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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 - LXXVII

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Abstract: Features of death predicting symptoms continue. Here, features based on chayaristam (complexion/lustre), kriyaristam (physical activities), symptoms of time-bound death and rogaristam (manifestation of major diseases) are explained.

Chāyāriṣṭam

संस्थानेन प्रमाणेन वर्णेन प्रभयाऽपि वा ।। ४१ ।।
छाया विवर्तते यस्य स्वप्नेऽपि प्रेत एव सः ।

(saṁsthānena pramāṇena
varṇena prabhayāऽpi vā ।। 41 ।।
Chāyā vivartate yasya
svapneऽpi preta eva saḥ ।)

If the chāya (feature) of a person is seen distorted either in shape, size, colour or in lustre, he is to be recognized as dead even in sleep.

Note: Chāya is a particular feature of the body notable by its appearance. It is not mere colour or lustre of the body (skin). It is different and unique in each and every person. The chāya of a person can be noted by four features viz. shape, size, colour and lustre. Chāya in general, is a dependant feature of our body. It appears to others in the above-mentioned four ways. Of these, shadow or the reflected image of a person is called praticchāya, which is explained now.

आतपादर्शतोयादौ या संस्थानप्रमाणतः ।। ४२ ।।
छायाऽङ्गात्सम्भवत्युक्ता प्रतिच्छायेति सा पुनः ।
वर्णप्रभाश्रया या तु सा छायैव शरीरगा ।। ४३ ।।

(ātapādarśatoyādau
yā saṁsthānapramāṇataḥ ।। 42 ।।
Chāyāऽṅgātsambhavatyuktā
praticchāyeti sā punaḥ ।
varṇaprabhāśrayā yā tu
sā chāyaiva śarīragā ।। 43 ।।)

The chāya that appears in the sunlight (shadow) and reflects in mirror, water, etc. in accordance with the shape and size of the body is termed as praticchāya. Apart from it, the chāya depending upon the colour and lustre of a particular person is termed as chāya of that particular body (śarīracchāya).

Note: Pratichāya is shadow or reflection, which usually resembles the body, its shape and size. Colour and lustre are not concerned with it. But all the four features i.e., size, shape, colour and lustre are concerned with chāya.

भवेद्यस्य प्रतिच्छाया छिन्ना भिन्नाऽधिकाऽऽकुला ।
विशिरा द्विशिरा जिह्मा विकृता यदि वाऽन्यथा ।। ४४ ।।
तं समाप्तयुषं विद्यान्न चेल्लक्ष्यनिमित्तजा ।
प्रतिच्छायामयी यस्य न चाक्ष्णीक्ष्येत कन्यका ।। ४५ ।।

(Bhavedyasya praticchāyā
chinnā bhinnāऽdhikāऽऽkulā ।

*"Amṛtālayam", Thozhupadam (PO), Chelakkara (Via), Thrissur - 680 586, Kerala

viśirā dviśirā jihmā
vikṛtā yadi vāऽnyathā ॥ 44 ॥
Taṁ samāptayuṣaṁ vidyānna
cellakṣyanimittajā ।
praticchāyāmayī yasya
na cākṣṇīkṣyeta kanyakā ॥ 45 ॥)

A person is said to be nearing death if his shadow is cut, torn, large, hazy, non-headed, double-headed, irregular, distorted or abnormal (in any sense) without specific causes. Non-percipiency of kumārika in one's eye is also a sign of nearing death.

Note: Kumārika or kanyaka is the reflection of a person seen in the pupil of the confronting person.

खादीनां पञ्च पञ्चानां छाया विविधलक्षणाः ।
नाभसी निर्मलाऽऽनीला सस्नेहा सप्रभेव च ॥ ४६ ॥
वाताद्रजोऽरुणा श्यावा भस्मरूक्षा हतप्रभा ।
विशुद्धरक्ता त्वाग्नेयी दीप्ताभा दर्शनप्रिया ॥ ४७ ॥
शुद्धवैडूर्यविमला सुस्निग्धा तोयजा सुखा ।
स्थिरा स्निग्धा घना शुद्धा श्यामा श्वेता च पार्थिवी ४८ ॥
वायवी रोगमरणक्लेशायान्याः सुखोदयाः ।
प्रभोक्ता तैजसी सर्वा, सा तु सप्तविधा स्मृता ॥ ४९ ॥

(Khādīnāṁ pañca pañcānāṁ
chāyā vividhalakṣaṇāḥ ।
nābhasī nirmalāऽऽnīlā
sasnehā saprabheva ca ॥ 46 ॥
Vātādrajoऽruṇā śyāvā
bhasmarūkṣā hataprabhā ।
viśuddharaktā tvāgneyī
dīptābhā darśanapriyā ॥ 47 ॥
Śuddhavaiḍūryavimalā
susnigdhā toyajā sukhā ।
sthirā snigdhā ghanā śuddhā
śyāmā śvetā ca pārthivī ॥ 48 ॥
Vāyavī rogamaraṇa-
kḷeśāyānyāḥ sukhodayāḥ ।
prabhoktā taijasī sarvā,
sā tu saptavidhā smṛtā ॥ 49 ॥)

There are five different types of chāya to the five great elements (Pañcamahābhūta), each possessing different characters. Of these, chāya of ākāśabhūta is transparent, light blue in hue, looks unctuous and radiant. Chāya of vāyumahābhūta looks dusty, rubescent, rough as ash and non-radiant. Agnimahābhūta's chāya is blood red in colour, glistening and pleasant to look. Chāya of jalamahābhūta is pure vaiḍūrya (agate) coloured, unctuous-looking and good looking, whereas chāya of pṛthvimahābhūta looks stable, unctuous, thick, transparent either slightly black or white. Among these five, chāya of vāyumahābhūta indicates diseases, death or miseries while the other four indicate good-health.

रक्ता पीता सिता श्यावा हरिता पाण्डुराऽसिता ।
तासां याः स्युर्विकासिन्यः स्निग्धाश्च विमलाश्च याः ५०
ताः शुभा, मलिना रूक्षाः सङ्क्लिष्टाश्चाशुभोदयाः ।
वर्णमाक्रामति छाया प्रभा वर्णप्रकाशिनी ॥ ५१ ॥

(Raktā pītā sitā śyāvā
haritā pāṇḍurāऽsitā ।
tāsāṁ yāḥ syurvikāsinyaḥ
snigdhāśca vimalāśca yāḥ ॥ 50 ॥
Tāḥ śubhā, malinā rūkṣāḥ
saṅkṣiptāścāśubhodayāḥ ।
varṇamākrāmati chāyā
prabhā varṇaprakāśinī ॥ 51 ॥)

Prabha (the radiance) feature is typical of agnimahābhūta and it is of 7 types viz. red, yellow, black, slightly black, green, grey and white. The diffusive, unctuous and transparent radiances are the harbingers of good health

while that which are dirty, dry and constricting are of misery.

आसन्ने लक्ष्यते छाया विकृष्टे भा प्रकाशते ।
नाच्छायो नाप्रभ: कश्चिद्विशेषाश्चिह्नयन्ति तु ।। ५२ ।।
नृणां शुभाशुभोत्पत्ति काले छायासमाश्रया: ।

(Āsanne lakṣyate chāyā
vikṛṣṭe bhā prakāśate ।
nācchāyo nāprabha: kaści-
dviśeṣāścihnayanti tu ।। 52 ।।
Nṛṇāṁ śubhāśubhotpatti
kāle chāyāsamāśrayā: ।)

Chāya masks one's colour whereas prabha (radiance) brightens it. Likewise, chāya is noticeable only from a short distance, whereas prabha is noticeable even from a distance. Nobody is here without chāya or prabha. The fluctuations in the chāya point out the causes of good and bad aspects of health.

Note: Both chāya and prabha are certain features in connection with the colour of body. Chāya is a general bodily feature as discussed previously and is perceived by shape, size, colour or complexion. Comparing with chāya, prabha is a minor feature that enlightens ones body-colour and is distinguished even from a distance. Though chāya is perceived by shape, colour, etc., it does not brighten or enlighten the body-colour. On the contrary, chāya appears to be more powerful than colour, distinguishable on nearing a person. Even if slight changes occur in the bodily colour of a man, chāya remains unique. A family physician can easily distinguish the changes in one's chāya and can foresee his health-related aspects both positive and negative.

Kṛiyāriṣṭam

निकषन्निव य: पादौ च्युतांस: परिसर्पति ।। ५३ ।।
हीयते बलत: शश्वद्योऽन्नमश्नन् हितं बहु ।
योऽल्पाशी बहुविण्मूत्रो बह्वाशी चाल्पमूत्रविट् ।। ५४ ।।
यो वाऽल्पाशी कफेनार्तो दीर्घं श्वसिति चेष्टते ।
दीर्घमुच्छ्वस्य यो ह्रस्वं नि:श्वस्य परिताम्यति ।। ५५ ।।
ह्रस्वं च य: प्रश्वसिति व्याविद्धं स्पन्दते भृशम् ।
शिरो विक्षिपते कृच्छ्राद्योऽञ्चयित्वा प्रपाणिकौ ।। ५६ ।।
यो ललाटात्स्रुतस्वेद: श्लथसन्धानबन्धन: ।
उत्थाप्यमान: सम्मुह्येद्यो बली दुर्बलोऽपि वा ।। ५७ ।।
उत्तान एव स्वपिति य: पादौ विकरोति च ।
शयनासनकुड्यादेर्योऽसदेव जिघृक्षति ।। ५८ ।।
अहास्यहासी सम्मुह्यान् यो लेढि दशनच्छदौ ।
उत्तरौष्ठं परिलिहन् फूत्कारांश्च करोति य: ।। ५९ ।।
यमभिद्रवति च्छाया कृष्णा पीताऽरुणाऽपि वा ।
भिषग्भेषजपानान्नगुरुमित्रद्विषश्च ये ।। ६० ।।
वशगा: सर्व एवैते विज्ञेया: समवर्तित: ।

(nikaṣanniva ya: pādau
cyutāṁsa: parisarpati ।। 53 ।।
Hīyate balata: śaśvadyoऽ-
nnamaśnan hitaṁ bahu ।
yoऽlpāśī bahuviṇmūtro
bahvāśī cālpamūtraviṭ ।। 54 ।।
Yo vāऽlpāśī kaphenārto
dīrghaṁ śvasiti ceṣṭate ।
dīrghamucchvsya yo hrasvaṁ
ni:śvasya paritāmyati ।। 55 ।।
Hrasvaṁ ca ya: praśvasiti
vyāviddhaṁ spandate bhṛśam ।
śiro vikṣipate kṛcchrād-
yoऽñcayitvā prapāṇikau ।। 56 ।।
Yo lalāṭātsrutasveda:
śḷathasandhānabandhana: ।
utthāpyamāna: sammuhyedyo
balī durbaloऽpi vā ।। 57 ।।
Uttāna eva svapiti ya:
pādau vikaroti ca ।
śayanāsanakuḍyāderyoऽ-

sadeva jighṛkṣati ।। 58 ।।
Ahāsyahāsī sammuhyān
yo leḍhi daśanacchadau ।
uttarauṣṭhaṁ parilihan
phūtkārāṁśca karoti ya: ।। 59 ।।
Yamabhidravati cchāyā
kṛṣṇā pītāऽruṇāऽpi vā ।
bhiṣagbheṣajapānānna-
gurumitradviṣaśca ye ।। 60 ।।
Vaśagā: sarva evaite
vijñeyā: samavartita: ।)

One, who - walks dragging his feet on the ground with drooping shoulders; feels weak/fatigued on sufficient consumption of wholesome food; less food intake with a very high output of urine and faeces and vice versa; eats more but produces less quantity of urine and faeces; person affected with mucus inside inhales long and show certain abnormal activities; inspires short and expels the air less and faints; exhales shortly while his chest throbs in an irregular rhythm; shivers head drastically when tries to hold back both the forehands; trickle sweat from the forehead and loosening joints; physically either strong or weak, faints down while trying to stand up; having irregular movements of the legs while sleeping in supine position; tries to pick up something that is in absentia on the coat, seat or wall;faints laughing inappropriately and trying to lick both the lips; makes 'pooh' sound while licking upper lip; confronts chāya of black, yellow or rose colour; hates and scolds physician, medicine, drinks, food materials, respectful persons and relatives - is to be considered as attacked by death in short time.

(ग्रीवाललाटहृदयं यस्य स्विद्यति शीतळम् ।। ६१ ।।
उष्णोऽपर: प्रदेशश्च शरणं तस्य देवता: ।)
[पूर्वरूपाणि सर्वाणि ज्वरादिष्वतिमात्राया ।
यं विशंति विशत्येनं मृत्युर्ज्वरपुर: सर: ।। १ ।।]
येऽणुज्योतिरनेकाग्रो दु:च्छायो दुर्मना: सदा ।। ६२ ।।
बलिं बलिभृतो यस्य प्रणीतं नोपभुञ्जते ।
निर्निमित्तं च यो मेधां शोभामुपचयं श्रियम् ।। ६३ ।।
प्राप्नोत्यतो वा विभ्रंशं स प्राप्नोति यमक्षयम् ।

((grīvālalāṭahṛdayaṁ
yasya svidyati śītaḷam ।। 61 ।।
Uṣṇoऽpara: pradeśaśca
śaraṇaṁ tasya devatā: ।)
[Pūrvarūpāṇi sarvāṇi
jvarādiṣvatimātrāyā ।
yaṁ viśanti viśatyenaṁ
mṛtyurjvarapura: sara: ।। 1 ।।]
yeऽṇujyotiranekāgro
du:cchāyo durmanā: sadā ।। 62 ।।
baliṁ balibhṛto yasya
praṇītaṁ nopabhuñjate ।
nirnimittaṁ ca yo medhāṁ
śobhāmupacayaṁ śriyam ।। 63 ।।
Prāpnotyato vā vibhraṁśaṁ
sa prāpnoti yamakṣayam ।)

Gods only can protect him, whose neck, forehead and chest are cold with sweat while other body-parts are hot to touch. A person who is with diminished valour, a perplexed mind, associated with abnormal chāya, full of negative thoughts; whose sacrificial offerings are not taken by the crows; who achieves or loses grasping power, lustre, body-nourishment or wealth, will die shortly.

Prediction of time-bound death

गुणदोषमयी यस्य स्वस्थस्य व्याधितस्य वा ।। ६४ ।।
यात्यन्यथात्वं प्रकृति: षण्मासान्न स जीवति ।

(guṇadoṣamayī yasya sva-
sthasya vyādhitasya vā ।। 64 ।।
Yātyanyathātvaṁ prakṛti:
ṣaṇmāsānna sa jīvati ।)

One, whose guṇaprakṛti (sāttvika, rājasa or tāmasa) or doṣaprakṛti (vāta, pitta or kapha) shows abnormal characteristic features, he is to die within a period of six months.

भक्ति: शीलं स्मृतिस्त्यागो बुद्धिर्बलमहेतुकम् ।। ६५ ।।
षडेतानि निवर्तन्ते षड्भिर्मासैर्मरिष्यत: ।
मत्तवद्गतिवाक्कम्पमोहा मासान्मरिष्यत: ।। ६६ ।।

(bhakti: śīlaṁ smṛtistyāgo
buddhirbalamahetukam ।। 65 ।।
Ṣaḍetāni nivartante
ṣaḍbhirmāsairmariṣyata: ।
mattavadgativākkampa-
mohā māsānmariṣyata: ।। 66 ।।)

Six qualities viz. individual interest, behaviour, memory, charitable nature, intelligence and physical strength disappear from one who is succumbed to death within six months. A person who is to die within one month will show the gait, speech, tremor and unconsciousness as those of an intoxicated person.

नश्यत्यजानन् षडहात्केशलुञ्चनवेदनाम् ।
न याति यस्य चाहार: कण्ठं कण्ठामयादृते ।। ६७ ।।
प्रेष्या: प्रतीपतां यान्ति प्रेताकृतिरुदीर्यते ।
यस्य निद्रा भवेन्नित्या नैव वा न स जीवति ।। ६८ ।।

(naśyatyajānan ṣaḍahāt-
keśaluñcanavedanām ।
na yāti yasya cāhāra:
kaṇṭhaṁ kaṇṭhāmayādṛte ।। 67 ।।
preṣyā: pratīpatāṁ yānti
pretākṛtirudīryate ।
yasya nidrā bhavennityā
naiva vā na sa jīvati ।। 68 ।।)

One does not understand the pain when his hair is plucked; this is an indication of his death within six months. Normal persons, who are unable to swallow food, also belong to this very same category. Contemptuous behaviour of attendants like disciples, servants, etc., manifestation of features as those of a cadaver, sleep always or does not sleep at all - all these are suggestive of sudden death.

वक्त्रमापूर्यतेऽश्रूणां स्विद्यतश्चरणौ भृशम् ।
चक्षुश्चाकुलतां याति यमराज्यं गमिष्यत: ।। ६९ ।।
यै: पुरा रमते भावैररतिस्तैर्न जीवति ।

(vaktramāpūryate'śrūṇāṁ
svidyataścaraṇau bhṛśam ।
cakṣuścākulatāṁ yāti
yamarājyaṁ gamiṣyata: ।। 69 ।।
yai: purā ramate bhāvair-
aratistairna jīvati ।)

For a dying person, tears will be filled inside the mouth, both the legs sweat profusely and the eyes will be troubled. When one gets irritated with the same subjects those were relished by him previously, is also an indication of sudden death.

