00	18	60.00
	- No pruritus	00	00.00	07	23.34

microcarpa and *Ficus arnottiana*) for vaginal douching, but karañja was selected for this study.

Karañja is having kaṭurasa (acrid in taste), uṣṇa vīrya (hot in potency), kapha-vātaghna (kapha-vāta alleviating), kṛmighna (anthalmintic), śothaghna (anti-inflammatory) and vedana-sthāpana (anodyne) as its properties and actions. Alcoholic and aqueous extracts of the fresh bark are reported to exhibit marked anti-bacterial activity against various anaerobic cocci like *Micrococcus pyogenes var. aureus*. The bark also showed positive tests for the presence of alkaloids and a triterpenaid saponin. On pharmacological screening it is found antibacterial. anthelmintic, antifungal and antipyretic.

A good improvement in the symptoms and signs was observed following 10 days of treatment. White discharge was effectively reduced and cervical congestion was also reduced in a large number of cases. This may be due to the astringent action of karañja. Disappearance of associated symptoms like pruritus, low backache and burning micturition was also observed. This might be due to the anti-pruritic (kaṇḍūghna), anthelmintic (kṛmighna) and anodyne (vedanasthāpana) effects of karañja. Its antibacterial effect might have definitely helped in combating infections. No side effects were noticed with karañja as local therapy including burning sensation and irritation.

Conclusion

It may be concluded from the above study that

yonikṣāḷana (vaginal douching) with karañja kaṣāya is an encouraging remedy in non-specific leucorrhoea.

- Effective results were found in the reduction of white discharge and pruritus
- It also shown significant action on cervical congestion
- By resolving the above symptoms an signs, it exhibits anti-bacterial property particularly on gram-positive cocci bacteria
- On statistical analysis of overall parameters its action is found highly significant ($p<0.001$)
- The study suggests positive effect and usefulness of the simple medicine viz. karañjakvātha-yonīkṣāḷana in non-specific leucorrhoea patients.

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CARE OF PREGNANT WOMAN - AN ĀYUṚVEDIC APPROACH

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Abstract: A pregnant woman needs more care because pregnancy is much more than just a physical condition. It encompasses the mind, spirit and creative being of a woman whose body is being 'altered' to accommodate the new life growing inside her. Āyuṛvedic classics elaborately discuss the dietary and behaviour regimen to be followed by a pregnant woman during all the nine months. This paper briefly deals with the diet and drugs, dos and don'ts, and some treatment procedures prescribed for pregnant women in the ayurvedic classics.

Introduction

Āyuṛveda is the science of life. Āyuṛvedic classics describe everything, may it be āhār (diet), vihār (behavior) or auṣadhi (medicine) that promotes 'āyu' (life). Our ācāryas give emphasis in following a specific routine according to the season and day i.e. ṛtucarya and dincarya respectively, for variation in dominance of doṣa occur according to season, day, time and age, and this specification is the hallmark of this system of medicine.

Almost all āyuṛvedic classics point out the importance of maintenance of health[1]. It can be achieved by the use of medicines, therapies or by non-pharmacological means like diet and behaviour. Gaṛbhiṇi or pregnant woman needs tender care as she is carrying a little life in her womb. So, only non-pharmacological methods should be used for gaṛbhiṇis. The physiological changes of pregnancy call for extra nutrients (micro and marco) and energy to meet the demands of an expanding blood supply for the growth of maternal tissues, a developing fetus, loss of maternal tissues, and the event of a birth.

Āyuṛvedic classics highlight that pregnant women should take congenial diet and adopt a proper mode of life, avoiding factors that are likely to harm the fetus, because the welfare of the mother and fetus are interrelated[2].

Almost all āyuṛvedic texts prescribe a particular diet and drug schedule for pregnant women (Table 1). They are mainly indented to provide adequate nourishment both for the mother and foetus. Some of the diets/drugs recommended for the pregnant woman include:

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TABLE 1

Few diet and drugs advised by different ācāryas

Month	Caraka	Suśṛuta	Vāgbhaṭa	Hārīta	Bheḷa
I	Non medicated milk[1]	Sweet, cold and liquid diet[2]	Ghṛta, sweet/cold liquids[3]	Madhuyaṣṭi, parūṣak and madhu[4]	-
II	Milk with some drugs of madhur group[1]	Sweet, cold and liquid diet[2]	Milk with some drugs of madhur group[3]	-	-
III	Honey, ghṛta and milk[1]	Sweet, cold and liquid diet[2]	Honey, ghṛta and milk[3]	-	-
IV	Butter extracted from milk[1]	Rice (ṣaṣṭi) with curd, pleasant food mixed with milk and butter, meat of wild animals[2]	Milk with butter[3]	Medicated cooked rice[4]	Milk with butter[5]
V	Ghṛta prepared with butter extracted from milk[1]	Rice (ṣaṣṭi) with milk, meat of wild animals, milk and ghṛta[2]	Ghṛta prepared with butter extracted from milk[3]	Payasa (rice cooked with milk and sweetened)[4]	Yavāgu (rice gruel)[5]
VI	Ghṛta medicated with drugs of madhur group[1]	Ghrita or rice gruel medicated with gokṣur[2]	Ghṛta medicated with drugs of madhur group[3]	Sweetened curd[4]	Ghṛta prepared with butter extracted from milk[5]
VII	Ghṛta medicated with drugs of madhur group[1]	Ghṛta medicated with pṛthakparṇi[2]	Ghṛta medicated with drugs of madhur group[3]	Ghṛta khand (a sweet dish)[4]	-
VIII	Rice gruel prepared in milk mixed with ghṛta[1]	Unctous gruel and meat soup of wild animals[2]	Rice gruel prepared in milk mixed with ghṛta[3]	Ghṛta purak (a sweet dish)[4]	-
IX	-	Unctuous gruel and meat soup of wild animals till delivery[2]	Meat soup with cooked rice and fat or gruel mixed with good quantity of fat[3]	Varieties of cereals[4]	Rice gruel[5]