Rogariṣṭam

सहसा जायते यस्य विकार: सर्वलक्षण: ।। ७० ।।
निवर्तते वा सहसा सहसा स विनश्यति ।

(sahasā jāyate yasya
vikāra: sarvalakṣaṇa: ।। 70 ।।
Nivartate vā sahasā
sahasā sa vinaśyati ।)

One, in whom either a disease appears suddenly manifesting all signs and symptoms or such an existing disease disappears spontaneously, would die soon.

Note: A detailed illustration of the riṣṭa signs and symptoms and the fatal stages of all major ailments are given here to make one aware of these in order to distinguish and avoid them. Detailing of major diseases starting from jvara

(fever) to bhagandara (fistula-in-ano) is given as follows.

ज्वरो निहन्ति बलवान् गम्भीरो दैर्घरात्रिक: ।। ७१ ।।
सप्रलापभ्रमश्वास: क्षीणं शून्नं हतानलम् ।
अक्षामं सक्तवचनं रक्ताक्षं हृदि शूलिनम् ।। ७२ ।।
सशुष्ककास: पूर्वाह्णे योऽपराह्णेऽपि वा भवेत् ।
बलमांसविहीनस्य श्लेष्मकाससमन्वित: ।। ७३ ।।

(jvaro nihanti balavān
gambhīro dairgharātrika: ।। 71 ।।
Sapralāpabhramaśvāsa:
kṣīṇaṁ śūnaṁ hatānalam ।
akṣāmaṁ saktavacanaṁ
raktākṣaṁ hṛdi śūlinam ।। 72 ।।
Saśuṣkakāsa: pūrvāhṇe
yoऽparāhṇeऽpi vā bhavet ।
balamāṁsavihīnasya
śleṣmakāsasamanvita: ।। 73 ।।)

Jvara, which is powerful (means manifested associated with all prodromal symptoms and major characteristic symptoms, etc.), deep-seated (afflicting all dhātus) and persistent, leads to the death of a patient who is with delirium, vertigo and dyspnoea. The patient will be emaciated or with swelling all over the body associated with diminished digestive power. Incase of a non-emaciated patient, speech will be obstructed, the eyes red and the heart area painful. The fever may appear in the morning or in the evening along with a dry cough. But in the case of a patient with meager physical strength and muscle tone, fever will attack producing a productive cough.

Note: Here the symptoms, starting from delirium, etc. are the complications (termed upadrava in āyurvedic texts) of jvara that make the disease more complicated and fatal during the last stage.

रक्तपित्तं भृशं रक्तं कृष्णमिन्द्रधनुष्प्रभम् ।
ताम्रहारिद्रहरितं रूपं रक्तं प्रदर्शयेत् ।। ७४ ।।
रोमकूपप्रविसृतं कण्ठास्यहृदये सजत् ।
वाससो रञ्जनं पूति वेगवच्चाति भूरि च ।। ७५ ।।
वृद्धं पाण्डुज्वरच्छर्दिकासशेफातिसारिणम् ।

(raktapittaṁ bhṛśaṁ raktaṁ
kṛṣṇamindradhanuṣprabham ।
tāmrahāridraharitaṁ
rūpaṁ raktaṁ pradarśayet ।। 74 ।।
romakūpapravisṛtaṁ
kaṇṭhāsyahṛdaye sajat ।
vāsaso rañjanaṁ pūti
vegavaccāti bhūri ca ।। 75 ।।
vṛddhaṁ pāṇḍujvaracchardi-
kāsaśephātisāriṇam ।)

The disease raktapitta shows characters in its fatal condition such as bleeding of bright red, black, multi-coloured like rainbow, copper coloured, yellow or green coloured blood even through hair follicles. Such blood may be accumulated in the throat, mouth or the chest region. This would not stain any cloth but is foul smelling and ejects out in large quantities. In the aggravated condition the disease will be associated with complications like anaemia, fever, vomiting, cough, swelling and diarrhoea.

कासश्वासौ ज्वरच्छर्दितृष्णातीसारशोफिनम् ।। ७६ ।।
यक्ष्मा पार्श्वरुजानाहरक्तच्छर्द्यंसतापिनम् ।
छर्दिर्वेगवती मूत्रशकृद्ग्रन्धि: सचन्द्रिका ।। ७७ ।।
सास्रविट्पूयरुक्कासश्वासवत्यनुषङ्गिणी ।

(kāsaśvāsau jvaracchardi-
tṛṣṇātīsāraśophinam ।। 76 ।।
yakṣmā pārśvarujānāha-
raktacchardyamsatāpinam ।
chardirvegavatī mūtra-
śakṛdgandhi: sacandrikā ।। 77 ।।

sāsraviṭpūyarukkāsa-
śvāsavatyanuṣaṅginī ।)

The diseases kāsa (cough) and śvāsa (dyspnoea) are found fatal when associated with fever, vomiting, thirst, diarrhoea and swelling. Yakṣma (emaciation) is to be reckoned fatal if associated with costal pain, flatulence, vomiting of blood and burning sensation in the shoulder. Chardi (vomiting) manifests with strong bouts of vomiting of materials with foul smell of urine and faeces, showing glistening particles, blood, faecal materials and pus with pain, cough, dyspnoea. The disease will be persistent also.

तृष्णाऽन्यरोगक्षपितं बहिर्जिह्वं विचेतनम् ।। ७८ ।।
मदात्ययोऽतिशीतार्तं क्षीणं तैलप्रभाननम् ।
अर्शांसि पाणिपन्नाभिगुदमुष्कास्यशोफिनम् ।। ७९ ।।
हृत्पार्श्वाङ्गरुजाच्छर्दिपायुपाकज्वरातुरम् ।

(tṛṣṇāऽnyarogakṣapitaṁ
bahirjihvaṁ vicetanam ।। 78 ।।
madātyayoऽtiśītārtam
kṣīṇaṁ tailaprabhānanam ।
arśāṁsi pāṇipannābhi-
gudamuṣkāsyaśophinam ।। 79 ।।
hṛtpārśvāṅgarujāchardi-
pāyupākajvarāturam ।)

Tṛṣṇa (the disease with main characteristic feature of severe thirst) is fatal in the persons debilitated by other diseases and the patient protrudes his tongue out and becomes unconscious. In the case of an emaciated patient showing face glistening as if applied with oil when madātyaya (intoxication) leads him to death. Haemorrhoides become fatal when complicated with the affliction of swelling in the limbs, navel, anus, scrotum and suffer pain in the chest, costal areas or the whole body, vomiting, ulceration of anal region and fever.

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IMPACT OF *CAPPARIS DECIDUA* FLOWER EXTRACT ON REPRODUCTIVE ORGANS OF MALE ALBINO RAT: A BIOCHEMICAL APPROACH

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Abstract: *Capparis decidua* (Frosk.) Edgew belongs to family Capparidaceae, is commonly known as karrel or ker. It is found in dry areas of Punjab, Sind, Kutch, Rajasthan, Gujarat and Madya Pradesh. This paper is an experimental study conducted to evaluate the effect of *Capparis decidua* flower crude ethanolic extract (cdfcee) on the spermatogenesis of albino rats. Significant fluctuations were observed in tissue protein, sialic acid, fructose, cholesterol and glycogen levels after treatment. Minor changes were also noticed in serum protein, cholesterol, HDL cholesterol, triglycerides and phospholipids level. The present investigation suggests that cdfcee treatment significantly affects the male reproductive organs.

Introduction

The explosion of scientific knowledge during the last few decades has generated a great deal of new knowledge about the physiology of human reproduction, information that is vital for the development of improved methods of fertility regulation.

It is generally agreed that contraceptive use is the key to improved reproductive health[1]. Contraceptive prevalence can be improved if a variety of contraceptive technologies are provided to the users backed up by good quality of services. The challenge facing all working in this field is to respond adequately to these needs by giving due attention to quality of care of developing new methods of fertility regulation.

Considering all these facts, the present investigation was carried on *Capparis decidua* in searching for a male antifertility agent of plant origin, because herbal products are known to cause lesser side effects[2]. *Capparis decidua* (Frosk.) Edgew belongs to family Capparidaceae. Its main constituents are n-pentacosane, n-triacontane, n-tricontanol, β-sitosterol and â-carotene[3-5].

Material and methods

Adult male albino rats (*Rattus norvegicus*) of Sprague Dawley strain aged between 3-5 months and weighing about 200 grams were divided into 2 groups of 10 animals each, and were housed in polypropylene cages under controlled environmental conditions with provision of

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12:12 hrs dark:light. The rats were fed with palette food (supplied by Ashirwavad Ltd., India) supplemented ch'icken bearing maize and soaked wheat. Water was provided *ad libitum*.

The rats were divided into two groups i.e. i. Control group which received vehicle (distilled water) for a reproductive cycle and ii. Treatment group that received crude extract freshly diluted in double distilled water @500 mg/kg body weight/day for a reproductive cycle.

The plant extract was freshly dissolved in double distilled water and administered orally to group 2 animals every morning for 60 days. Mating test was performed with proestrous females after 55 days of treatment. Vaginal smears were checked every morning. After the last dose the male rats were screened and autopsied for detailed study. Half of the rats were exempted for recovery observation for a period of 60 days. In autopsied rats blood was collected through cardiac puncture. All the reproductive organs and vital organs were dissected out, cleared of fat and connective tissue and kept at - 20°C until assayed.

Sperm analysis

Sperm density in testis and cauda epididymides and motility from cauda epididymides were assessed[6].

Serum biochemistry: - Serum was separated and lipid profile i.e. cholesterol, HDL cholesterol, phospholipids, and triglycerides were done[7-10].

Tissue biochemistry: - Frozen tissues were analyzed for quantitative estimation using biochemical techniques i.e. Glycogen, Fructose, Cholesterol, Protein and Sialic acid[11-14].

Statistical analysis: - Data was expressed in ± SEM and the significance of difference was analyzed by the student's t- test.

Results and discussion

Continuity in estrous cycle was observed in females mated with treated males. The motility of sperm in cauda epididymides found significantly reduced (P≤ 0.001) in the treated group when compared with the control group (Gr. 1). Decreased sperm count was noticed in both cauda epididymides and testis (P≤0.001) (Table 1). Blood variables i.e. RBC, WBC, Haemoglobin, Haematocrit and Blood sugar were found within the normal range after treatment (Table 2). Significant (P≤0.01 to 0.001) reductions were observed in tissue protein, sialic acid, fructose, cholesterol, and glycogen levels in treated rats in comparison to the controls (Table 1 & 3). Slight changes were also noticed in serum protein, cholesterol, HDL cholesterol, triglycerides and phospholipids level but these were found to be insignificant.

TABLE 1
Tissue biochemistry and sperm analysis

Parameters	Groups	
	Control	Treatment
Fructose (mg/gm) - *S.Vesicle*	5.7 + 0.43	1.27^{c} + 0.19
Cholesterol (mg/gm) - *Testis*	6.39 + 0.63	1.4^{c} + 0.28
Glycogen (mg/gm) - *Testis*	3.2 + 026	1.42^{c} + 0.16c
Sperm density (million/ml) - *Testis*	4.81 + 0.41	1.25^{c} + 0.02
Sperm density (million/ml) - *Cauda*	57.31 + 3.61	20.5^{c} + 1.43
Sperm motility (%)	79.32 + 3.73	35.18^{c} + 3.03
Fertility test (%)	100 (+)	100 (-)

Mean of 5 values ± SEM
Gr. 2 was compared with Gr.1: c = P < 0.001

In this experiment, *Capparis decidua* flower 50% ethanol crude extract had shown anti spermatogenic effect as evidenced by reduced number of spermatozoa, declined sperm motility and altered biochemical milieu in reproductive organs. The disturbed spermatogenesis in the current investigation could be due to the suppression of pituitary gonadotropin secretion[15]. The role of gonadotropins, particularly LH and FSH activity, in initiation and maintenance of spermatogenesis has been studied by many authors[16-18] and concluded the fact that gonadotropins are essential for testicular function. These hormonal messengers are critical not only for regulation of germ cell differentiation, but also the proliferation and function of the somatic cell types required for proper development of the testis[19]. Secondarily crude extract treatment might probably impair the androgen synthesis by causing considerable adverse effect on somatic cell types required for proper development of the testis. These cells include the interstitial steroidogenic Leydig cells, whose primary function is to produce testosterone, the myoid cells that surround the seminiferous tubules and secrete basal lamina components and the Sertoli cells, whose direct contact with proliferating and differentiating germ cells within the seminiferous tubules makes them essential for providing both physical and nutritional support for spermatogenesis. The changes in the androgen concentrations alter the pattern of cellular proliferation in the reproductive organs[20]. Circulating androgen levels are essential for the survival and maturation of spermatozoa, the process by which sperms gain their ability to fertilize eggs.

TABLE 2
Haematological parameters

Parameters	Groups	
	Control	Treatment
RBC mill/mm^3	5.03 ± 0.56	5.2^d ± 1.04
WBC/mm^3	8185 ± 210	7525^d ± 150.5
Haemoglobin g%	13.55 ± 10.74	11.95^d ± 2.39
Haematocrit value %	58.01 ± 3.21	47.67^d ± 5.21
Blood Sugar mg/100ml	101.44 ± 11.03	93.26^d ± 18.65

Mean of 5 values ± SEM
Gr. 2 was compared with Gr.1: d = Insignificant

The principle cells of epididymis synthesize proteins, which have important role in the maturation of spermatozoa. Alterations in the secretion and function of these proteins impaired sperm maturation in the present study.

Sialoproteins are involved in the stabilization of acrosomal membrane[21]. Lower concentrations of sialic acid in seminal plasma may cause deteriorating effect on the structural integrity of the spermatozoa[22]. It may have major role in maturation[23], capacitation and fertilization[24].

The declined sialic acid content levels in the epididymides possibly may have contributed to prevention of maturation of spermatozoa. This must have curtailed the viability and fertilizing ability of epididymal spermatozoa.

The highly significant decline in the fructose concentration of seminal tissue in the present study demonstrating that it might cause fertility loss through disturbing the sperm energy metabolism as seminal fructose provide energy for sperm motility.

TABLE 3
Tissue biochemistry of *Capparis decidua* flower extract treated intact rats

Parameters	Testis	Caput	Cauda	S.Vesicle	V. Prostate
1. Group I (Control)					
- Protein (mg/gm)	210.4 ± 4.76	240.4 ± 4.12	280.2 ± 3.89	189.6 ± 3.12	221.7 ± 1.8
- Sialic acid (mg/gm)	4.71 ± 0.23	5.65 ± 0.5	6.23 ± 0.13	5.08 ± 0.23	4.76 ± 0.45
2. Group II (Treatment)					
- Protein (mg/gm)	58.43^{c} ± 1.16	83.55^{c} ± 1.67	76.43^{c} ± 1.52	65.77^{c} ± 1.37	80.21^{c} ± 1.6
- Sialic acid (mg/gm)	3.28^{c} ± 0.05	3.2^{b} ± 0.19	3.01^{c} ± 0.01	3.64^{b} ± 0.2	2.7^{b} ± 0.19

Mean of 5 values ± SEM; Gr. 2 was compared with Gr.1; b = P < 0.01, c = P < 0.001

The findings in the present study indicate that the decreased glycogen concentrations might lead to testicular dysfunction. As glucose induces protein synthesis, declined levels of glycogen might obstruct the germ cell development. Consequently, it resulted in fluctuated tissue biochemical environment and in sperm dynamics.

Cholesterol is an important precursor in the synthesis of steroid hormone[25]. The requirement of cholesterol for normal activity of testis has been well-established[26]. Depleted cholesterol level in the testicular tissue might interfere with steroid synthesis resulting in improper functioning of reproductive organs.

Toxicological investigation

In the present investigation the hematological parameters such as RBC, WBC, Haematocrit, Haemoglobin and blood sugar in all experimental groups remain unaltered. The normal ranges of haematological parameter suggest non-toxic nature of the *Capparis decidua* extracts and indicate no drug related side effects on the animals.

The serum biochemistry parameters such as protein, HDL cholesterol, serum triglycerides and serum phospholipids remain in the normal range. The above data is enough to conclude decisively that *Capparis decidua* flower crude ethanol extracts are free from visible toxicity.

Conclusion

Considering all the above findings, it can be concluded that *Capparis decidua* flower crude ethanolic extract (cdfcee) has the efficiency to achieve loss of fertility. It is evidenced that the plant material can be used as anti-fertility agent for males as it posses all the required properties expected in a contraceptive drug. Needless to say that further experimentation is required.

Recovery: - All the treated animals became fertile after 60 days of drug withdrawal. Females mated with these males delivered healthy litters.

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REMOVAL OF HEAVY METAL IONS FROM AQUEOUS SOLUTIONS USING *MORINGA OLEIFERA* FRUITS

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Abstract: An experimental investigation carried out on the removal of heavy metal ions such as Fe (III), Cr (VI), Ni (II) and Pb (II) present in aqueous solution by adsorption technique is described here. Dried fruits of *Moringa oleifera* (drum stick) was used as the adsorbent for the investigation. In adsorption technique, effect of agitation time and Langmuir's adsorption isotherm, etc. has been studied.

Introduction

Water pollution is one of the major problems facing the world today. Concern about water pollution in the past focused primarily on the effects of contaminated water on human health[1]. In this context, the effectiveness of *Moringa oleifera* (drumstick) fruits as the adsorbent for the removal of heavy metal ions namely Fe (III), Cr (VI), Ni (II) and Pb (II) from aqueous solutions has been studied. The heavy metals enter the human body through skin, gastro intestinal tract and the respiratory tract and are very toxic to most plants and living beings. The separation of heavy metal ions from an aqueous environment by adsorption technique is an important treatment process for the control of water pollution[2]. The data obtained from the study can be conveniently used for removing heavy metal ions from industrial effluents.

Materials and methods

Adsorbent collection

2 kg of matured drumstick fruits purchased from the market, dried in the sunlight and powdered in the mixer grinder.

Preparation of stock solutions

A stock solution containing 0.63803 mg ml^{-1} of Fe (III) was prepared by dissolving 5.5086g of ferric alum in one litre of distilled water. Experimental solutions of different concentration were prepared by properly diluting this stock solution. A stock solution containing 0.62546 mg ml^{-1} of Cr (VI) was prepared by dissolving 1.7689 g of potassium dichromate in one litre of distilled water. Experimental solutions of different concentration were prepared by properly diluting this stock solution. A stock solution containing 0.60135 mg ml^{-1} of Ni (II) was prepared dissolving 4.0459 g of nickel ammonium sulphate in one litre of distilled water. A stock solution containing 2.31524 mg ml^{-1} of Pb (II) was prepared.

Langmuir's adsorption isotherm

Langmuir's adsorption isotherm can be expressed as: $\frac{C_e}{x/m} = \frac{1}{bx_m} + \frac{C_e}{x_m}$

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Where C_e = equilibrium concentration of the adsorbate; x_m = amount of adsorbate adsorbed per unit weight of adsorbent required for mono-layer coverage of surface, also called mono-layer capacity. It also defines the total capacity of adsorbent for a specific adsorbate; x/m = amount of adsorbate 'x' adsorbed per unit weight of adsorbent 'm'; b = a constant related to the heat of adsorption 'Q' i.e. $b \alpha e^{-\triangle H/RT}$.

When $\frac{C_e}{x/m}$ is plotted against C_e, a straight-line should result, having a slope $\frac{1}{x_m}$ and an intercept $\frac{1}{bx_m}$.

Experimental

Effect of agitation time

Effect of agitation time on the percentage of adsorption has been studied by shaking 1 g of adsorbent with 50 ml of adsorbate solutions of known concentrations in an electric shaker at 30°C. 5 ml of solution withdrawn at different time intervals, filtered and the percentage of the adsorbate estimated colorimetrically. Percentage of adsorbate adsorbed was then plotted against agitation time.

Verification of Langmuir's adsorption isotherm

50 ml of adsorbate solutions of known concentrations were shaken with 1 g of adsorbent in an electric shaker for a definite period of time at 30°C. The solution was then filtered and the percentage of adsorbate estimated colorimetrically. Langmuir's adsorption isotherm can be verified by plotting $\frac{C_e}{x/m}$ against C_e.

Colorimetric estimation of iron

To a known volume of filtered Fe (III) solution, added 3 ml of 4N HNO_3 and 5 ml of 20% NH_4CNS solution and made up to 100 ml in a volumetric flask. The absorbance was measured using a photoelectric colorimeter at 480 nm. A number of solutions of known concentration were prepared and their absorbance measured as above. A plot of concentration *vs* absorbance should give a straight line passing through the origin. From the graph the concentration of the unknown solution and hence the amount of Fe (III) in the whole of the solution can be obtained.

Colorimetric estimation of chromium

To a known volume of filtered Cr (VI) solution, add 3.5 ml of 6N H_2SO_4 and 1.5 ml of 0.25% diphenyl carbazide solution and make up to 100 ml; measured the absorbance at 540 nm.

Colorimetric estimation of nickel

To a known volume of filtered Ni (II) solution, add 10 ml of bromine water, 2 ml of liquor NH_3 solution and 2 ml of 1% dimethyl glyoxime on ethanol, and make the solution to 100 ml and measure the absorbance at 445 nm.

TABLE 1

Calibration data for Fe (III), Cr (VI), Ni (II) and Pb (II) estimation

Vol. of standard solution (ml)	Absorbance of solutions			
	Fe(III)	Cr(VI)	Ni(II)	Pb(II)
2	0.27	0.10	0.08	0.10
4	0.49	0.19	0.13	0.20
6	0.70	0.30	0.16	0.29
7	-	-	-	0.33
8	0.99	0.39	0.20	-
10	-	-	0.23	-

Mass of standard solution per ml:
Fe (III) = 0.127607 mg; Cr (VI) = 0.012509 mg;
Ni (II) = 0.108243 mg; Pb (II) = 0.324134 mg.

TABLE 2

Effect of agitation time on the adsorption of solutions

Adsorbate	Time (minutes)	Amount present (mg)	Amount adsorbed (mg)	% of Adsorption
1. Fe (III)	0	12.76074	0	0
	30	10.8466	1.91414	15
	60	8.93251	3.82823	30
	90	6.8908	5.86994	46
	120	4.8916	7.86914	61.66
	150	3.9583	8.8049	69
	180	3.82822	8.93252	70
	210	3.82822	8.93252	70
2. Cr (VI)	0	6.2546	0	0
	30	4.27321	1.98139	31.68
	60	3.2874	2.9672	47.44
	90	2.2336	4.0210	64.29
	120	1.89719	4.35741	69.67
	150	1.89719	4.35741	69.67
3. Ni (II)	0	5.41215	0	0
	60	4.32972	1.08243	20
	120	3.42769	1.98446	36.67
	180	2.52567	2.88648	53.33
	210	2.52476	2.88739	53.35
4. Pb (II)	0	11.57621	0	0
	15	3.56547	8.01074	69.20
	30	3.3710	8.20521	70.88
	45	3.05612	8.52009	73.59
	60	3.00055	8.57566	74.08
	75	2.59307	8.98314	77.60
	90	2.36154	9.21467	79.60
	105	2.36152	9.21469	79.60

Colorimetric estimation of lead

To a known volume of filtered Pb (II) solution, add 50 ml of 1:2 NH_3 solution and 2 ml of 10% sodium sulphide solution; make the solution up to 100 ml and measure the absorbance at 430 nm.

Results and discussion

Study of effect of agitation time

After the treatment with the same amount of adsorbent viz. drumstick fruits with aqueous solution of metal ions such as Fe (III), Cr (VI), Ni (II) and Pb (II), it was observed that the residual concentration of the unadsorbed metal still remaining in the solution varies with time, falling rapidly at first and reaching constant value asymptotically. From these, the threshold adsorption time can be chosen as 180 min for Fe (III), 120 min for Cr (VI), 180 min for Ni (II) and 90 min for Pb (II). The percentage of Fe (III), Cr (VI), Ni (II) and Pb (II) adsorbed were found to be 70%, 69.67%, 53.33% and 79.60% respectively.

Langmuir's adsorption isotherm

Adsorption data for a wide range of adsorbate concentrations were most conveniently described by Langmuir's adsorption isotherm.

TABLE 3

Study of adsorption equilibrium for different solutions

Adsorbate / Solution	Initial concentration (mg)	Amount remaining (mg)	Amount adsorbed (mg) x/m	Percentage of Adsorption	Equilibrium concentration of the adsorbate (C_e)*	$\frac{C_e}{x/m}$
1. Fe (III)	6.38037	1.8503	4.53007	71	0.66259	0.14626
	12.76074	3.82822	8.93252	70	1.37089	0.15347
	15.9509	7.65643	8.29446	52	2.74178	0.33056
	18.86111	10.0108	8.85031	46.92	3.58489	0.40506
	22.3313	13.6221	8.7092	39	4.87810	0.56011
	25.92148	16.33374	9.58774	37	5.84914	0.61006
2. Cr (VI)	3.1073	0.8196	2.28577	73.62	0.31511	0.13774
	4.37822	1.28211	3.0961	70.72	0.49293	0.15921
	6.2546	1.89719	4.35741	69.67	0.72941	0.16739
	9.3019	3.14294	6.15896	66.21	1.20836	0.19619
	12.5092	4.84558	7.66362	61.26	1.86297	0.24309
3. Pb (II)	7.16572	1.38915	5.77657	80.61	0.13408	0.02321
	11.57621	2.36154	9.21467	79.60	0.22794	0.02474
	12.31709	2.67157	9.64552	78.31	0.25786	0.02673
	16.4067	3.88799	12.51871	76.30	0.37527	0.02998
	23.15243	6.27894	16.87349	72.88	0.60601	0.03591

* Fe (III) $C_e = \frac{C \times 1000}{50 \times 55.85}$; *Cr (VI) $C_e = \frac{C \times 1000}{50 \times 52.02}$; *Pb (II) $C_e = \frac{C \times 1000}{50 \times 207.21}$

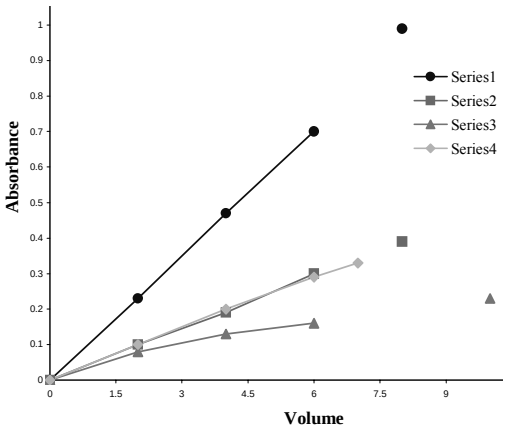

Fig. I.
Standard plots for Fe (III) - Series 1,
Cr (VI) - Series 2, Ni (II) - Series 3 and
Pb (II) - Series 4 solutions

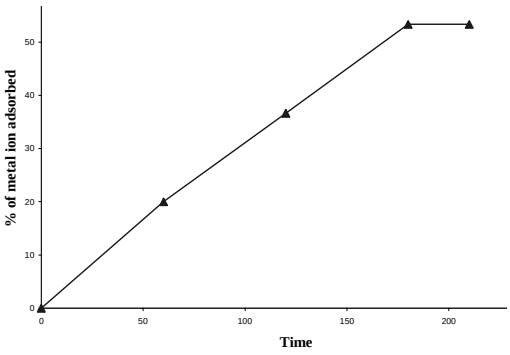

Fig. III.
Effect of agitation time on the adsorption of
Ni (II) ion

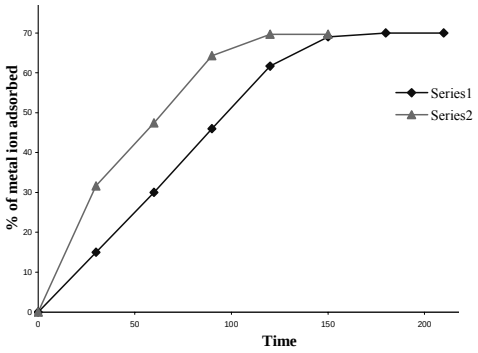

Fig. II.
Effect of agitation time on the adsorption of
Fe (III) - Series 1 and Cr (VI) - Series 2 ions

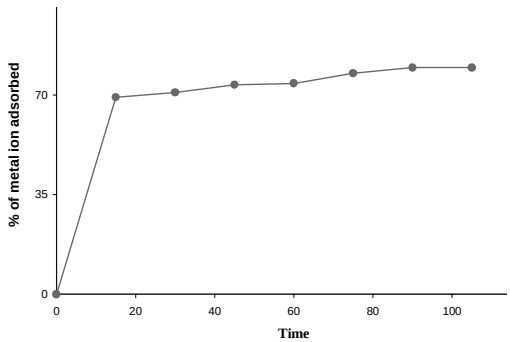

Fig. IV.
Effect of agitation time on the adsorption of
Pb (II) ion

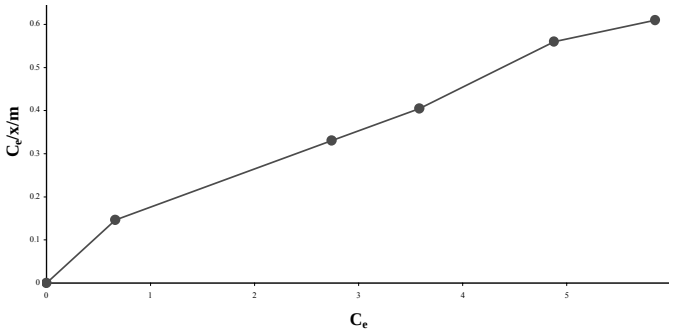

Fig. V. Langmuir adsorption isotherm for the adsorption of Fe (III) ion

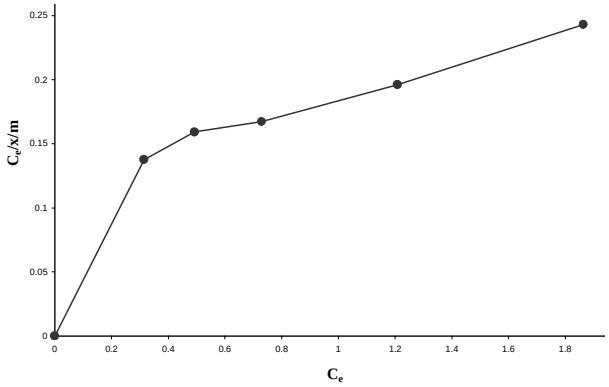

Fig. VI. Langmuir adsorption isotherm for the adsorption of Cr (VI) ion

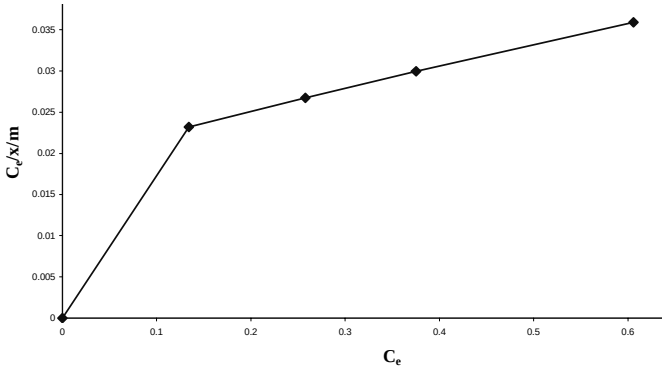

Fig. VII. Langmuir adsorption isotherm for the adsorption of Pb (II) ion

TABLE 4

Evaluation of b and x_m

Adsorbate	Slope	Y-intercept	X_m	b
Fe (III)	0.09	0.085	11.1111	1.0588
Cr (VI)	0.06575	0.118	15.2091	0.5572
Ni (II)	-	-	-	-
Pb (II)	0.02556	0.016	39.1236	1.5975

The slope and intercept were calculated from the plot of C_e vs C_e. (Table 1-4)

Conclusion

The effectiveness of dried drumstick fruits as adsorbent for the removal of heavy metal ions namely Fe (III), Cr (VI), Ni (II) and Pb (II) from their aqueous solutions has been studied. The effect of agitation time and adsorption equilibrium has been investigated. The following results were obtained from the above studies:

- The time taken to attain the equilibrium was different for different metal ions.
- The extent of adsorption depends on the initial concentration.
- Adsorption isotherm follows Langmuir's equation.

From the experimental results it can be concluded that the biomaterial drumstick fruit is a good adsorbent for removing heavy metal ions from aqueous solutions.

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EXPERIMENTAL STUDIES OF LOHĀSAVA

Vijay Gupta and K.R.C. Reddy*

Abstract: Lohāsava is a herbo-mineral fermented preparation formulated by Ācārya Śārṅgadhara, containing self generated alcohol, and is indicated for the treatment of pāṇḍu (anaemia), jvara and for many other diseased conditions. In this work, an attempt has been made to reveal any untoward side effects of this preparation on experimental animal models, to confirm its toxicity (acute and chronic), if any. For this study, four different samples of Lohāsava prepared as referred in Śārṅgadharasamhita were administered to albino rats.

Introduction

Toxicity of āyurvedic metallic preparations is one of the important topics of discussion now. Despite the fact that the metals are toxic in the crude form, the scholars of Rasaśāstra claim that the processing of metals to bhasmas, kūpīpakvas, parpaṭi, etc., minimizes the toxicity. However, modern science does not accept metallic preparations freely for oral administration as modern pharmacology is not in its favour. Since human subjects cannot be used for such trials, albino rats are used.

The effect of drugs on animals can be traced to Samhitas of 1000 BC. The royal physicians used to try the drugs on birds and animals before the actual treatment and also the food and water to rule out any suspected poisoning. Now advanced science has helped to evaluate the toxicity in a more sophisticated form. Hence it is relevant to screen known toxic drugs before use.

Any drug toxic to any part or organ of body produces certain changes in that organ. These changes can be broadly classified into two categories i.e. structural and functional.

Structural changes

Structural changes may be gross or microscopic. Gross changes are evident by naked eye, examination itself. However when an organ looks normal, the invisible structural changes, which have not yet produced gross abnormalities, can be seen by histopathological studies.

Functional changes

These are usually earlier to appear. They are evident in the form of serological haematological alterations in the levels of certain biochemical substances specific to particular organ or organ system of the body.