1. Carakasamhita, Śārīrasthānam, 8/32
2. Suśṛutasamhita, Śārīrasthānam, 10/4; 3/6.
3. Aṣṭāṅga Samgraham, Śārīrasthānam 3/3-12
4. Hārītasamhita, Triosthānam 49/1-3
5. Bheḷa Samhita, Śārīrasthānam, 8/6-7

- Cold/sweet liquids, milk and honey: - As pregnant women usually suffer from nausea and vomiting in the 1st trimester, ingestion of these type of diets are preferred to supply the required nourishment and to prevent dehydration. Sweet liquids and honey provide the increased glucose demand during pregnancy. Milk, being a complete food, provides nourishment and stability to the fetus.
- Meat and pulses: - Additional protein is needed during pregnancy to cover the estimated 21 g/d deposited in the fetal, placental and maternal tissues during the 2nd and 3rd trimesters. Meat and pulses suppress vata, give protein supplementation needed for growth of the foetus and energy to the woman. W.H.O. suggests balanced protein energy supplementation within <25% calories in pregnant woman.
- Butter and ghee: - These give energy, make body unctuous and nourish the fetus. Woman requires higher energy in her body when pregnant to support the growth and development of the fetus, placenta and reproductive tissues such as the uterus and breasts. Additional energy leads to maternal fat storage and increase in metabolism that normally accompany gestation. The total outlay of energy can be divided into 3 parts viz. 1) the obligatory need of energy to be deposited in the products of conception, 2) maternal fat storage and 3) the extra energy needed for basal metabolism to maintain a newly synthesized tissue. The energy obtained from butter and ghee is mainly used during 1st trimester.
- Yavāgu, kṛsara: - These items, being light (laghu) in nature and easily digestible, are used in the 3rd trimester as digestive problems arise more in last trimester due to a gravid uterus.
- Intake of excessive food items may increase the body weight of the mother and fetus. Overeating is one of the causes of the pregnancy toxaemia. Overweight of fetus may cause difficulty in labour.
- Drugs of sweet group: - Drugs in this group are mild and safe for the fetus. 1st trimester is the period for embryogenesis and organogenesis. So, drugs prescribed in this period should be benign to prevent tetragenecity.
- Gokṣura and pṛthakparṇi: - Pregnancy-induced hypertension may occur in the 2nd trimester. The diuretic drugs of these types are prescribed in this trimester to relieve hypertension.

Apart from the diet and drugs, āyuṛveda advocates a behavioural regimen also to be followed by pregnant woman (Table 2). It is said that pregnant woman should follow certain behaviour for the betterment of the pregnancy, and avoid others that may negatively affect the health of both the mother and the child. Also, almost all ayurvedic classics describe certain procedures like vasti (medicated enema), picu (medicated tampon of oil) to be administered for pregnant woman (Table 3). Vasti is indicated for relieving constipation; it affects the autonomous nervous system governing myometrium and helps in regulating its function during labour. Administration of picu destroys

TABLE 2

Behavioural regimen prescribed for pregnant women by different ācāryas

Description	Reasoning
Dos:	
Use of clean white clothes and ornaments. (Su. Śā. 10/3)	Feeling of comfort and mental peace
Remains in high spirit, pious, perform religious rites, auspicious deeds and worship deity. (Su. Śā. 10/3)	Psychological relief
Sleeping and sitting place should be comfortable	Give comfort
Bathing with saṛvagandhodak i.e. cold decoction of all fragrant drugs (A.S. Śā. 3/14) or leaves of drugs capable of suppressing vāta (A.H. Śā. 1/68)	Good for hygienic point of view and aromatic too.
Don'ts:	
Exercise, coitus (Ca. Sū. 25/40; A.S. Sū. 13/2)	Though normal coitus and exercise is beneficial, their excessiveness is contra-indicated, for it consumes extra energy; it may also precipitate abortion.
Visit to cremation ground (Su. Śā. 10/3)	Sudden shock may produce abnormality, even abortion.
Prolonged stay in hot sun or near fire (A.S. Śā. 2/60-62	It may cause varicose veins. Blood return to heart may become improper. Increased temperature may cause dehydration and if occur early in pregnancy, may cause an abnormal baby.
Anger, grief, terror looking or hearing disliked things (Su. Śā. 10/3)	Psychological disturbances may occur.
Emesis, sudation, fasting, emaciation, indigestion (Y.R. Kṣirdoṣa Ci.)	Dehydration may occur. Fetus unable to get proper glucose supply. Emesis may precipitate abortion due to reflex stimulation of myometrium.
Trauma, falling in pits or wells, going to river bank, temple, garden (A.S. Śā. 2/60)	Temple are usually on high places, river banks are often slippery; so, fall or blow to the abdomen, specially after 1st trimester, is risk. Maternal injury is associated with fetal distress or rarely death due to premature separation of the placenta or premature labour.
Prolonged squatting, abnormal postures, supine position. (Su. Śā. 3/16, A. S. Śā. 2/60)	These may influence placental and uterine blood flow (due to pressure of gravid uterus on iliac vessels) thus cause abortion or intra uterine death of fetus.

TABLE 3

Few treatment procedures prescribed for pregnant women by different ācāryas

Ācāryas	VIII month of gestation	IX month of gestation
Caraka		Anuvāsana vasti and picu both with medicated drugs of madhur group. (Śā. 8/32)
Suśṛuta	Āsthāpana vasti (evacuative enema) with decoction of badari mixed with bala, atibala, śatapuṣpa, palala, milk, curd, mastu (sour butter), oil, salt, madanaphala, honey, ghṛta followed by anuvāsana vasti of oil (uncting enema) medicated with milk and decoction of drugs of madhur group.	
Vāgbhaṭa	Āsthāpana vasti with decoction of badari mixed with palala, milk, curd, mastu, oil, salt, madana phala, honey, ghṛta followed by anuvāsana vasti of oil medicated with milk and decoction of drugs of madhur group.	Picu medicated with drugs of madhur group. (Śā. 3/12)

the pathogenic bacteria of vaginal canal, and prevents puerperal sepsis; it softens the vaginal passage and peurpurial canal and thus helps in normal labour.

Conclusion

Pregnancy is much more than just a physical condition. It encompasses the mind, spirit and creative being of a woman whose body is being 'altered' to accommodate the new life growing inside. Keeping this view in mind our ācāryas prefer special regimens for pregnant woman. By following this regimen the woman gains strength and remains healthy, and the foetus attains good growth. Adhering to this regimen also helps to move vāyu in its right direction and delivers a child possessing good health, energy, strength and voice.

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ANTI-INFLAMMATORY ACTIVITY OF *CALOTROPIS GIGANTEA* LEAVES

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Abstract: Investigations were conducted to evaluate the anti-inflammatory activity of *Calotropis gigantea* leaves in the form of methanolic extract. The extract at oral doses of mg/kg produced significant reduction in carrageenan-induced rat paw oedema, comparable to the anti-inflammatory drug phenylbutazone.

Introduction

Calotropis gigantea (Asclepiadaceae) is regarded as one of the important medicinal plants in India. It is known as arka in Sanskrit, madār in Hindi and erukku in Malayalam. Its leaves are considered sacred since Vedic times in the worship of Sun God and Lord Ganesh. Different parts of the plant, including its milky secretion have been claimed to possess varied medicinal uses under the indigenous systems of medicine (Kirtikar and Basu, 1935; Nadkami, 1954; Chopra *et al*., 1956; Jain, 1991; Oudhia, 2001). The milkweeds have been claimed to be useful in treating skin diseases and healing of wounds and ulcers (Rasik *et al*., 1999; Begum and Nath, 2000). Very recently the plant is reported to possess analgesic and antipyretic activities (Chitme *et al*., 2004; Chitme *et al*., 2005). The present study pertains the evaluation of anti-inflammatory activity of methanol extract of *C. gigantea* against carrageenan-induced rat paw oedema.

Materials and methods

Fresh matured leaves in bulk were locally obtained from a single plant. The leaves were cleaned and shade-dried under a fan at room temperature. The dried leaves were ground into a fine powder with the help of an electrical grinder. The powder was processed to obtain methanol extract using Soxhlet's extraction.

Anti-inflammatory activity test was performed, using rat paw oedema model induced by phlogistic agent carrageenan, according to the method described by Winter *et al*. (1962). Thirty adult male albino rats, weighing between 125 and 150 gm, kept off feed for 16 hours with free access to drinking water, were selected for the study. The rats were randomly assigned to five groups, each containing six animals. The Ist Group animals served as control which received only the normal saline orally. The IInd Group rats were orally administered the reference anti-inflammatory drug phenylbutazone at a dose rate of 100 mg/kg.

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The animals in the other three groups (III, IV and V) were respectively administered the methanol extract orally at the dose rates of 100, 300 and 1000 mg/kg. The treatments in the five groups were given one hour before giving the phlogistic agent. Carrageenan, prepared as 1 percent suspension in sterile normal saline, was injected (0.1 ml) into the plantar aponeurosis of right hind paw of the rats with the help of a 26-gauze needle. The volume of the injected paw of each rat was measured immediately after carrageenan injection (0 hour) and subsequently after 3 hours; and the difference between volume of paw at 3 and 0 hours was adopted as a measure of the inflammatory response (oedema). The paw volume was measured by water displacement using a plethysmometer (Bhat *et al*., 1977). The percentage of inhibition of oedema was calculated from the difference in oedema volume between treated and control groups. Dunett's 't' test (Dunnett, 1955; 1964) was employed for statistical interpretation of the results.