In the present work, the whole toxicity (acute

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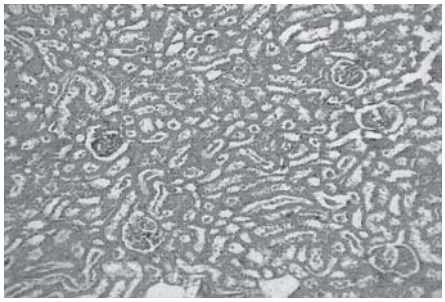

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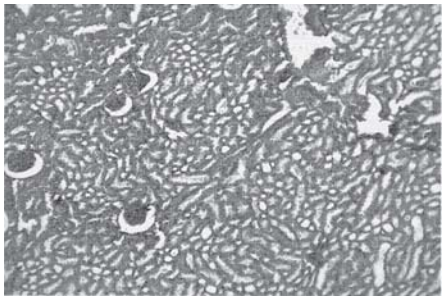

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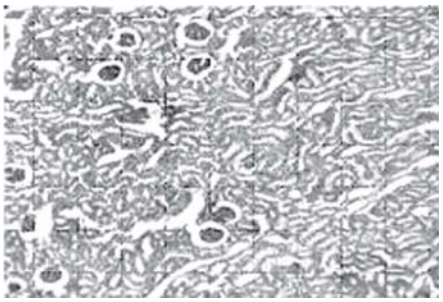

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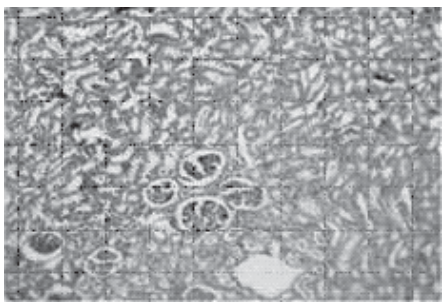

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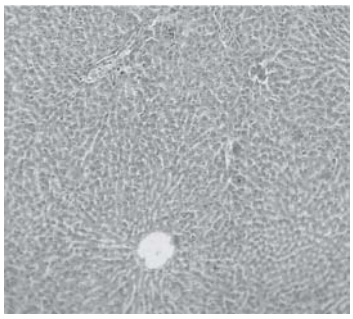
Fig.1

a Photomicrograph of normal histopathological structure of kidney. (Control Group) (H & E stained, 400x); **b** Photomicrograph of Cellular damage in medullar region (Acute Group-1) (H & E stained, 400x); **c** Photomicrograph of tubular damage in both medullar and cellular region of kidney. (Acute Group - IV) (H & E stained, 400x); **d** Photomicrograph of mild tubular damage and affected glomeruli of the Kidney (Chronic Group - IV) (H & E stained, 400x)



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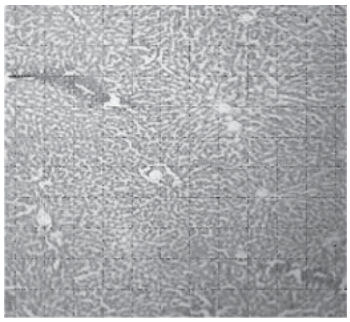

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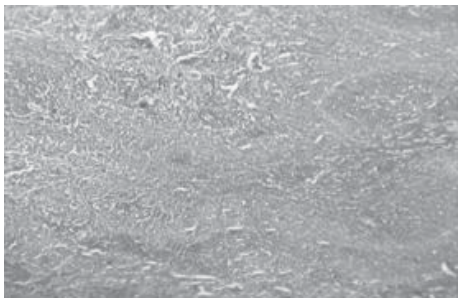

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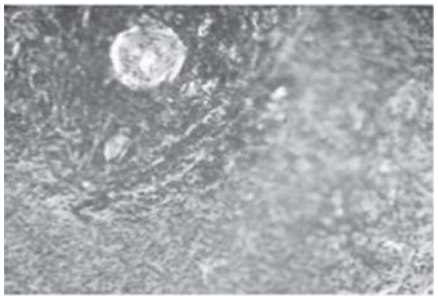

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Fig.2

a Photomicrograph of normal histopathological structure of Liver. (Control Group) (H & E stained, 400x); **b** Photomicrograph of liver mild increased in the intracellular space (Chronic Group-III) (H & E stained, 400x); **c** Photomicrograph of normal histopathological structure of spleen (Control Group) (H & E stained, 400x); **d** Photomicrograph of spleen mild increased in the white and red pulp (Acute Group-II) (H & E stained, 400x).

and chronic) study is divided in two parts and studied by histopathological and biochemical investigations.

Histopathological study: - To screen out the toxicity of different samples of Lohāsava (acute and chronic levels) on various vital organs in albino rats.

Biochemical study: - To evaluate the effect of different samples of Lohāsava in different doses on normal physiological variations in albino rats.

Trial drug preparation

The trial drugs were made out in the department of Rasaśāstra, faculty of āyurveda, IMS, BHU, Varanasi. Of the preparation of four different samples of Lohāsava (I-IV), the three samples (I-III) were incorporated with Lauhabhasma, while the sample IV with śodhita Lohacūrṇa (Table 1)

Material and methods

The study was conducted on albino rats weighing 100-150g of both sexes, which were procured from Central Animal House, IMS, BHU, Varanasi. All the animals were kept in colony cages at an ambient temperature of 25 ± 2 ºC, with 45-55% relative humidity and 10:14 light and dark conditions. The animals were kept on standard rodent feed and water *ad-libitum*. (Table 2)

TABLE 1
Ingredients used in the preparation of different samples of Lohāsava

Sl.No.	Name of drug	Part used	Qty	Different samples of Lohāsava			
				I	II	III	IV
1.	Āmalaki	Fruit	96 gm	+	+	+	+
2.	Harītaki	Fruit	96 gm	+	+	+	+
3.	Vibhītaki	Fruit	96 gm	+	+	+	+
4.	Citraka	Root	96 gm	+	+	+	+
5.	Śuṇṭhi	Rhizome	96 gm	+	+	+	+
6.	Pippali	Fruit	96 gm	+	+	+	+
7.	Marica	Seed	96 gm	+	+	+	+
8.	Ajvain	Rhizome	96 gm	+	+	+	+
9.	Mustaka	Fruit	96 gm	+	+	+	+
10.	Vidaṅga	Fruit	480 gm	+	+	+	+
11.	Dhātaki	Flower	480 gm	+	+	+	+
12.	Śodhita lohacūrṇa		96 gm	-	-	-	+
13.	Lohabhasma (20 puṭa)		96 gm	+	+	+	-
14.	Honey		1.50 kg	+	+	+	+
15.	Jaggery		2.50 kg	+	+	+	+
16.	Water		12.50 Ltr	+	+	+	+
17.	Containers*			SS	P	CC	P

*SS - Stainless Steel; P - Plastic; CC - China Clay

TABLE 2
Details of animals used in both the experiments (in all the Groups)

1	Number of animals	6
2	Sexes	Both sexes
3	Weight	100-150g
4	Diet	Std animal diet
5	Water	*ad libitum*
6	Acclimatized for	15 days

Objectives: - To study the acute and chronic toxicity of different samples of Lohāsava

Duration: - Acute toxicity study (7 days) and Chronic toxicity study (90 days) of different samples of Lohāsava

Experimental group

The animals (albino rats) were divided into two main groups.

- Control group: 6 Animals for each acute and chronic toxicity studies.
- Treated groups: 24 animals for acute and chronic toxicity studies, sub divided into 4 groups (I-IV), with 6 animals in each group.

Dose selection

The therapeutic dose of asava in human beings is one pala (48 ml) /60 kg body weight i.e. 0.8 ml/kg. The dose in experimental animals is about 10 times more than human beings. Therefore, therapeutic dose is 10 x 0.8 ml = 8 ml/kg body weight of animals i.e. 0.8 ml/100g of albino rat/day. Therefore toxic dose is 10 x 0.8 = 8 ml/100 gm/day.

Mode of administration

Since the āsava is taken with equal quantity of water, oral route was opted as practiced in āyurveda. The Control group was not given any drug. (Table 3)

Histopathological study

The rats were given diet, water, and doses of medicine, and each animal was sacrificed on the day 9th for acute and 92nd day for chronic toxicity groups respectively. (Blood was collected from the rats in fluoride bottles by applying orbital bleeding technique before sacrificing them.)

Visceral organs (liver, kidney and spleen) of both the groups were collected and preserved in 10% formalin solution. They were then stained with haematoxylin and Eosin.

Biochemical study

The following data were studied:

1. Blood hemoglobin
2. Total leucocytes count
3. Differential leucocytes count
4. Serum bilirubin

TABLE 3
Details of dose, drug sample, etc. used in both the experiments

Parameter	Group				
	Control	I	II	III	IV
• Acute toxicity					
- Drug	-	L1	L2	L3	L4
- Dose	8ml/100g/day*				
- No. of exp.	7 (days)*				
- Sacrificed on	9th day*				
• Chronic toxicity					
- Drug	-	L1	L2	L3	L4
- Dose	0.8ml/100g*				
- No. of exp.	90 (days)*				
- Sacrificed on	92nd day*				

L1, L2, L3, L4 - Lohasava I - IV respectively
*Applicable to Groups I, II, III and IV

TABLE 6

Effect and various hematological parameters of different samples of Lohāsava in Acute toxicity study on albino rats.

Parameters	Control group	Acute				Control vs Acute			
		Group I	Group II	Group III	Group IV	Group I	Group II	Group III	Group IV
Hb%	15.51 ± 0.354	15.08 ± 1.11	15.15 ± 0.79	15.41 ± 0.47	15.50 ± 0.44	t = 0.91 p>0.05 NS	t = 1.03 p>0.05 NS	t = 0.41 p>0.05 NS	t = 0.07 p>0.05 N
TLC(/µl)	12066.66 ± 150.55	12200 ± 282.84	12075 ± 140.53	12200.00 ± 244.94	12250.0 ± 242.89	t = 1.02 p>0.05 NS	t = 0.10 p>0.05 NS	t = 1.14 p>0.05 NS	t = 1.57 p>0.05 NS
Lymphocytes%	77.33 ± 1.75	77.16 ± 1.72	77.83 ± 1.90	76.83 ± 2.04	76.66 ± 1.20	t = 0.17 p>0.05 NS	t = 0.47 p>0.05 NS	t = 0.46 p>0.05 NS	t = 0.77 p>0.05 NS
Polymorphs%	24.00 ± 2.60	24.00 ± 1.40	24.50 ± 1.76	23.83 ± 1.16	24.16 ± 2.23	t = 0 p>0.05 NS	t = 0.38 p>0.05 NS	t = 0.14 p>0.05 NS	t = 0.12 p>0.05 NS
S.bilirubin (mg/dl)	0.55 ± 0.08	0.56 ± 0.08	0.52 ± 0.04	0.56 ± 0.05	0.53 ± 0.05	t = 0.35 p>0.05 NS	t = 0.65 p>0.05 NS	t = 0.40 p>0.05 NS	t = 0.42 p>0.05 NS
S. Protein (g/dl)	4.80 ± 0.22	4.85 ± 0.39	4.66 ± 0.26	4.68 ± 0.24	5.35 ± 0.25	t = 0.35 p>0.05 NS	t = 0.65 p>0.05 NS	t = 0.40 p>0.05 NS	t = 0.42 p>0.05 NS
S. Albumin (g/dl)	3.33 ± 0.19	3.41 ± 0.13	3.56 ± 0.12	3.48 ± 0.14	3.43 ± 0.31	t = 0.80 p>0.05 NS	t = 2.40 p>0.05 NS	t = 1.43 p>0.05 NS	t =0.63 p>0.05 NS
SGPT (IU/L)	81.66 ± 3.55	82.16 ± 2.70	82.66 ± 1.96	81.50 ± 2.58	83.00 ± 2.09	t = 0.27 p>0.05 NS	t = 0.60 p>0.05 NS	t = 0.09 p>0.05 NS	t =0.79 p>0.05 NS
SGOT (IU/L)	152.5 ± 6.8	147.3 ± 2.06	147.5 ± 5.24	148.16 ± 3.8	150.5 ± 3.9	t = 1.76 p>0.05 NS	t = 1.41 p>0.05 NS	t = 1.34 p>0.05 NS	t = 0.62 p>0.05 NS
S. Alkaline Phosphatase (U/L)	454.00 ± 4.30	456.66 ± 7.50	447.50 ± 10.80	450.83 ± 7.30	450.00 ± 7.07	t = 0.75 p>0.05 NS	t = 1.36 p>0.05 NS	t = 0.91 p>0.05 NS	t = 1.18 p>0.05 NS
S.Creatinine (mg/dl)	0.58 ± 0.07	0.56 ± 0.08	0.61 ± 0.11	0.61 ± 0.09	0.56 ± 0.05	t = 0.37 p>0.05 NS	t = 0.59 p>0.05 NS	t = 0.66 p>0.05 NS	t =0.45 p>0.05 NS

TABLE 7

Effect and various hematological parameters of different samples of Lohāsava in Chronic toxicity study on albino rats.

Parameters	Control group	Chronic				Control vs Chronic			
		Group I	Group II	Group III	Group IV	Group I	Group II	Group III	Group IV
Hb%	14.80 ± 0.68	15.10 ± 0.32	15.30 ± 0.26	15.58 ± 0.38	15.13 ± 0.62	t = 0.94 p>0.05 NS	t = 1.29 p>0.05 NS	t = 2.46 p<0.05 S	t =0.85 p>0.05 NS
TLC(/µl)	11983.33 ± 278.68	12150.00 ± 242.89	12083.33 ± 147.19	12116.00 ± 213.69	12216.00 ± 1.75	t = 1.10 p>0.05 NS	t = 0.78 p>0.05 NS	t = 0.93 p>0.05 NS	t = 1.45 p>0.05 NS
Lymphocytes%	77.16 ± 1.94	76.50 ± 1.37	78.00 ± 1.89	77.50 ± 1.64	76.66 ± 1.21	t = 0.69 p>0.05 NS	t = 0.75 p>0.05 NS	t = 0.32 p>0.05 NS	t = 0.54 p>0.05 NS
Polymorphs%	23.00 ± 3.09	23.83 ± 1.06	23.66 ± 2.33	23.33 ± 1.21	23.66 ± 1.75	t = 0.62 p>0.05 NS	t = 0.42 p>0.05 NS	t = 0.25 p>0.05 NS	t = 0.46 p>0.05 NS
S.bilirubin (mg/dl)	0.59 ± 0.09	0.52 ± 0.04	0.52 ± 0.08	0.58 ± 0.08	0.55 ± 0.05	t = 1.99 p>0.05 NS	t = 1.65 p>0.05 NS	t = 0.22 p>0.05 NS	t = 1.05 p>0.05 NS
S. Protein (g/dl)	4.92 ± 0.38	5.22 ± 0.47	4.97 ± 0.33	5.90 ± 0.47	4.88 ± 0.33	t = 1.22 p>0.05 NS	t = 0.25 p>0.05 NS	t = 1.56 p>0.05 NS	t = 0.16 p>0.05 NS
S. Albumin (g/dl)	3.45 ± 0.13	3.31 ± 0.13	3.35 ± 0.17	3.51 ± 0.07	3.38 ± 0.16	t = 1.71 p>0.05 NS	t = 1.10 p>0.05 NS	t = 1.04 p>0.05 NS	t = 0.77 p>0.05 NS
SGPT (IU/L)	80.33 ± 3.01	81.16 ± 2.04	82.16 ± 2.40	80.83 ± 2.04	83.00 ± 2.09	t = 0.56 p>0.05 NS	t = 1.17 p>0.05 NS	t = 0.34 p>0.05 NS	t =1.78 p>0.05 NS
SGOT (IU/L)	150.83 ± 5.85	147.3 ± 2.06	147.5 ± 5.24	148.16 ± 3.80	150.33 ± 4.08	t = 1.38 p>0.05 NS	t = 1.04 p>0.05 NS	t = 0.93 p>0.05 NS	t = 0.17 p>0.05 NS
S. Alkaline Phosphatase (U/L)	454.00 ± 4.08	455.00 ± 4.72	446.00 ± 10.32	447.00 ± 5.24	446.00 ± 6.05	t = 0.13 p>0.05 NS	t = 1.76 p>0.05 NS	t = 2.64 p>0.05 NS	t = 2.68 p>0.05 NS
S.Creatinine (mg/dl)	0.58 ± 0.07	0.56 ± 0.07	0.56 ± 0.08	0.56 ± 0.05	0.56 ± 0.08	t = 0.38 p>0.05 NS	t = 0.37 p>0.05 NS	t = 0.45 p>0.05 NS	t = 0.037 p>0.05 NS

5. Serum protein (total)
6. Serum albumin
7. SGOT
8. SGPT
9. Serum creatinine
10. Serum alkaline phosphatase

Before starting the drug and after completion of the experiment, the blood sample was collected and subjected to the above tests.

Observation and results

Histopathological study

All the animals were found healthy and active during the experiment. After the experiment, the animals were sacrificed and organs were processed and studied for histopathological changes. The changes observed are as follows:

TABLE 4
Microscopic findings/pathological changes observed in Acute toxicity study

Group	Organ	Observation
I	Kidney	Cellular damage in medullar region 1* (Fig. 2)
II	Spleen	Mild congestion in white and red pulp 1* (Fig.8)
IV	Kidney	Tubular damage in both medullar & cellular region 1* (Fig.3)

* Number of animals affected in groups

TABLE 5
Microscopic findings/pathological changes in Chronic toxicity study

Group	Organ	Observation
III	Liver	Mild intra cellular space increased (Fig 6)
IV	Kidney	Glomerulus region widely affected 1*(Fig.4)

* Number of animals affected in groups

Gross changes: - No remarkable pathological changes were observed in both control and treated groups.