Results and discussion

The normal right paw volume of the rats in all the five groups soon after the injection of the phlogistic agent carrageenan, varied between 0.55 + 0.038 and 0.70 + 0.075 ml, which was considered as the pretreatment observation (0 hour). After three hours of carrageenan injection, the paw volume in control (Group I) untreated rats was 1.27 + 0.150 ml as against 0.89 + 0.078 ml among the phenylbutazone dosed rats (Group II), and 0.97 + 0.066 to 1.15 + 0.101 ml in extract treated rats (Groups III, IV and V). The mean oedema volume of right paw oedema in the control group (I), phenylbutazone treated group (II) and extract treated groups (III to V) was 0.62 + 0.026, 0.18 + 0.024 and 0.27 + 0.018 to 0.49 + 0.029 ml respectively. The percent reduction in oedema volume in the four treatment groups was 70.96, 20.96, 40.30 and 58.06, respectively. (Table 1)

The reduction in rat-paw oedema volume was highly significant (P<0.001) with standard drug (Group II) and extract @ 1000 mg/kg (Group V) as compared to the oedema in untreated control rats (Group I). Similarly, the reduction in oedema among the rats dosed with 100 and 300 mg/kg of extract was also significant

TABLE 1

Effect of methanol extract of *Calotropis gigantea* leaf powder on carrageenan-induced rat paw oedema

Group No	Treatment	Dose (mg/kg)	Mean rat paw volume (ml) + SE			% decrease
			0 hour	3 hours*	Difference	
I	Normal saline + Carrageenan	-	0.77 + 0.057	1.27 + 0.150	0.62 + 0.026	-
II	Phenyl butazone + Carrageenan	100	0.70 + 0.075	0.89 + 0.078	0.18 + 0.024a	70.96
III	Normal saline + Extract	100	0.68 + 0.089	1.15 + 0.101	0.49 + 0.029b	20.96
IV	Normal saline + Extract	300	0.55 + 0.038	0.92 + 0.031	0.37 + 0.015c	40.30
V	Normal saline + Extract	1000	0.70 + 0.065	0.97 + 0.066	0.27 + 0.018a	58.06

* 3 hours after injection of carrageenan (0.1 ml SC in plantar aponeurosis of right hid paw)

a, b & c - Significantly different from Group I - (P < 0.001), (P < 0.05) and (P < 0.01) respectively.

($P<0.05$ or $P<0.01$), though lesser than that seen in rats which received 1000 mg/kg of the extract.

The above observations revealed dose-dependent anti-inflammatory effect of methanol extract of *C. gigantea* leaves against carrageenan-induced rat-paw. The present observation of anti-inflammatory effect of hot methanol extract of *C. gigantea* leaf powder validates the ethnomedicinal uses of *Calotropis* plants and is also supported by the reports of anti-inflammatory effects of aqueous extract of leaves (Jangade *et al*., 1994) and latex of *C. procera* (Majumder and Kumar, 1997).

Conclusion

The leaves of *Calotropis gigantea* may be of value in treating inflammatory affections.

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SNEHAKALPANA - A PROBABLE PHARMACEUTICAL EXPLANATION

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Abstract: Oleaginous preparation is one of the distinctive formulations in āyuṛveda. The snehakalpana can be defined as a pharmaceutical procedure to prepare oleaginous medicaments from the substances like kalka (paste of drugs), dravadravya (liquid material) in specific proportions by subjecting it to unique heating pattern and duration to fulfill certain pharmaceutical parameters, according to the need of therapeutics. It has been extensively used by physicians internally and externally and can be administered through all the routes of human body. The method of snehakalpana, the different procedures like mūṛcchana, āvaṛtana, the general process of preparation of sneha, etc. are explained in this article.

Introduction

The concept of health is not only physical health but mental and spiritual too. According to Suśṛuta, a person possessing the equilibrium of the tṛidoṣas, balanced condition of gastric fire and harmonious working of digestion, assimilation and elimination process, and the best mood of spirit, senses and mind is said to be in perfect health[1]. WHO also follows this concept. The definition of 'health' by WHO is 'health is a dynamic state of complete physical, mental, social and spiritual well being and not only absence of disease'.

The condition of health vitiates and we need one of the tṛividha cikitsa to bring back to normal stage. The yuktivyapāsṛaya (auṣadha cikitsa) plays a pivotal role to keep the physical stage balanced[2]. Medical advancement has to be judged largely by the richness in the variety as well as the quality of the pharmacopoeia and pharmacy. Different dosages are introduced to get better therapeutic efficacy to increase palatability, potency and shelf life. Amongst this, snehakalpana was used from vedic period in different forms.

The systemic description of preparation of snehadravyas is mentioned in various texts from the periods of Samhita and Saṅgraha onwards. Concept of mūṛcchana and āvaṛtana has given new dimension to snehakalpana, which shows its advancement and development.

Snehakalpana is extensively used by physicians, both internally and externally; it can be administered through all the routes of human

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body as per therapeutic needs. Oleaginous preparations is one of the distinctive formulations in āyurveda.

Literary review

The two words sneha and kalpana frame the wording 'snehakalpana'. A substance with heavy (guru), cold (śīta), free flowing (sāra), smooth (snigdha), liquid (drava), subtle (sūkṣma), soft (mṛdu) and slowly acting (manda) traits termed as snehadravya (oleaginous substances) whereas kalpana denotes the specific procedure to convert it into medicaments[3].

Ghee (ghṛta), oil (taila), muscle fat (vasā), bone marrow (majjā) are labeled as best oleaginous substances. However, ghee got the supreme position as it is having the trait of samskārasyānuvaṛtanam (the capacity to receive the properties of the drugs used without loosing its own identity)[4]. It acts on tṛidoṣa, the constituents of the body, by its qualities[5].

The snehakalpana may be defined as 'a pharmaceutical procedure to prepare oleaginous medicaments from the substances like kalka (paste of drugs), dravadravya (liquid material) in specific proportions by subjecting it to unique heating pattern and duration to fulfill certain pharmaceutical parameters, according to the need of therapeutics[6].