Microscopic changes: - The pathological changes observed in organs like kidney, liver, and spleen in the control and treated groups of both experimental groups is detailed in Table 4&5. Rest of the organs like brain, heart, liver, intestine, bone and skin were found morphologically normal. (Fig. 1-8)

Non significant variation was seen in the normal physiological different parameters on group comparison between control and all treated groups (acute and chronic toxicity groups) based upon different haematological biochemical investigation, (Table 6&7)

Summary

- Lohāsava is a herbo-mineral fermented preparation containing self generated alcohol, and is indicated for the treatment of pandu (anaemia) mainly.
- For this work four different samples of Lohāsava were made as per the reference of Śāraṅgadharasamhita and administered on the albino rats.
- No serious toxicity (histopathological & biochemical) was observed in acute and chronic experimental study. So Lohāsava may be considered as a safe drug.

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ROLE OF PAÑCAKOLA IN MAKKALLA (PYOMETRA)

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Abstract: Pain is a very common symptom that everyone experiences sometimes or the other. The perception of pain is subjective and difficult to quantitate. Makkalla (pyometra) is characterized by spasmodic pain of uterine origin in the postpartum state. Management of pain has become a global challenge and much work has been done to provide relief from pain. An effective and safe management of pain is a matter of great concern for physicians as well as surgeons. In āyurveda, a large number of drugs possessing analgesic properties have been mentioned under śūlapraśamana and vedanāsthāpaka mahākaṣāya, Commonly used synthetic or semi synthetic analgesic and anti-inflammatory drugs are known to have adverse effect. In āyurveda, many recipes of drugs mentioned in the texts for the management of makkalla; of them pañcakola was chosen to evaluate its efficacy for the management of makkalla

Woman is termed as sūtika only after the delivery of foetus with its placenta. If placenta is not expelled after foetus, the woman is not called sūtika[1]. Prasūta (delivered woman) becomes weak and lethargic because of labour pains and loss of blood[2]. As her dhātūs decreases because of development and growth of the foetus, she becomes weak and is vulnerable to number of diseases, which are incurable or are cured with difficulty[3]. Makkalla is one such disease and is characterized by spasmodic pain of uterine origin and pain in the head, bladder region and in the abdomen[4-6]. She needs special care, as her digestive power, and physical and psychological strength are undermined due to severe stress during labour.

Though the condition of makkalla is said to develop after delivery, it is included in mūḍhagarbha (obstructed labour). It indicates that our ācāryas were of the opinion that makkalla could develop during pregnancy as well as after delivery[7].

Makkalla occurs mostly in those who has previously given birth to a child, but occasionally occurs in primiparous because of the release of oxytocin when the infant suckles. Sometimes these pains are severe enough to require an analgesic. In āyurveda, a

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number of drugs are described under Śūlapraśamana and Vedanāsthāpana Mahā-kaṣāya. These drugs are used alone or in combination to pacify the pain.

Material and methods

The main objective of the proposed clinical trial was to evaluate the efficiency of an herbal drug compound pañcakola in the management of makkalla as śūlapraśamana (analgesic and antispasmodic) and its un-towards effect, if any.

130 cases were registered out of which 107 patients were selected for the present study. These patients were categorized in three groups viz A, B and C by the table of random numbers. Group A, B and C comprised 32, 35 and 40 patients respectively.

The patients of group A considered as Control group and treated with mefenamic acid 500 mg (Tab. Ponston) while patients of group B considered as Trial group I and treated with Pañcakola ghansattva two capsules (each of 500 mg). These control and trial drugs were given to patients who complained of intolerable pain during first 24 hours of observation. To the patients of group C, considered as Trial group II, were given Pañcakola ghansattva two capsules (each of 500 mg) thrice a day eight

TABLE 1
Mean ± SD of Visual Analogue Scale & Objective Assessment of pain score in the first 8 hours in different groups.

Parameter	Mean ± SD				
	Group A		Group B		Group B
	DR* (n=16)	DNR* (n=16)	DR* (n=17)	DNR* (n=18)	(n=40)
A. Visual Analogue Scale					
1 hr	1.81 ± 0.54	0.81 ± 0.66	1.41 ± 0.62	1.00 ± 0.97	1.33 ± 0.80
2 hrs	2.31 ± 0.70	1.31 ± 0.60	2.29 ± 0.99	1.17 ± 0.99	1.33 ± 0.73
3 hrs	3.06 ± 1.00	1.50 ± 0.82	2.35 ± 1.06	1.44 ± 0.70	1.43 ± 0.84
4 hrs	3.44 ± 1.36	1.50 ± 0.82	2.59 ± 1.37	1.39 ± 0.70	1.65 ± 1.14
5 hrs	2.81 ± 1.17	1.56 ± 0.81	2.53 ± 1.28	1.19 ± 0.68	1.47 ± 1.22
6 hrs	2.00 ± 1.03	1.25 ± 0.77	2.18 ± 1.39	1.00 ± 0.59	1.50 ± 1.45
7 hrs	1.50 ± 0.89	1.06 ± 1.12	1.59 ± 1.23	0.78 ± 0.55	1.50 ± 1.54
8 hrs	0.69 ± 0.79	1.19 ± 1.28	1.12 ± 0.86	0.56 ± 0.51	1.20 ± 1.09
B. Objective Assessment					
1 hr	0.56 ± 0.51	0.31 ± 0.48	0.71 ± 0.59	0.72 ± 0.83	0.50 ± 0.51
2 hrs	0.94 ± 0.25	0.56 ± 0.51	0.88 ± 0.60	0.56 ± 0.70	0.57 ± 0.55
3 hrs	1.44 ± 0.73	0.56 ± 0.51	1.59 ± 0.51	0.67 ± 0.59	0.57 ± 0.55
4 hrs	1.87 ± 0.96	0.56 ± 0.51	1.53 ± 0.72	0.61 ± 0.50	0.98 ± 1.12
5 hrs	1.19 ± 0.54	0.44 ± 0.51	1.29 ± 0.85	0.56 ± 0.51	0.95 ± 1.01
6 hrs	0.87 ± 0.50	0.37 ± 0.50	1.12 ± 0.99	0.39 ± 0.50	0.95 ± 0.99
7 hrs	0.44 ± 0.51	0.44 ± 0.51	0.71 ± 0.81	0.22 ± 0.43	0.75 ± 0.90
8 hrs	0.25 ± 0.45	0.37 ± 0.50	0.47 ± 0.62	0.22 ± 0.43	0.63 ± 0.70

* DR - Drug required; DNR - Drug not required

hourly for seven days irrespective of postpartum pain.

Postpartum pain was assessed during first eight hours on visual analogue scale (VAS) and objective assessment (OA) methods, and the mean of pain scores were calculated as mean pain score. All types of pain like pain in lower abdomen, backache, pain during micturation, retention of urine, flatulence, pain in perineal wound and headache were assessed during postpartum and were taken together and graded as 0, 1, 2 and 3 for absent, mild, moderate and severe. All the patients were examined thoroughly before the clinical trial and were subjected to socio-demographic profile and other variables.

Results and discussion

Pain score**:-** Postpartum pain was assessed during first 8 hours on VAS and OA methods (Table 1). Most of the patients of group A and B had higher pain score in between the second and sixth hour on VAS and OA scales, whereas in patient of group C, where trial drug was given just after delivery, the intensity of pain score was comparatively low (Table 2).

TABLE 2
First dose of drug required in the first 8 hours in group A and B

First dose	Group A	Group B
1 hr	00 -	00 -
2 hrs	01 (3.1%)	02 (5.7%)
3 hrs	05 (15:6%)	04 (11.4%)
4 hrs	04 (12.5%)	04 (11.4%)
5 hrs	03 (9.4%)	04 (11.4%)
6 hrs	01 (3.1%)	02 (5.7%)
7 hrs	02 (6.3%)	01 (2.9%)
8 hrs	00 -	00 -
Drug not required	16 (50%)	18 (51.4%)

Most of patients required medication during third to fifth hour after delivery. The requirement of first dose of the drug in patients of group A and B in first 8 hours of pain assessment was almost equal and identical. The requirement of drug for pain relief in first 8 hours is almost equal and identical in both groups A & B (Table 3).

TABLE 3
Doses required in the first 24 hours in Group A and B

No. of dose	Group A	Group B
0 dose	06 (18.8%)	06 (17.1 %)
1 dose	12 (37.5%)	05 (14.3%)
2 dose	14 (43.8%)	13 (37.1 %)
3 dose	00	10 (28.6%)
4 dose	00	01 (2.9%)

$\div^2$ =12.87, p<0.01, NS

During the first 24 hours of observation, it was found that 37.5 % patients in Group A required only a single dose and 43.8 % required 2 doses for pain relief. No patients of Control group (A) required more than 2 doses in the first 24 hours. However, in Group B, 14.3% patients required single dose, 37.1% two doses and 28.6% three doses, while one patient required four doses in the first 24 hours. The requirement of drug in first 24 hours was more in Group B than Group A. Six patients in each group (A and B) did not require any medication for pain relief in the first 24 hours. Mean pain score on VAS and OA scales were found higher in patients who required two doses in the first 24 hours in Group A, while in Group B it was higher in those who required three or four doses in the first 24 hours.

It clearly indicates that the control drug Ponston was more potent with reference to

pain relief than the trial drug Pañcakola ghansattva because the patients of group A did not require more than two doses of control drug while the patients of group B required more than two doses in 11 patients. No adverse effect of trial drug was observed in patients of group C whereas mild adverse effect was observed in few patients under control drug. Higher pain score was observed in patients of all the groups on following parameters:

- Who belonged to nuclear family, working class and primipara in comparison to joint family, house wife and multipara respectively
- Who took greater time in delivery
- Who belong to vāta-pittaja prakṛti and had avarasattva
- Who were accustomed to irregular and non-unctuous diet
- Who were having irregular menstrual cycle with pain
- Mean pain score on VAS & OA methods were observed highest in patients delivered in varṣaṛtu (monsoon season) while it was lowest in śiśiraṛtu (winter season).
- Who had vaginal delivery with episiotomy
- The higher frequency of vāta doṣakāla (62.6%) was observed when pain score was at its peak in first 24 hours. Mean pain score on VAS and OA scales was also higher in vātadoṣakāla than the pitta and kapha doṣakāla.

No definite relation was observed between the pain score and habitat, educational and socio-economic status, time of delivery and sex of the delivered child.

Patients of group C had less bleeding per vaginum, low tenderness in lower abdomen and more involution of uterus in comparison to patients of group A & B after seven days of medication.

Conclusion

The present clinical study shows that the trial drug Pañcakola ghansattva when used in therapeutic doses in makkalla produces beneficial effects. The analgasic effect of pañcakola is less potent than mefenamic acid (Tab. Ponston) but it seems to be free from adverse effect and hence an alternative acceptable approach to synthetic drugs**.**

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UNDERSTANDING THYROID DISODERS IN ĀYURVEDA

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Abstract: Understanding thyroid disorders in āyurveda is a critical topic of research. They are a common presentations encountered in general practice. Thyroid disorders fall under three pathological conditions that affect the gland. Hypothyroidism, Hyperthyroidism and Benign nontoxic Goitre are associated with swelling in the neck region. Here, an attempt has been made to correlate and discuss the above conditions from an āyurvedic perspective.

Introduction

Disorders of the thyroid are the second most common presentations after diabetes mellitus in the hospitals. Among them Iodine deficiency disorders are common. Hypothyroidism, Hyperthyroidism and benign Thyroiditis are the three pathologies that affect the gland.[1]

No description is available in the āyurvedic classics under the name of thyroid disorders. However, Suśruta has mentioned a swelling called gaḷagaṇḍa. It is caused by vitiated kapha and vāta, and thereby vitiated medodhātu.[2] Ḍalhaṇa, the famous commentator on Suśrutasamhita refers to a small or large swelling that hangs like a testicle with a broad base is called gaḷagaṇḍa.[3] All the swellings of the neck cannot be termed gaḷagaṇḍa but the one that hangs firmly from the neck, like an egg, is called gaḷagaṇḍa. Bhoja substantiates it further and specifies the sites of swelling as mandibular, sternomastoid, and neck regions.[4]

The clinical features of gaḷagaṇḍa include dryness of mouth, anorexia and sweetness of mouth. It is of three types i.e. vātaja, kaphaja and medoja. Pittaja gaḷagaṇḍa is omitted by the authors because of the nature of the disease (vyādhisvabhāva).[5] The complications described are breathlessness and hoarseness of voice.[6] No specific treatment has been mentioned except local application and surgical excision. Thus our ācāryas have recognized it as a non-significant swelling of the neck. Hypothyroidism is a pathologic condition of multi-system involvement. The clinical features are generalised swelling of the body, loss of hair, depression, constipation and menorrhegia in females. The possibility of correlation of Hypothyroidism with gaḷagaṇḍa can be excluded since it has no systemic symptoms. Gaḷagaṇḍa is a state of simple goitrous swelling, or benign thyroiditis where there is excess accumulation of the colloid material.

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Hyperthyroidism may be associated with goitre as seen in graves disease. It is characterized by circulation of excess T_3 and T_4 in the blood leading to the development of symptoms i.e. increased appetite, weight loss, heat intolerance, sweating, easy fatigue, irritability, fine tremors, tachycardia, exophthalmos and myopathy. These symptoms are also seen in a state of increased Basal Metabolic Rate.

Bhasmaka is a disorder of agni which can be correlated and understood with Hyperthyroidism The features described above are inconsistent with a condition called bhasmaka, an abnormality of excess function of digestive fire (tīkṣṇāgni). Bhasmakaroga has been mentioned by our ācāryas in the context of grahaṇi. Caraka and Vāgbhaṭa describe this disease as atyagnipradoṣa i.e perverted digestive metabolism[7]. But Mādhavakara refers to the term bhasmaka while commenting about agni (atyantatīkṣṇāgnirevabhasmaka)[8]. He considers atyantatīkṣṇāgni (hyper functioning of digestive enzymes) as bhasmaka.

Tīkṣṇāgni is different from bhasmaka in the following points: i. that it is a state of agni (sama, viṣama, tīkṣṇa and manda), ii. that tīkṣṇāgni has the association of pitta and iii. tīkṣṇāgni is a physiological condition but not a pathological state[9a].

On the other hand, bhasmaka is a state of gross decrease in kapha and abnormal increase in vāta and pitta. Bhasmaka is described in the chapter of Grahaṇiroga as this too is a disorder of deranged agni. Bhasmaka (bhasma) literally means ash; as fire has the property to burn anything and every thing it comes across and turn them into ash, so also the digestive fire. When there is no fuel available it burns the kaphadi doṣas, the dhātus (rasa, rakta, māmsa, medus, etc) and ultimately kills the person.

The clinical features of bhasmaka are explained in Carakasamhita[9b]. It says that there is excess craving for food which is pacified only by taking large amounts and reverts once it is digested. Suśruta says that intake of excess food is digested very quickly, forcibly and generates a feeling of burning sensation in the palate, lips and throat. This condition simulates medoroga as mentioned by Suśruta and Vāgbhaṭa where there is voracious appetite but no weight loss, instead excess weight gain is seen, Caraka conceived this and described the same under atisthūla of aṣṭaninditapuruṣa[10]. The complications are thirst, dyspnoea, burning sensation and syncope. The appearance of these symptoms is considered as a bad prognosis.

The disease Hyperthyroidism is a condition of increased Basal Metabolic Rate (BMR) in which there is hyper functioning of agni. This abnormal function of agni can be measured by assessing the BMR according to modern medicine. Some other endocrinal conditions like Hyperpitutarism, Frolich's syndrome, Bulimia Nervosa and some of the anxiety states associated with excess appetite, compulsive intake of food and obesity. Weight loss is never seen in the above conditions, so they can be excluded from bhasmaka roga.

A similar condition of voracious appetite with paradoxical weight loss has been described in western medicine under Diabetes Mellitus (DM). DM is characterised by insulin deficiency, (absolute or relative), deficiency of insulin receptors on the cell membrane or insulin resistance. Insulin is the transporter molecule of glucose inside the cell. In the absence of

insulin cells are devoid of glucose and undergo a state of starvation. The sensitive receptors in the Hypothalamus sense this and stimulate the satiety center due to which a person feels appetite. At times the person goes on taking food without developing any satiety. This precipitates hyperglycaemia and glycosuria. If this vicious cycle continues, the cells derive their fuel glucose by mobilizing and burning the protein and the reserved adipose tissue (neoglucogenesis). Hence weight loss is seen in DM. Hyperglycaemia has its own adversities which brings about atherosclerotic changes in the blood vessels and myelin degeneration in nerves. Diabetes spares no organ in the body. There are some common features in bhasmaka and hyperthyroidism (Table 1).

The other symptoms of D.M like polydipsia and polyuria are missing in bhasmaka and voracious appetite is seen only in Type-I (juvenile) diabetes. This makes āyurveda to limit correlation of diabetes with bhasmaka. Moreover, from the features of hyperthyroidim and bhasmaka (Table 1), it is clear that both the conditions are one and the same. Only symptom like exophthalmos is missing. Regarding the management of bhasmaka and hyperthyroidism, as described in classics, there exists heaven and earth difference. But, discovery of such drugs that act both in bhasmaka and hyperthyroidism is the need of the hour.