The snehakalpana process ensures transportation of the soluble active principles of the ingredients to the solvent media and hence to get fat soluble, water soluble or even the chemical constituents, which are soluble in media like kañji (sour gruel), buttermilk etc.; various solvent media like oil or ghee, water, milk, buttermilk etc. are used.

Mūṛcchana and āvaṛtanamūṛcchana

Yogaratnākara, a pioneer of the concept of mūṛcchana, refers to the details of tailamūṛcchana along with the proportion of drugs. Mūṛcchana of ghee, castor oil and mustard oil along with drug are described in Bhaiṣajyaratnāvali.

It is a special pharmaceutical procedure used for sneha before subjecting to snehapaka (actual procedure). In this process, sneha is treated with specific plant material along with water to overcome bad odour, impart good colour, to have good fragrance and āmadoṣaharatva (removal of impurities).

Removal of impurities enhances the potency of sneha and makes it more suitable to extract and assimilate active principles from the medicament. Specific plant material may alter the chemical composition of sneha, which may help in extraction of active principles. Acid value is found to be increased after mūṛcchana process, which may act as carrier of the active medicaments.

Necessity: -

Probably, the following reasons might have lead to invention of mūṛcchana:

- Water content leading to early rancidity
- Fungal growth
- Loss of odour
- Colouring
- Absorbability

This process is referred as refining of oil and is aimed at removing of free fatty acids, phosphatides, undesirable colour, moisture and solids from crude oil thereby alters the physical as well as chemical characteristics of the oil

base. One study shows that mūṛcchana alters the solubility pattern and absorbability, which is desired to get maximum medicinal properties.

Āvarṭana

The term āvaṛtana literally means 'repetition of process'. Sneha, after subjecting to the repeated process (pāka) with paste of drugs (kalka) and liquid (drava) is called as āvaṛtitasneha. Preparation of āvaṛtitasneha is found from the period Samhitas. There are numerical logos such as daśapāki (10 times processed), śatapāki (100 times processed), sahasṛapāki (1000 times processed) which denote how many times snehapāka is done.

Though loss in sneha is observed in the āvaṛtana process, dose of sneha get reduced after āvaṛtana, as sneha contains more active material in concentrated form.

Advantages: -

- Minimum dose
- Maximum therapeutic effect
- Early action
- Easy drug administration

Disadvantages: -

- Cost effect
- Time Factor
- Cautions handling

Method of snehakalpana

There are three essential components required for the preparation of sneha kalpana viz. 1. kalka (a paste of drug or drugs), 2. snehadravya (oleaginous material like ghee, oil, etc.) and 3. drava dravya (liquid material, which may be one or more, such as milk, decoction, fresh juice, meat juice, butter milk, etc.).

Preparation of sneha

First of all, oleaginous material has to be collected, then the paste and liquid material are added. The whole contents boiled together till the watery portion get evaporated and get siddhilakṣaṇa (properly cooked sneha - completion signs). The 3 stages of pāka, which are important for the completion viz. mṛdu, madhyama and khara, are to be done as per therapeutic indication. Generally, 1 part of the paste, 4 parts of oleginous material and 16 parts of water are to be taken where specific proportion is not mentioned.

There are other general rules regarding paste, liquid and oleaginous-material in different texts, which is summarized in Table (1)[7]

Snehasiddhilakṣaṇa (signs of completion)

The completion tests are different in different pāka condition. Snehapāka appears in different stages i.e. mṛdu, madhyam and khara. Ācārya Śāṛṅgadhara adds two more stages i.e. āmapāka, dagdhapāka. Observation in each stage of pāka is detailed in the Table 2.

Clinical uses of different pāka

Sneha preparations are administered through all the body routes. The clinical uses of different pāka and their therapeutic efficacy are described in Table 3.

Dose:-

- 1 Pala - Śāṛṅgadharasamhita
- Uttama - 1 pala
- Madhyama - 3 akṣa
- Hīna - ½ pala

} Cakṛapāṇi

Shelf life:-

- 16 months or
  4 months - Śāṛṅgadharasamhita

TABLE 1

General rules of preparation of sneha described in different texts

Description	Proportion
1. Proportion of kalka in accordance with nature of paste material:	
- Any part of plant except flower	¼ of sneha
- Flower	⅛ of sneha
- Flower of vāśā, kāñcanāra and aṛjuna	¼ of sneha
2. Proportion of kalka in accordance with nature of liquid media:	
- Water	¼ of sneha
- Kvātha (decoction)	⅙ of sneha
- Fresh juice, meat juice, buttermilk, milk, curd	⅛ of sneha
3. Proportion of liquids in accordance with nature of material:	
- Anukta - water	4 times to sneha
- Fresh juice/decoction	4 times to sneha
- Milk alone	4 times to sneha
- Milk and other liquids	Equal to sneha
- Cow's urine, curd	Equal to sneha
- Meat juice, sugarcane juice	½ to sneha
4. Proportion of liquids in accordance with number of liquids:	
- If 4 or less than 4 liquids are used	All liquids in equal but as a whole 4 times to sneha
- If more than 4 liquids are used	All liquids are taken in equal to sneha
5. Variation in duration of snehapāka	
Liquid materials:	Night
- Meat juice	1
- Milk	2
- Fresh Juice	3
- Buttermilk and decoction	5
- Gandhadravya - mūli, valli	12

- Pakva ghṛta - 1 year
- Pakva and apakva taila - more than 1 year — Vaṅgasena
- Deterioration occurs only in qualities produced during sneha pāka - Āḍhmalla

Modern aspect of oil and fats[8]

Functions

- Storage form of energy
- Structural components of bio-membranes
- Providing insulation against changes in external temperature
- Giving shape and contour to the body.
- Protecting internal organs by providing a cushioning effect
- Metabolic regulators
- Acting as emulgents, detergents, emulsifying agents.
- Acting as electric insulators in neurons
- Helping in absorption of fat-soluble vitamins A, D, E & K.
- Adding taste and palatability to food

Oils and fats are product from vegetable, animal, marine and mineral sources. Oils are liquid at 20°C and fats are in solid state at normal temperature. Natural fats are glycerides of saturated fatty acid (melt at higher temp.) or long chain fatty acids for which is solid and oils are glycerides unsaturated fatty acids or

TABLE 2

Observation in each stage of the pāka

Stage of pāka	Kalka	Taila
Āmapāka	• Water content persists (+) • Crackling sound on putting to the fire • Very soft in consistently	• Water content persists (++) • Heterogeneous media of water and oil • Crackling sound on putting to fire
Mṛdupāka	• Sticky on touch • Traces of water (+) • Crackling sound on putting to the fire	• Traces of water (+) • Crackling sound on putting to the fire
Madhyamapāka	• Not sticky • Free of water contents • Can be made into vaṛti when rolled between fingers	• Free from water contents • No crackling sound on putting to the fire • Froth appearance (oil) or subside (ghee) • Good colour/odour • Desired taste of drugs
Kharapāka	• Hard paste • Rough • Blackened • Water free	• Colour/odour may change
Dagdhapāka	• Burnt kalka • Rough, dry and black after charred • Burnt smell	• Essential contents of oil partially lost • Loss of colour/odour/taste

short chain glycerides for which it is liquid[9].

Physical properties[10]

- Fats and oils are solids or liquids having no colour or taste in pure state
- They are lighter and insoluble in water and therefore form upper layer when mixed with it
- They readily form emulsions when mixed with water in the presence of soap, gelatin or other emulsifier some time lipid itself as an emulsifying agent

Digestion of lipids[11]

The dietary lipids are emulsified by the peristaltic movements. The lingual lipase from the mouth enters stomach and acts on short chain triglycerides which are present in milk, ghee, coconut oil, etc. The gastric lipase, which is acid stable, is secreted by gastrin up to 30% digestion of triglycerides occurs in stomach. The pancreatic lipase cholesterol esterase and phospholipase A2, bile salts are important in the digestion of lipids. The bile salts present in the bile lower surface tension and helps in emulsification of fat droplets in the intestine.

Absorption of lipids[12]

The glycerol as well as small chain and medium chain fatty acids are directly absorbed from the intestinal lumen into the portal vein and taken to the liver and immediately utilized for energy. Long chain fatty acids are absorbed by forming micelle, facilitated by bile salts, is the perquisite for fat digestion and absorption from the intestine.

In the micellar form, the products of digestion of dietary lipids are presented for absorption at the microvillous surface of jejunal mucosa. Inside the intestinal mucosal cell, the long chain fatty acid is reesterified to form trigleceride. Short chain fatty acids do not need re-esterification and directly enter into blood vessels.

Discussion

The main sneha used in snehakalpana are cow's ghee and sesame oil. Cow's ghee has got supreme importance due to its samskārasyānu-varṭanata trait. And, it contains 8% lower saturated fatty acid, which make it easily

TABLE 3

Therapeutic efficacy of different pāka stage

Name of pāka	Carakasamhita	Suśṛutasamhita	Aṣtāṅgasamgraham	Sāṛṅgadharasamhita
Āmapāka	Not mentioned	Not mentioned	No use	No use
Mṛdupāka	Nasya	Pāna Bhojana	Nasya	Nasya
Madhayamapāka	Pāna Vasti	Nasya Abhyaṅga	Pāna Vasti	All
Kharapāka	Abhyaṅga	Vasti Karṇapūraṇa	Abhyaṅga	Abhyaṅga
Dagdhapāka	Not mentioned	To be prepared again	No use	No use

digestible and 4-5% linoleic acid, an essential fatty acid, which promotes proper growth of human body. Vitamin A & E, well established antioxidants, facilitates lipophilic action of ghee, transformation of necessary elements to a target organ and to the mitocondria, microsome and nuclear membrane. This is because cell membrane also contains lipid. Cow's ghee serves the maximum benefits of digestion, absorption and drug delivery to a target organ system while sesame oil is a mixture of compound of glycerides and fatty acids. The presence of the lignans imparts stability and protects the oil against oxidation. It also contains antioxidant principle 7-tocopherol, PUFA, vitamin E, Fat Nitrogen[13] (which may act as lowering the surface tension of water and acid in the emulsification and helps in the formation of lipid water mixture as a part of phospholipid).

The ingredients of snehakalpana comprise sneha (oleaginous material), kalka (paste) and drava (liquid). Water in the snehakalpana has a unique role in extraction of active principle to oleaginous material and also in the absorption of oil in the body.

The kalka material used in the snehakalpana have two fractions i.e. lipid soluble and water soluble; the active principle transfers from kalka to lipids and water respectively, may act as solid/liquid mass transformation phenomenon[14].

The macromolecule, which disrupts the normal structure of water (liquid) and forms water solute hydrogen bonds. After proper hydrogen bonding sites are distributed on the surface of macromolecules a structured zone of water exists at the macromolecule water interface.