TABLE 1
Clinical features of Bhasmaka and Hyperthyroidism in common

Clinical features	Bhasmaka	Hyp.thyroidism
Excess appetite	+	++
Excess food intake	+	++
Weight loss	+	++
Excess thirst	+	++
Heat intolerance	+	++
Syncope	-	++
Breathlessness	-	+
Palpitations	-	+
Irritability	-	++
Insomnia	-	+
Hyperglycaemia	-	+
Fatigue	-	++
Myopathy	-	+++

Management principle

As described by Caraka, decreased kapha should be increased, pitta should be pacified and vāta should be brought to normalcy. This checks the deranged fire and restores the normalcy of digestion, resulting in improved strength, longevity of life. Only the dietary foods are described in texts and no drugs are mentioned. The foods which are sweet, heavy and oily i.e. rich in carbohydrates and fats are to be taken and day sleep is advised to increase kapha and pacify the perverted digestive fire.[11]

Conclusion

- Thyroid disorders find no mention in āyurvedic texts as such.
- Gaḷagaṇḍa mentioned in āyurveda, is a simple local swelling, colloid goitre but not hypothyroidism which is a multi-system disorder with varied systemic features.
- Hyperthyroidism, a disorder of excess T_3, T_4, can be correlated with the entity bhasmaka, a state of hyperfunctioning of agni characterized by compulsive food intake with paradoxical weight loss.
- The rationality of treatment mentioned in ayurveda for bhasmaka is still the topic of research.

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EXPLORING THE USE OF MEDICINAL LEECHES

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Abstract: Leeches, popularly known as jaḷauka in āyurveda, are described in all the three major compendium of āyurveda. Leeches, through a blissful dispensation of nature in themselves, instinctively draws off the vitiated blood from a diseased part, attacking the healthy vital fluid when the former has been completely tapped or sucked. Being cool and sweet, or soothing in nature, it is mainly indicated in pitta-dominated diseases. Āyurvedic physicians use leeches for the management of skin diseases, granthi, śopha, etc. Now a days, modem surgeons also use leeches in chronic non-healing ulcers, varicose vein, deep venous thrombosis etc. This paper briefly discusses the uses of medicinal leeches.

Introduction:

The medicinal leech, *Hirudo medicinalis*, was used extensively in the 19th century for various diseases. Today leeches are increasingly being used as surgical tools in tissue grafts and reattachment surgery for their ability to prevent blood clots and to help keep tissues healthy. In 1884, John B. Haycraft, Professor of Physiology at the University of Wales, discovered that blood within the gut of the leech would not coagulate and that blood continuously flow from leech wounds for abnormally long times. Since thrombin both makes fibrin from fibrinogen and activates platelets, its inhibition by hirudin decreases blood clotting. Subsequently, the biochemical, structural, biological and pharmacological activities of hirudin, which is now made by recombinant DNA technology, have been well studied.

Reconstructive surgical procedures, such as free flaps, pedicle flaps, and replantation of amputated tissues, often include an anastomosis between either surgically ligated or traumatically severed blood vessels. Venous congestion is a serious complication of these types of procedures and occurs when the venous outflow from a tissue is reduced relative to arterial input. Kinking or impingement on the veins and/or thrombus formation within the veins can cause this reduction. If venous congestion is not corrected either surgically or via some other means, the developed stasis within the vasculature of the tissue will cause the replanted region to necrosis. Although medicinal leeches have been a part of medical practice for thousands of years, not until the advent of reconstructive microsurgery in the 1960s did bloodletting by leeches have a

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legitimate medical purpose. In āyurveda, raktaviśravaṇa (bloodletting) is a type of karma. There are three means of bloodletting described in āyurveda; among them jaḷaukāvacaraṇa or leech application is one. It mainly cures pitta-dominated diseases like granthi, śopha and skin disorders.

Historical background

Blood letting had been practiced since the Stone Age. Evil spirits were thought to cause illness, and removal of these evil spirits required blood withdrawal. Fevers and other illness were once believed to be caused by vitiation of blood. Leeches were widely used in Europe especially in France for medicinal purpose from reliving pain to high blood pressure treatment. Their use caused the depletion of the supply of European population of leeches. The first western documentation of therapeutic use of leeches is the poem of Alexander by Nicander of Colophon in 200-130 B.C. Galen in 129-189 A.D advanced the practice of blood letting through the development of his humoral concept of disease. Records of the medical use of leeches date back to the beginning of civilization. Illustrations of leech application to patients were found in Egyptian tombs dating back to 1500 B.C. Chinese writings from the first century A.D describe medicinal leeching. The therapeutic use of leech reached a height between 1825 and 1840. The peak in use of medicinal leech during this period was due to new theories regarding the benefits of blood letting. Francisco Broussais proposed that all disease resulted from excess build up of blood and the alleviation of this condition required heavy leeching and starvation. *H. medicinalis* became endangered species because of its popularity in leeching benefits. France had turn to importing leeches. Leeches were used in bloodletting in the United States also during 19th century. After 1830, the practice by leech began to decline as medical diagnostic skills improved. Then the discoveries that blood in the leech gut would not coagulate (by Jhon Harycraft in 1884) and isolation of anticoagulant in leech pharyngeal glands (by F.Maerkwardt in l957) ensured the medical importance of leeches.

References in āyurvedic texts

Āyurveda offers unique measures that heal acute and chronic disease. A number of incurable diseases are referred to be managed by raktamokṣaṇam (bloodletting). Application of leech is a specialized contribution of āyurveda to treat certain pitta-dominated disease. It is harm less and pain less mode that successfully treat the blood related disorders. It is a minimum invasive para-surgical approach to treat successfully eczema, urticaria, chronic non-healing ulcers, gout, arthritis, varicose veins, hemorrhoids and deep venous thrombosis. Āyurvedic texts like Caraka and Suśruta samhitas elaborately describe leech therapy. Carakasamhita mentions that in all blood related diseases, one should follow the treatment principles such as purgation and bloodletting as they mitigate rakta and pitta doṣas[1]. Suśrutasamhita, in the context of vidradhicikitsa, mentions that bloodletting should be done by leeches and if it suppurates then puncture the vidradhi and pus should be drained out[2]. It also describes that leeches should be applied where the patient is old or imbecile, a women, an infant, a person of extremely timid disposition, a person of delicate constitution. And as such, it is not fit on surgically operated upon since this mode of bleeding is the gentlest that can be possibly devised[3].

Mode of action

According to āyurvedic concepts, the blood vitiated due to deranged vayu, pitta and kapha should be sucked through a horn, by leech and a gourd appliance respectively[4]. A cow-horn has heat making potency, slightly cooling or soothing property; accordingly, it should be used in sucking the blood vitiated due to vāta doṣa. Leeches which are born in water, posses sweet or soothing properties and hence they should be used in sucking the blood vitiated due to pitta doṣa. So, it is useful in pitta and rakta dominated diseases[5].

The term jaḷauka may be etymologically interpreted to mean the creature whose life or longevity is in or depend upon water. The term 'oak' means dwelling place; its dwelling place is jala or water[6].

According to modern concepts, leeches are used to enhance circulation of blood in the injured area after replantation surgery. Blood will flow out through the veins resulting in a build up pressure. The reason for this could be that there are not enough veins or, because the veins are not functioning well enough. In this condition, leeches are used to suck up the extra blood causing a reduction in pressure leading a better circulation. Leeches are used to reduce venous congestion by creating prolonged localized bleeding. The artificial circulation gives the graft time to reestablish its own circulation. It helps to prevent necrosis and edema. Besides this, leech saliva contains hirudin, bdelin, eglin, hementin, collagenese, apyrase, decrosin, hyaluronidase, orgelase and anesthetics. Gosic and viner in 1983 postulated that haementeria ghilani inhibits lung metastasis. Specifically, medicinal leeches are placed upon the congested tissue to facilitate removal of excess blood until micro venous circulation is effectively reestablished approximately 4 to 10 days after surgery.

Methods of application

Suśrutasamhita explains that the part, from which the blood to be sucked, should be scarified first by dusting with a composition of loose earth or pulverized cow dung[7]. Then the leech should be taken out from the container and sprinkled over with water saturated with mustard seed and paste of turmeric and kept in a basin full of water. After regaining their natural vivacity and freshness, they should be applied on the affected part. Their bodies should be covered with a piece of white cotton. In case the leech refuse to stick to the desired spot, the effected part should be sprinkled over with drops of milk or blood, or slight incision should be made on it.

Indications

Suśrutasamhita indicates bloodletting by leeches in skin disorders, granthi, śopha and all kinds of blood related disorders, and emphasizes that they will not reoccur if managed by bloodletting used by leeches[8]. It is very useful in kuṣṭha and all kinds of skin diseases[9]. Carakasamhita recommends bloodletting by leeches in all kind of blood vitiated disorders[10].

Post-bite management

Āyurvedic texts fairly deals with post-bite management also. Suśruta mentions that an ulcer incident where application of leeches are indicated, should be rubbed with honey or washed with spray of cold water or bound up with an astringent, sweet and cooling plaster. In cases of proper bleeding, the ulcer should be rubbed with medicated ghee technically known as Śatadhauta ghṛta or a piece of cotton soaked

in the same substance applied as a compress over the part. The ulcer should be rubbed with honey in case of insufficient bleeding, while it should be washed with a copious quantity of cold water if excessive bleeding set in[11].

Conclusion

Today, *hirudin* is in human clinical trials for the treatment of thrombotic disease and may someday become an approved drug, for leeches and other bloodsucking creatures have figured out how to prevent blood from clotting. If we can learn the secret of leeches, it would be boon to human being in many ways including prevention of blood clotting that cause large number of serious illnesses such as heart attack.

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1. कुर्याच्छोणितरोगेषु रक्तपित्तहरीं क्रियाम् ।
विरेकमुपवासं च स्रावणं शोणितस्य च ।।
(च. सू. २४/१८)

2. त्रिवृद्धरीतकीनां च चूर्णं लिह्यान्मधुद्रवम् ।
जळौकोभिहरेच्चासृक् पक्वं चापाट्य बुद्धिमान् ।।
(सु. चि. १६/१२)

3. नृपाढ्यबालस्थविरभीरुदुर्बलनारीसुकुमाराणा-
मनुग्रहार्थं परमसुकुमारोऽयं शोणितावसेचनोपा-
योऽभिहितो जळौकसः ।। (सु. सू. १३/३)

4. तत्र वातपित्तकफदुष्टशोणितं यथासंख्यं शृङ्गज-
ळौकालाबुभिरवसेचयेत्, सर्वाणि सर्वैर्वा (विशेषस्तु
विस्राव्यं शृङ्गजळौकालाबुभिर्गृह्णीयात्) ।।
(सु. सू. १३/४)

5. शीताधिवासा मधुरा जळौका वारिसंभवा ।
तस्मात् पित्तोपसृष्टे तु हिता सा त्ववसेचने ।।
(सु. सू. १३/६)

6. जलमासामायुरिति जळायुकाः, जलमासामोक इति
जलौकसः ।। (सु. सू. १३/९)

7. अथ जळौकोवसेकसाध्यव्याधितमुपवेश्य संवेश्य वा,
विरूक्ष्य चास्य तमवकाशं मृद्गोमयचूर्णैर्यद्यरुजः
स्यात् । गृहीताश्च ताः सर्षपरजनीकल्कोदक-
प्रदिग्धगात्रीः सलिलसरकमध्ये मुहूर्तस्थिता
विगतक्ळमा ज्ञात्वा ताभी रोगं ग्राहयेत् । श्ळक्ष्ण-
शुक्ळार्द्रपिचुप्रोतावच्छन्नां कृत्वा मुखमपावृणुयात्:
अगृह्णन्त्यै क्षीरबिन्दुं शोणितबिन्दुं वा दद्यात्,
शस्त्रपदानि वा कुर्वीत; यद्येवमपि न गृह्णीयात्तदाऽन्यां
ग्राहयेत् ।। (सु. सू. १३/१९)

8. त्वग्दोषा ग्रन्थयः शोफा रोगाः शोणितजाश्च ये ।
रक्तमोक्षणशीलानां न भवन्ति कदाचन ।।
(सु. सू. १४/३४)

9. रुधिरागमार्थमथवा शृङ्गालाबूनि योजयेत् कुष्ठे ।
प्रच्छितमल्पं कुष्ठं विरेचयेद्वा जळौकोभिः ।।
(च. चि. ७/५२)

10. शीतोष्णस्निग्धरूक्षैर्हि न व्याधिरुपशाम्यति ।
रक्ते दुष्टे भिषक् तस्माद्रक्तमेवावसेचयेत् ।।
जळौकोभिस्तथा शस्त्रैः सूचीभिर्वा पुनः पुनः ।
आवर्तमानं रुधिरं रक्तार्शोभ्यः प्रवाहयेत् ।।
(च. चि. १४/६०-६१)

11. शोणितस्य योगायोगानवेक्ष्य शतधौतघृताभ्यङ्गः
तत्पिचुधारणं वा; जळौकोव्रणान् मधुनाऽवघट्टयेत्,

शीताभिरद्भिः परिषेचयेद् बध्नीत वा, कषायमधुर-स्निग्धशीतैश्च प्रदेहैः, प्रदिह्यादिति ।।

(सु. सू. १३/२३)

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STUDIES ON HYPOLIPIDEMIC PROPERTIES OF *MURRAYA KOENIGII* SPRENG.

Gambhire Sheetal, P.R. More, M.I. Qureshi and S.R. Rajurkar *

Abstract: *Murraya koenigii* Spreng., belongs to the family Rutaceae, is one of the most widely cultivated plant throughout the country, commonly known as Curry leaf tree in English, karhinimb or karhipatta in Hindi. The powdered leaf powder was experimented in normal and alloxan induced diabetic rats to explore its effect on serum cholesterol, triglyceride, blood urea nitrogen (BUN) and alanine transaminase (ALT) level. The result indicated significant reduction in the serum cholesterol and serum triglyceride level in the treated group.

Introduction

Maintaining the blood sugar level with a controlled lipid profile is a key to fight diabetes. Naturally, treatment of controlling the hyperlipidemia is a part of the antidiabetic therapy. There are many drugs in the market but they are either uneconomic or are not free from the side effects. Hence a search for a safe and economic drug is necessary.

Several studies on hypoglycemic effect of medicinal herbs indicated usefulness of these plants in the treatment of hyperlipidemia also. Therefore, the present study was carried out to investigate the hypolipidemic effect of common spice plant *Murraya koenigii* Spreng. in normal and alloxan diabetic rats with the following objectives :

- To study the hypolipidemic effect of the leaf powder of *Murraya koenigii* Spreng. in normal wistar rats and in alloxan diabetic rats.
- To investigate the changes in biochemical parameters like cholesterol, triglycerides, blood urea nitrogen (BUN) and alanine transaminase (ALT).

Materials and methods

Murraya koenigii Spreng., belongs to the family Rutaceae, is one of the most widely cultivated plant throughout the country, commonly known as Curry leaf in English and karhinimb or karhipatta in Hindi. (Fig. 1)

Healthy matured fresh leaves of *Murraya koenigii* Spreng. were collected and dried under fan in the laboratory. The dried leaves were crushed into a fine powder with the help of electrical grinder. The powder so obtained was used for experimental purpose. Each gram dry powder of leaves was equal to three grams of fresh leaves.

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Experimental animals

Fifty adult wistar rats of either sex weighing between 180-220 g were randomly selected for the study. They were divided into five groups each consisting of ten rats (Table 1). The treatment was continued daily for sixty consecutive days. All rats were maintained on standard rat feed with free access to fresh clean drinking water.

Diabetes mellitus was induced by intraperitoneal administration of alloxan monohydrate (S.d. Fine-Chem. Ltd., Mumbai) at the dose rate of 120 mg/kg body weight. One week after alloxan administration diabetic status was confirmed by estimating serum glucose levels. The rats showing fasting serum glucose level higher than 200 mg/dl were included in group III, IV and V.

Observations

All five groups of rats were continuously observed for any behavioural changes and for the appearance of any visible adverse reactions during the entire experimental period.

Fig. 1. *Murraya koenigii* Spreng. - Leaves

Biochemical parameters

The serum samples were analysed for blood urea nitrogen (BUN), cholesterol, triglyceride, alanine transaminase (ALT) using Autospan reagent kits on Auto-analyser Slim (SEAC)

Statistical analysis

The biochemical parameters in all the five groups were analysed by analysing the data generated by Factorial Randomised Block Design (Panse and Sukhatme, 1967).

Results and discussion

General behaviour: All groups of rats did not exhibit any behavioural change during entire period of experiment. The rats of control and treatment groups did not show any treatment related adverse reaction and they were apparently healthy even up to sixty days.

Biochemical investigations:- The study was carried out on various biochemical parameters during different intervals.