Inert solutes, such as hydrocarbons and the nonpolar groups of compounds like fatty acids, and amino acid of kalka have a structure forming action, when introduced into water. Solutes of this nature situate themselves at the boundary of the bulky hydrogen bonded cluster of water molecules and thereby encourage the formation of the more extensive water to water hydrogen bonding. This causes the solute to become partly surrounded by water with a greater than normal amount of structure[15] while the lipid soluble part of kalka gets solubilized in the lipid.

The liquid/liquid mass transformation takes place during the transformation of water-soluble active principle to lipid[16]. The fatty acids formed are amphipathic in nature, which comprises of a hydrophobic exterior and hydrophilic interior. The water-soluble constituent of the kalka interacts with the hydrophilic end of the fatty acid and the oil soluble constituent interacts with the hydrophobic end. The amphipathic lipids get oriented at oil water interface with polar groups in water phase and non polar groups in the oil phase when a critical concentration of these amphipathic lipid is present in an aqueous media they from micelles[17].

When particles of a liquid or a solid are dispersed in a liquid, a number of attractive and repulsive forces are operative between them. The chief forces of attraction are the London forces which arise as a result of interaction between instantaneous dipoles in atoms formed due to electron motions. The forces of repulsion operative at large distances are the electrical forces resulting from interactions of diffuse double layers[18]. Hence

due to micellerisation the finished sneha may contain both oil-soluble and as well as water-soluble active principles.

At the initial stage of process, emulsion is made while mixing oil and water together. The particular ingredients of murcchana dravya for cow's ghee, tila taila, ēraṇḍa taila and saṛṣapa taila have specific action on sneha (lipids) and water. Mixing of lipid and water makes unstable emulsion. To make stable emulsion, conduction and convection heating and emulsifying agents like surfactant may be added. It may be said the ingredients used for mūṛcchana can work as surfactants, which are the best emulsifier. The emulgent materials tend to accumulate at the oil water interface. Surfactants are adsorbed as monomolecular films, while hydrocolloids and finely divided solids act mainly by high viscosities at the oil water interface. Closer distances, the absorbed films of surfactants or other substances may prove to be mechanical barriers[19].

Due to the mechanical barrier of surfactants (ingredients of mūṛcchana dravya), the bond between lipid and water become strong and suppose water in oil type of emulsion is made.

The maximum surface area provided for the active constituents of the formulation may lead in to maximum bio-availability of the drugs in its shortest duration. This technique may help:

- Enhance the drug absorption
- Drug distribution
- Delayed excretion

The reason behind why the oil becomes solid after āvaṛtana may be unsaturated fatty acids converted to the corresponding saturated fatty acids by hydrogenation of the double bond[20]. Due to the repeated heating, there are chances the formation and polymerisation of cyclic hydrocarbons, but in āvaṛtana process every time fresh liquid is added, may be to overcome of this process[21].

Conclusion

On the basis of references and discussions made in this paper, we may conclude that the process mūṛcchana snehapāka and āvaṛtana play an important role to increase stability and therapeutic effectiveness of sneha. It also seems that these processes are very rational and scientific. We invite the attention of researchers to work in this direction to explore the pharmaceutical and therapeutic validity of products of snehakalpana by applying advanced analytical and clinical techniques.

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(सु. सू. १५/४४)

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घृतं तुल्यगुणं दोषं संस्कारात्तु जयेत् कफम् ।।
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EXCERPTS FROM CIKITSĀMAÑJARI - LIII

P. Unnikrishnan*

Abstract: The treatments for obesity, slimness and insomnia are explained in this chapter.

TREATMENT OF STHŪLA (OBESE)

Obese individuals should consume food that pacifies vāta, reduces kapha and medas (fat tissue), such as khalva (*Macrotyloma uniflorum*), mudga (*Vigna radiata*), yava (*Hordeum vulgare*) etc. Thinking, sexual union, exercise, purificatory measures like vomiting and purging, keeping awake, dry udvaṛtana (vigorous rubbing against the direction of hairs), consumption of fats that do not cause burning, etc. are recommended. Consumption of mantha (sour gruel) prepared from the following mixed with water treated with fine powder of iron is advised.

Kṛmighna	*Embelia ribes*
Tṛiphala	*Terminalia chebula* *Emblica officinalis* *Terminalia bellirica*
Taila	Sesame oil
Saktu	Nocake powder
Cukku	*Zingiber officinale*
Kurumuḷaku	*Piper nigrum*
Tippali	*Piper longum*
Dīpyaka	*Trachyspermum ammi*

Consumption of a kaṣāya prepared from urukkupoṭi (iron powder) and kariṅgāli (*Acacia catechu*) mixed with the fine powders of the above drugs is effective (Sesame oil can be mixed as additive). Those who can't bear oil may use honey in its place.

Fine powder of tṛiphala fortified in the kaṣāya prepared from khadira (*Acacia catechu*) and asana (*Pterocarpus marsupium*) mixed with honey shall be licked for the relief of ailments caused by obesity.

Intake of a kañji prepared with the kaṣāya of khadira, mudga and laja (parched rice) relieves diseases like prameha (diabetes) caused secondary to obesity.

Doing udvaṛtana (a type of massage where fine powder of drugs are rubbed vigorously on the body) every day with the fine powders of the drugs of ēlādigaṇa (A.H. Sū. 15) and the following is effectual.

Nālpāmaram	*Ficus racemosa* *Ficus microcarpa* *Ficus religiosa* *Ficus benghalensis*
Varaṭṭumañjaḷ	*Curcuma longa*

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Pṛabhañjanavimaṛdanam shall be applied on the body. Those who are obese should consume these medications for the prevention of diabetes. Intake of medicated water prepared from fine powders of cukku and kariṅgāli reduced to half, is very effective.

Those who are obese should consume sesame oil in the morning or a kaṣāya prepared from asanasāra (*Pterocarpus marsupium*) to which, a small quantity of honey is to be added.

The following powder mixed with honey relieves all illnesses associated with obesity:

Viḍaṅga	*Embelia ribes*
Nāgara	*Zingiber officinale*
Kṣāra	*Potassi carbonas*
Kālalohārāja	Iron powder
Yava	*Hordeum vulgare*
Āmalakacūṛṇa	*Emblica officinalis* (powder)

Kariṅgāli is very effective in the conditions where medus (fat) is increased.

TREATMENT OF KṚŚA (SLIM)

Application of a paste of ñjavara (*Oryza sativa*) rice, Lākṣādi kuzhampu or Balāśvagandhādi taila on the body, Āṛukālādi medicated oil or Tuṅgadrumādi oil on the head or suitable medicated oils on the body, and consumption of Svāducatuṣka (Cross. ref. Tṛṣṇācikitsa, Aryavaidyan, Vol. VII. 1), medicated ghee relieves the slim and facilitates gaining of weight.

Consumption of the fine powder of aśvagandha (*Withania somnifera*) with milk, medicated ghee, sesame oil or warm water promotes weight like the rain boosting the growth of plants. Consumption of one pṛakuñca (48 g) of sesame seeds once a day followed with water, also promotes weight gain.

A decoction of koṭuttūva (*Tragia involucrata*) boiled in milk and reduced to ¼ may be taken in the morning with amukkura cūṛṇam (powder of *Withania somnifera*) and sugar. The dose should be uzhakku (48 ml). The drugs which are palatable like vidārika (*Pueraria tuberosa*), payasyā (*Ipomoea mauritiana*), etc. can also be taken.

Intake of fishes, meats, milk and medicated ghee is recommended. Immersion in water, edibles prepared from jaggery and khaṇḍa (sugar candy) can be taken. Female friends who are very likable, more wealth, etc. can also promote weight.

There is nothing as effective as meat that promotes weight, especially of the animals that are carnivorous as their flesh is accumulated from the flesh of other animals.

Intake of chicken cooked without salt for twenty-one days is effective. Consumption of Vidāryādi kaṣāya is advised. Consumption of rock salt and butter in the evening, a kaṣāya prepared from aṭapotiyankizhaṅgu (*Holostemma ada-koedien*) is also effectual.

While taking drugs for weight gain, it has to be seen that no indigestion, intestinal disorders, piles or diarrhea supervenes. An overdose of medicines may precipitate these ailments.

Long last fasting, walking long distances, excessive talking or thinking may reduce the body weight. One who desires weight gain shall consume milk or meat soup with payasyā (*Ipomoea mauritiana*).

TREATMENT OF MANDANIDRA (INSOMNIA)

Drink milk in the evening. The following measures also bring undisturbed and sound sleep. Irrigation with milk on the head,

application of a paste prepared with butter and milk on the vertex, consumption of milk concentrated by boiling in the night, application of medicated oils such as Tuṅgadrumādi or Āṛukālādi prepared with the addition of a small quantity of ghee on the head, nasya (nasal medication) with breast milk in the evening, application of a mixture of sesame oil and ghee on the body, external application of medicated oils such as Lākṣādi Kuzhampu or Piṇḍatailam.

Prepare a paste with the fruits of kataka (*Strychnos potatorum*) in breast milk and spread it over a thin cotton cloth; make a wick with this soaked in ghee. Burn the wick and collect the soot in a bronze vessel. Application of this on the eyes as collyrium provides good sleep.

A kaṣāya prepared from 1 niṣka (3 g) each of viṣṇukṛānti (*Evolvulus alsiniodes*, roots) and cukku added with half pala (24 g) of milk, on consumption prevents excessive sleep and clears functions of the brain.

Root bark of kūvaḷam (*Aegle marmelos*) ground to a paste with buttermilk and cooked, on consumption for three consecutive days, relieves insomnia.

Application of the root bark powder of kūvaḷam mixed with butter on the soles is effective. Intake of milk, sugarcane juice, meat soup, śāli (a type of cereal), alcoholic beverages, black gram, kīlāṭa (de fatted buttermilk added with a little milk and kept overnight) and curd prepared from buffalo milk are recommended for those who suffer from light sleep. Application of oil on the body, rubbing body vigorously against the direction of hairs, taking bath, śirovasti, netṛatarpaṇa, immersion of feet in oil or ghee, consumption of ghee along with cow's milk, and intake of a kaṣāya prepared from drugs of the Jīvantyādi group provides sound sleep.

Intake of kañji (sour gruel) added with buffalo-milk is advised. Drinking and irrigation on the head with the milk of buffalo is also good. Medicated oil for application on the head is to be prepared added with buffalo milk.

Consume a kaṣāya prepared with iraṭṭi-madhuram (*Glycyrrhiza glabra*) and roots of aṭapotiyan (*Holostemma ada-koedien*) after supper. Wash the soles and apply butter liberally in the night. Irrigation with the combination of ghee and sesame oil on the soles; rubbing the soles with this is also effective.

Buffalo milk is the best medicine for insomnia.