Serum cholesterol concentration

There was no significant alteration in serum cholesterol levels in normal control rats and

TABLE 1

Experimental groups and treatment

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

*10 rats in each group

normal rats treated with the powder i.e. the levels were within normal range. In diabetic control rats day '0' and 61st day serum cholesterol levels were 93.95 + 9.44 and 142.12 + 11.96mg/dl, respectively. However, there was significant rise (P<0.01) in cholesterol level on 61st day in diabetic control rats. In diabetic rats treated with *Murraya Koenigii* Spreng. leaf powder the pre treatment level was 90.93 + 4.33 mg/dl and post treatment level was 65.25 + 5.47 mg/dl. There was significant fall (P<0.01) at 60 days interval as compared to pre treatment level. In diabetic rats treated with glibenclamide the pre treatment and post treatment cholesterol level were 82.5 + 5.70 and 103.74 + 7.87 mg/dl, respectively. There was significant (P<0.01) rise on 61st day in glibeclamide treated diabetic rats.(Table 2)

Serum triglyceride concentration

There was no significant change in serum triglyceride levels in normal control rats and normal rats treated with leaf powder. In diabetic control rats day '0' and 61st day serum triglyceride levels was 88.07 + 5.23 mg/dl and 150.84 + 9.24 mg/dl, respectively. However, there was significant (P<0.01) rise in serum triglyceride level on 61st day in diabetic rats. In diabetic rats treated with leaf powder the pre treatment level was 95.15 + 3.55 mg/dl and post treatment level was 76.81 + 3.47 mg/dl. There was significant fall (P<0.01) at 60 days interval as compared to pre treatment level. In diabetic rats treated with glibenclamide the pre treatment level and post treatment level was 80.62 + 3.90 and 98.63 + 3.96 mg/dl, respectively. There was significant rise (P<0.01) in serum triglyceride concentration in glibeclamide treated diabetic rats, on 61st day. (Table 2)

The serum cholesterol and triglyceride concentrations were within normal range in normal control rats and normal rats treated with leaf powder. The serum cholesterol and triglyceride levels in normal rats treated with

TABLE 2

Effect of leaf powder of *Murraya koenigii* Spreng. on serum choesterol and triglyceride levels

	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)	65.62 + 4.69	66.16 + 5.63	81.05 + 5.43	80.65 + 4.48
II	Normal + *Murraya koenigii* (@ 2 g/kg body weight)	68.24 + 5.78	60.78 + 6.34	82.50 + 6.48	78.94 + 4.86
III	Diabetic control	93.95 + 9.44*	142.12 + 11.96*	88.07 + 5.23*	150.84 + 9.24*
IV	Alloxan diabetic + *Murraya koenigii* @ 2 g/kg body weight	90.93 + 4.33*	65.25 + 5.47	95.15 + 3.55*	76.81 + 3.47*
V	Alloxan diabetic + glibenclamide (@ 600µg/kg body weight)	82.05 + 5.70*	103.74 + 7.87*	80.62 + 3.90*	98.63 + 3.96*

*Significant difference (P<0.01) in rows

leaf powder were decreased at post treatment as compared to pre treatment level but the fall was not significant. In diabetic control rats significant rise (P<0.01) was observed in serum cholesterol and serum triglyceride levels. In diabetes there is increased activity of hormone sensitive lipases in adipose tissues which causes lipolysis and releases more free fatty acids into circulation (Agardh *et al.*, 1999). Insulin causes lypolysis and decreased activity of insulin in diabetic rats leads to hypercholesterolemia and hypertriglyceridemia (Boppana *et al.* 1997). Similar findings were recorded by several others (Ponnachan *et al.* 1993 and Khosala *et al.* 1995). In diabetic rats treated with leaf powder there was significant (P<0.01) fall in serum cholesterol and triglyceride concentration as compared to their '0' day concentration.

Serum ALT concentration

There was no significant alteration in serum ALT levels in normal rats and normal rats treated with leaf powder and the values were within normal range. In diabetic control rats there was significant rise (P<0.01) in ALT level at post treatment interval (75.60 + 3.66 IU/L) as compared to pre treatment level of 46.43 + 1.32 IU/L. In leaf powder treated diabetic rats the pre treatment ALT concentration was 48.36+ 2.6 IU/L post treatment concentration of 36.52 + 1.26 IU/L. However, the post treatment serum ALT level was significantly (P<0.01) reduced as compared to pre treatment value. In diabetic rats treated with glibenclamide the serum concentrations at pre treatment was 53.49 + 3.05 IU/L and post treatment value of 64.67 + 4.13 IU/L. The post treatment ALT value was significantly higher (P<0.01) when compared to pre treatment value. However, the serum ALT concentrations were within normal range. (Table 3)

Blood urea nitrogen concentration

The BUN values of normal rats were 17.14 + 0.92 mg/dl at pre treatment and 19.00 + 1.41 mg/dl post treatment. In normal rats treated with

TABLE 3

Effect of leaf powder of *Murraya koenigii* Spreng. on serum ALT & urea nitrogen levels

	Group and Treatment	Serum ALT level in IU/L (Mean + SE)		Blood urea nitrogen in mg/dl (Mean + SE)	
		Pre-treat (0 day)	Post-treat (60 day)	Pre-treat (0 day)	Post-treat (60 day)
I	Normal (Control)	37.45 + 1.58	39.19 + 1.25	17.14 + 0.92	19.00 + 1.41
II	Normal + *Murraya koenigii* (@ 2 g/kg body weight)	36.74 + 1.46	38.65 + 1.60	18.10 + 0.93	18.37 + 0.79
III	Diabetic control	46.43 + 1.32*	75.60 + 3.66*	26.44 + 0.56*	40.14 + 0.81*
IV	Alloxan diabetic + *Murraya koenigii* (@ 2 g/kg body weight)	48.36 + 2.6*	36.52 + 1.26*	24.01 + 0.89	22.96 + 1.53
V	Alloxan diabetic + glibenclamide (@ 600µg/kg body weight)	53.49 + 3.05*	64.67 + 4.13*	27.80 + 1.06*	34.52 + 1.02*

* Significant difference (P<0.01) in rows

leaf powder the BUN level were 18.10 + 0.93 mg/dl and 18.37 + 0.79 mg/dl at pre treatment and post treatment level, respectively. In diabetic control rats, the BUN levels were significantly higher ($P<0.01$) at post treatment (40.14 + 0.81 mg/dl) than pre treatment levels (26.44 + 0.56 mg/dl). Diabetic rats treated with the leaf powder showed no significant alteration serum BUN level at post treatment (22.96 + 1.53 mg/dl) as compared to pre treatment value (24.01 + 0.89 mg/dl). The BUN levels in diabetic rats treated with glibenclamide were significantly higher ($P<0.01$) at post treatment level (34.52 + 1.02 mg/dl) as compared to pre treatment value (27.80 + 1.06 mg/dl). (Table 3)

There was no significant change in blood urea nitrogen level on 61st day in normal and normal rats treated with the leaf powder. The increase in blood urea nitrogen level in diabetic control rats might be due to oxidative damage to kidney (Prasad *et al.* 2004). In diabetic rats treated with *Murraya koenigii* Spreng. leaf powder there was no significant change in BUN level.

Conclusion

From the present investigations it can be concluded that

- The *Murraya koenigii* Spreng. leaf powder treatment significantly reduce serum cholesterol and triglyceride levels in alloxan diabetic rats indicating hypolipidemic response.
- Leaf powder treatment for entire experimental trial did not produce any gross pathological changes in visceral organs.

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PHARMACOGNOSTICAL STUDIES OF *ANAPHALIS NEELGERRIANA* DC.

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Abstract: *Anaphalis neelgerriana* DC. is found to be effective in various diseases such as cuts, wounds, abscesses, stomach inflammation, skin infections, etc. This paper deals with the Pharmacognostical studies carried out on the aerial parts of *Anaphalis neelgerriana* DC. for the identification and differentiation of the plant from other related species of *Anaphalis*. Leaf constants such as vein islet number, veinlet termination number, stomatal index, palisade ratio, physical constants like ash values and extractive values are studied.

Introduction

Anaphalis neelgerriana DC belongs to the Asteraceae family. It is a small much branched plant known as 'nilgiri everlasting'[1,2] which is used by the tribals of Nilgiris in stomach inflammation, cuts, wounds, abscesses and in skin infections[1,2,3]. The plant is indigenous to Himalayas, Palani and Nilgiri Hills and is widely used in herbal medicine for psoriasis[4]. Survey of literature showed that no systematic approach has been made to study Pharmacognostical parameters of this plant. The present investigation deals with macroscopical, microscopical, leaf constants, analytical parameters and powder microscopy of the *Anaphalis neelgerriana* DC. leaf and stem.

Collection and identification

The aerial parts of the plant were collected from Ooty, Nilgiris, Tamilnadu and identified from Medicinal Plants Collection Unit, Ooty. The plant material was cleaned and allowed to dry in shade and powdered; it was then filtered by sieve 60 and the fine powder so obtained was used for determining analytical parameters[5,6,7].

Macroscopical characters

This plant is found usually grow in dry rocky soil and on dry slopes. The branches are thick woody, short and densely compacted. The leaves are cauline, appressed, linear and less than 1 cm long. The inflorescence is terminal and corymbose[1-3].

Stem:- The stem has quite broad, rough and fissured periderm, continuous cylinder of secondary phloem and dense, solid cylinder of secondary xylem.

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Microscopical characters

T.S. of Leaf

The plant is woody shrub with densely crowded, whitish grey narrow thin leaves; surface of the stem is rough and deeply fissured. The T.S. of leaf shows revolute margins and dense epidermal trichomes of uniseriate unbranched non glandular type. The midrib is planoconvex with prominent oblong wide adaxial midrib, the vascular bundle of the midrib is single, collateral and small. Lamina has distinct epidermal cells single layered of short, wide palisade cells and 3 layers of spherical spongy mesophyll cells. Calcium oxalate crystals are abundant in the leaf tissues[8-10] (Fig.1)

T.S. of Stem

The stem has wide obliterated and fissured cortex and deeper, broader, irregularly organized periderm. The secondary phloem has discontinuous tangential blocks of fibres and radial files of phloem elements. Secondary xylem consists of radial bands of xylem elements separated by wide dilate of rays. Vessels are narrow, spare and diffuse in distribution. Secondary xylem exhibits distinct narrow growth rings. Pith is narrow, thick walled and parenchymatous. (Fig.2)

Anaphalis neelgerriana DC.
Leaf and stem parts

Powder microscopy

Leaf

The powdered leaf shows small fragments of epidermal tissue. The upper epidermal fragment is apostomatic. The epidermal cells are either squarish or rectangular. The anticlinal walls are wavy and thick. The lower epidermal fragment has polygonal epidermal cells. The anticlinal walls of the epidermal cells are thick and straight, the lower epidermis has dense stomata, the stoma is surrounded by subsidiary cells around the stomatal type is cyclocytic.

Stem

These are elongated cylindrical cells with thick secondary walls, the lateral walls have well developed, bordered pits which are alternate in arrangement. The end -of the vessel element may be blunt or shortly tailed. The perforation plate is simple wide either horizontal or oblique. The vessels range from 150-200 µm long and 40 - 60 µm wide. The xylem fibres are 350 µm long and 30 µm wide the narrow fibres without pits are 350-400 µm long and 10 µm wide. The xylem parenchyma cells have thick walls and abundant, elliptic simple pits.

Leaf constants

The leaf constants were found to be as follows: Vein islet number 8.15 - 9.92, Veinlet termination number 10.16 - 11.15, stomatal number of the upper epidermis 78.70 - 82.15, lower epidermis 150.12 - 165.15, stomatal index of the upper epidermis 30.82 - 32.92, lower epidermis 32.65 - 36.78[5, 6].

Analytical parameters

Ash values

Ash values are helpful in determining the

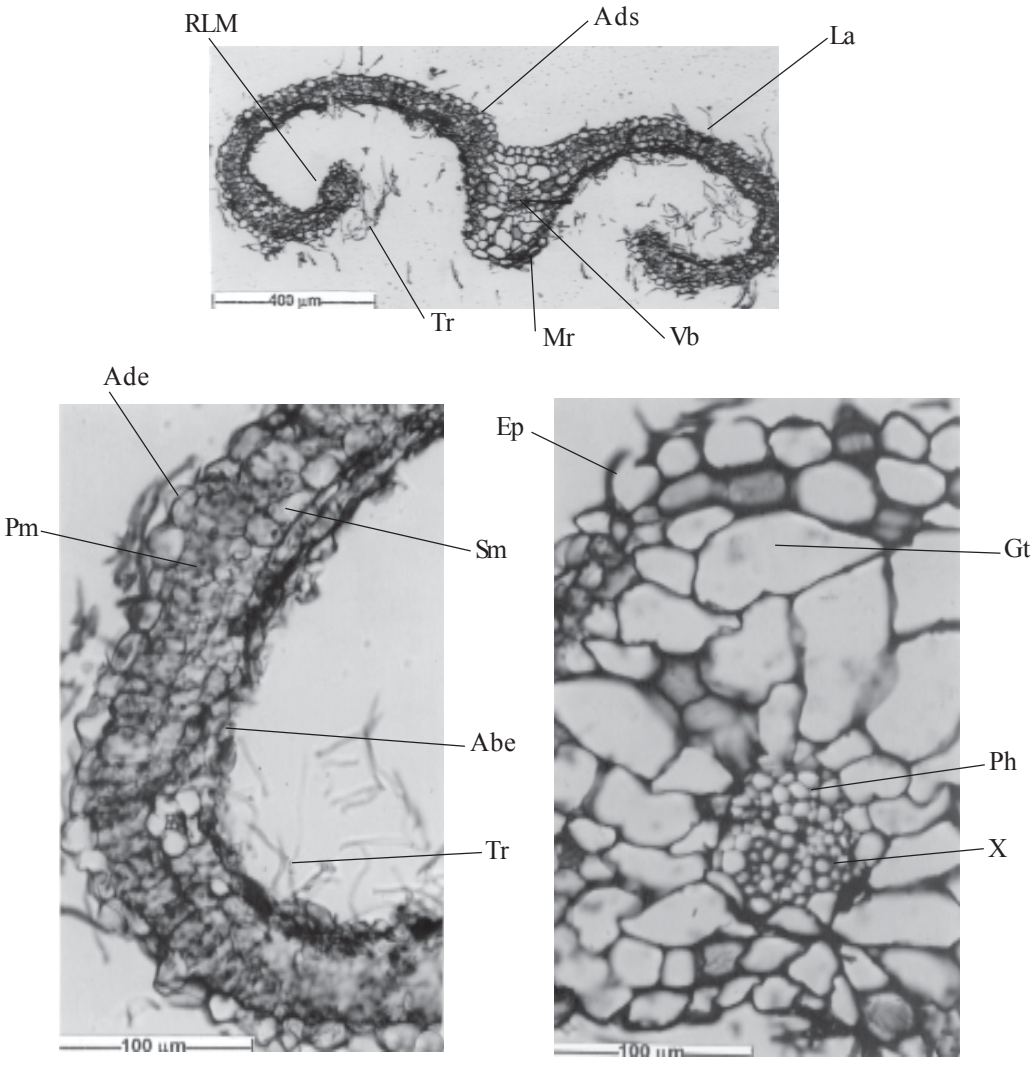

Fig. 1: *Anaphalis neelgerriana* DC. - Leaf with midrib and revolute margins

Ads Adaxial side **La** Lamina **Tr** Trichomes **Vb** Vascular bundles **Mr** Midrib
Ade Adaxial epidermis **Sm** Spongymesophyll **Pm** Palisade mesophyll
Ep Epidermis **Gt** Ground tissue **Ph** Phloem **X** Xylem

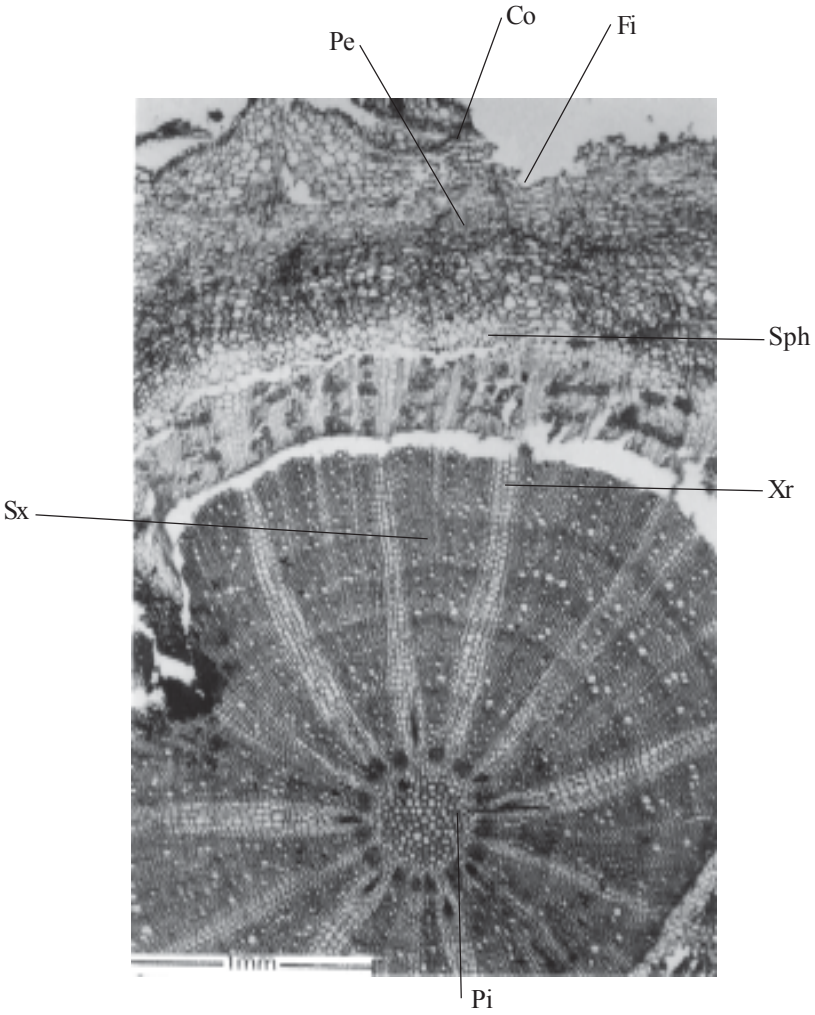

Fig. 2: *Anaphalis neelgerriana* DC. - T.S. of stem

Co Cortex **Fi** Fissures **Pe** Periderm **Sph** Secondar phloem **Sx** Secondary xylem **Xr** Xylem rays **Pi** Pith

quality and purity of the crude drugs in the powder form. The ash values such as total ash (10.15%) acid insoluble ash (0.352%) water soluble ash[7] (3.62%) and sulphated ash (9.5%)[7] were determined according to Indian Pharmacopoeia.

Extractive values

Extractive values of crude drugs are useful for their evaluation especially when the constituents of a drug cannot be readily estimated by any other means. Further these values indicate the nature of the constituents present in a crude drug. Here alcohol soluble extractive values and water soluble extractive values were determined and found to be 3.52% and 21.5 % respectively[7].

Discussions

Anaphalis neelgerriana DC. is found to be effective in variety of diseases such as stomach inflammation, cuts, wounds, abscesses and in skin infections. Pharmacognostical study of the aerial parts of this plant was carried out in order to identify the correct species and to differentiate the close related other species of *Anaphalis*. The parameters observed may be useful for the future identification of the plant.

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The authors are thankful to Jagadguru Sri Sri Deshikendra Mahaswamigalavaru of Suttur Mutt and the management, J.S.S. College of Pharmacy, Ooty for providing the facilities for the study.

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ORGANIC FARMING TECHNIQUES FOR CULTIVATION OF LONG PEPPER (*PIPER LONGUM* LINN.)

A.S Anilkumar and P. Jayasree*

Abstract: An experiment was carried out at the Instructional Farm, College of Agriculture, Vellayani during 2003-'06 to standardize organic farming techniques for the cultivation of long pepper in pots. The experiment was laid out in CRD with three replications. The twelve treatments consisted of different nutrient sources viz., Farm yard manure, vermicompost, coir pith compost, poultry manure, bone meal, biogas slurry, neem cake, green leaf, litter, crop residue, NPK fertilizer and integration of FYM and NPK fertilizer. The long pepper cuttings were inoculated with fluorescent pseudomonas, Phosphorus Solubilizing Bacteria and Arbuscular Mycorrhizal Fungi before planting. The results of the study revealed that vine length, leaf area index and collar girth were found to be significantly influenced by treatment effects.

Introduction

Piper longum Linn. (long pepper or tippali) is a well known medicinal plant belonging to the family Piperaceae. It is a slender aromatic climber with perennial woody roots. It grows in tropical zones and distributed throughout India in evergreen forests and is cultivated in many parts of India[1]. The spikes of long pepper contain piperine and piplartin alkaloid, starch, resin, gum and fat[2]. The dried unripe fruits are useful in cold, cough, chronic bronchitis and diarrhea. Roots are used in paralysis, stiff joints and epilepsy. Fruits and roots are used in Āyurvedic and Unani systems of medicine to treat insomnia, obstruction of bile duct and gall bladder, dysentery and leprosy. It possesses anti helminthic and carminative properties and is known to enhance the bio-availability of food and drugs[3,4]. Long pepper is a major constituent of Āyurvedic drugs prescribed for increasing immunity against AIDS virus and acts as immuno-stimulant. It is sometimes considered as a condiment because of its similar properties as that of black pepper.

It is estimated that people of Kerala depend mainly on āyurvedic system of medicine for treating common ailments. Āyurvedic preparations against common ailments can be made in the home utilizing medicinal herbs. Hence strengthening the traditional health care

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system is of paramount importance to alleviate the sufferings of rural folk. The long pepper which is used as a home remedy for many ailments should be free from any residues of pesticides or fertilizers. Growing medicinal plants using chemical fertilizers and pesticides may alter their active ingredient and cause deterioration in their quality[5]. In this background an experiment was conducted to standardize organic farming techniques for cultivation of long pepper in pots so that it can be adopted for terrace-farming and homestead cultivation which may promote primary health care programme especially among weaker sections.

Materials and methods

An experiment was carried out at Instructional Farm, College of Agriculture, Vellayani during 2003-06 to standardize organic farming techniques for the cultivation of long pepper in pots. The experiment was laid out in CRD with three replications. The twelve treatments consisted of different nutrient sources viz., farm yard manure, vermicompost, coir pith compost, poultry manure, bone meal, biogas slurry, neem cake, green leaf, litter, crop residue NPK fertilizer and integration of FYM and NPK fertilizer. The long pepper cuttings were inoculated with Fluorescent pseudomonas, Phosphorus Solubilizing Bacteria and Arbuscular Mycorrhizal Fungi before planting. Long pepper was harvested five times during the course of the study. Vine length, number of branches, girth, number of leaves, total number of branches, girth, number of leaves, total number of spikes, total spike yield and crude extract content were observed.

Results and discussion

The results of the study revealed that various

TABLE 1
Performance of long pepper (*Piper longum*) being influenced by organic farming techniques

Treatments	Vine length (cm)	No. of branches	Girth (mm)	No. of leaves	No. of spikes	Total spike yield (g plant^{-1})		Crude extract
						Fresh	Dry	
T_1	213	9.0	7.5	139	70	664	132	10.5
T_2	217	9.5	9.2	136	65	660	132	9.75
T_3	192	8.0	6.5	137	59	611	122	7.75
T_4	231	10.5	9.0	142	56	594	118	7.5
T_5	208	9.0	8.0	131	45	399	89	9.75
T_6	221	10.0	10.0	137	45	465	81	7.75
T_7	223	9.5	7.5	138	55	577	115	9.5
T_8	194	8.5	7.0	131	56	450	90	11.0
T_9	200	8.5	7.5	128	59	497	99	9.0
T_{10}	196	8.0	7.5	129	53	418	91	10.75
T_{11}	227	7.5	9.0	135	68	594	118	8.25
T_{12}	219	11.0	10.0	144	67	768	153	11.75
SEm	5.21	0.79	0.30	3.41	2.5	43.4	8.4	-
CD (0.05)	16.05	2.44	0.92	10.51	7.9	133.8	26.1	-

nutrient sourced had significant influence on growth, yield and quality of long pepper. Vine length, leaf area index and collar girth were found to be significantly influenced by treatment effects. Poultry manure registered maximum vine length. Poultry manure is a good source of nutrients. In this manure 60 percent of nitrogen is present as uric acid, 30 percent as more stable organic nitrogen forms and balance as mineral nitrogen[6]. The uric acid nitrogen readily changes to ammoniacal form of nitrogen[7] attributed higher efficiency of poultry manure to its narrow C:N ratio and comparatively higher content of readily mineralizable nitrogen. This might have resulted in increased vine length. Biogas slurry recorded maximum leaf area index. Biogas slurry is a valuable source of humus substances and micronutrients in addition to major nutrients[8]. Integrated nutrient management was found to enhance collar girth, number of branches and leaf number. Maximum total fresh and dry spike yield were recorded when FYM and chemical fertilizers were integrated. Integration was also found to enhance crude extract content. The integrated use of organic manures and mineral fertilizers has been found to be promising in maintaining stability in crop production through correction of marginal deficiencies of secondary and micro nutrient elements[9].

It is concluded that cultivation of long pepper cuttings inoculated with all the three bioinoculants and integrated application of FYM and chemical fertilizers is beneficial for improving both quality and quantity of the officinal parts.

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EXCERPTS FROM CIKITSĀMAÑJARI - LVI

P. Unnikrishnan*

Abstract: Garbhiṇīcarya continues. In this chapter, the complications of abortion like upaviṣṭaka, nāgodara, etc. and their treatments are explained. In case of threatened abortion, the medicines which are to be taken in each month up to 7 months are also explained here.

The pregnant woman is advised to apply Śatadhautaghṛtam on the body and take immersion bath in water medicated with the following:

Sevya	*Vetiveria zizanioides*
Ambhoja	*Nelumbo nucifera*
Hima	*Santalum album*
Kṣīrivalka	*Ficus racemosa*
	Ficus microcarpa
	Ficus religiosa
	Ficus benghalensis

The kesara (pollen) of kumuda (*Nymphaea nouchali*), kamala (*Nelumbo nucifera*) and utpala (*Kaempferia rotunda*) mixed with honey and sugar shall be licked. Alternatively, consumption of butter from milk; intake of śṛṅgāṭaka (*Trapa natans* var. *bispinosa*) and kaśeruka (*Cyperus esculentus*) are effective. Intake of milk medicated with the following is also effective:

Kāntā	*Callycarpa macrophylla*
Abja	*Nelumbo nucifera*
Śālūka	*Nymphaea alba*
Bālodumbara	*Ficus racemosa* (sprouts)

Consume food prepared with raktasāli (*Oryza sativa* red var) mixed with milk medicated with the following along with honey and sugar.

Śāli	*Oryza sativa*
Kākoli	*Fritillaria roylei*
Dvibala	*Sida rhombifolia* ssp. *retusa*
	Sida rhombifolia,
Madhuka	*Glycyrrhiza glabra*
Ikṣu	*Saccharum officinarum*

Consumption of a soup prepared from the flesh of animals inhabiting jāṅgala (dry) region is effective. All treatments indicated in rakttapitta, excluding purifactory therapies such as induction of emesis, purgation, etc., shall be followed.

Drugs having snigdha (oily) property and śīta (cold) potency are indicated for abdominal pain and bleeding per vagina. Intake of fine paste of candana (*Santalum album*) mixed with butter is effective. Cases of abortion are to be treated by consumption of milk medicated from the following mixed with sugar and grapes:

Candana	*Santalum album*
Uśīra	*Vetiveria zizanioides*
Vāmśī	*Maranta arundinacea*
Yaṣṭī	*Glycyrrhiza glabra*

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Alternatively, milk is medicated with seeds of kataka (*Strychnos potatorum*), earlier washed in kāṭi (first washing of rice). In cases of abortion, intake of the following drugs ground to a paste in kāṭi is effective.

Vaṭaśṛṅga	*Ficus benghalensis*
Hima	*Santalum album*
Drākṣa	*Vitis vinifera*
Yaṣṭī	*Glycyrrhiza glabra*

In the cases of abortion, intake of a kaṣāya prepared from the following added with sugar and honey is effective.

Āṭaloṭakam	*Justicia beddomei*
Attitol	*Ficus racemosa* (bark)
Apāmārgam	*Achyranthus aspera*
Japā	*Hibiscus rosa-sinensis*
Siphā	*Nelumbo nucifera* - tuber
Vatsādani	*Tinospora cordifolia*
Varī	*Asparagus racemosus*
Yaṣṭī	*Glycyrrhiza glabra*
Mṛṇāḷam	*Nelumbo nucifera* (stem)

Consumption of kaṣāya prepared from the following with milk immediately after abortion is effectual.

Utpala	*Kaempferia rotunda*
Bala	*Sida rhombifolia ssp. retusa*
Payasyā	*Ipomoea mauritiana*
Gopāhva	*Hemidesmus indicus*
Uśīra	*Vetiveria zizanioides*

Consumption of a mukkuṭi* prepared from nilamparaṇṭa (*Desmodium triflorum*), perāl-moṭṭu (*Ficus benghalensis* - bud) and mayūram (*Achyranthus aspera*) is effective in the cases of abortion.

Pain and bleeding secondary to abortion are relieved by consumption of milk medicated with the following:

Orila	*Desmodium gangeticum*
Mūvila	*Pseudarthria viscida*
Ceṛuvazhutina	*Solanum indicum* (root)
Nāypal (Svadamṣṭra)	*Tribulus terrestris*
Vari	*Asparagus racemosus*
Kuṛuntoṭṭi	*Sida rhombifolia* ssp. *retusa*

Upaviṣṭaka

During pregnancy, hemorrhage from the vagina arrests the intra uterine growth of fetus. This condition is known as upaviṣṭaka and the normal, gradual enlargement of uterus is not observed. Pulsations are present.

Upaśuṣkaka (nāgodaram)

Sorrow, anger, fasting, dry (rūkṣa) food, etc. and excessive secretion per vagina increase vāyu and the fetus becomes emaciated due to malnutrition. Abdomen enlarges but pulsations are not present or rarely present. This condition is known as nāgodara.

In the above cited two conditions, medicated ghee, milk, meat soup prepared from drugs that are satiating (bṛmhaṇa), sweet and capable to subdue increased vāyu, are to be consumed. Undeveloped fetus of goat, etc. may be consumed with either in soup form or fried in ghee.

The woman shall be kept happy always so that the fetus attains normal growth. In failure of this treatment, it may take several years to attain full growth and the delivery may be risky.

A kaṣāya prepared from the following shall be consumed early morning in the empty stomach:

Tāmara-vaḷayam	*Nelumbo nucifera*	6 kazhañju
Kuṛuntoṭṭi	*Sida rhombifolia* ssp. *retusa*	2 kazhañju
Iraṭṭi-madhuram	*Glycyrrhiza glabra*	2 kazhañju
Ñjeriñjil	*Tribulus terrestris*	2 kazhañju

**A liquid preparation in which drug/drugs are cooked in buttermilk, churned well and boiled.*

Consumption of milk medicated with the roots of kuṛuntoṭṭi and ceṛupūḷaver (*Aerva lanata*) is preferred. A kaṣāya prepared from kuṛuntoṭṭi, aṭapatiyankizhaṅgu (*Holostemma adakoedien*), ñjeriñjil and iraṭṭimadhuram is also effective. Application of Lākṣādi kuzhampu or a mixture of sesame oil and ghee on the body is suggested.

In upaviṣṭaka and nāgodara, a kaṣāya prepared from the following mixed with milk and sugar is recommended.

Mṛṇāḷa	*Nelumbo nucifera* (stem)
Riddhi	*Habenaria edgeworthii*
Bala	*Sida rhombifolia* ssp. *retusa*
Yaṣṭi	*Glycyrrhiza glabra*

In līnagarbha (latent fetus), satiating therapy (bṛmhaṇa) and application of oil around the hip are indicated. Fetus remaining in the uterus due to the obstruction of vāta for more than 280 days will cause troubles like a foreign body. Here, warm milk is to be consumed with the addition of ghee.

When delivery becomes difficult and delayed due to increased vāyu that blocks the passage, consumption of milk medicated with the roots of ceṛupūḷa (*Aerva lanata*) added with ghee is suggested. The dose of ghee shall not be above one uri (96 ml).

In cases of abortion, intake of alcoholic beverages are recommended; but in cases where beverages are disliked by the patient, a kaṣāya prepared from pañcakola [*Piper longum, Piper longum* (root), *Piper brachystachyum, Plumbago indica* and *Zingiber officinale*], ceṛupañcamūla (roots of *Desmodium gangeticum*, *Pseudarthria viscida, Solanum indicum, Solanum surattense* and *Tribulus terrestris*) or pañcamūla (roots of *Aegle marmelos*, *Gmelina arborea, Stereospermum colais*, *Oroxylum indicum* and *Premna corymbosa*) is effective.

A kaṣāya prepared from the following shall be consumed for the reduction of deranged doṣās and dhātus:

Vilva	*Aegle marmelos*
Kāśmarya	*Gmelina arborea*
Takkarī	*Premna corymbosa*
Pāṭala	*Stereospermum colais*
Dunduka	*Oroxylum indicum*
Tila	*Sesamum indicum*
Uddāḷākataṇḍulam	*Paspalum scrobiculatum*

In cases of abortion where there is insufficient bleeding, hot and pungent materials are to be consumed. Substances like garlic can be taken. Some may not be able to stand the strength of such drugs and flatulence and thirst may supervene. Here, drugs that are not much hot shall be given. Supernatant medicated water prepared from orila (*Desmodium gangeticum*), mūvila (*Pseudarthria viscida*) and ñjeriñjil (*Tribulus terrestris*) can be given for the relief of thirst.

In the conditions where vāyu is increased, consumption of medicines mixed with coconut water is recommended. Application of ghee mixed with sesame oil over the body is also good. Ṣadaṅga kaṣāya (earlier detailed) shall be taken for the relief of fever. Intake of Māvilañjeṭṭyādi kaṣāya in the evening relieves anorexia, and application of butter on the head relieves headache. Intake of nocake boiled with water is suggested. In cases where the fetus is surgically removed, the mother may suffer from fever, flatulence, burning sensation, unconsciousness, etc. Here, the patient is advised to remain in a patti (receptacle in which the patient can lie in supine position) for a considerable

time after applying a mixture of ghee and sesame oil. Consumption of decanted medicated fluid (earlier detailed) is effective. Intake of Ṣadaṅgakaṣāya with the addition of iraṭṭimadhuram or ciṭṭamṛtu (*Tinospora cordifolia*) and kuṟuntoṭṭi (*Sida rhombifolia* ssp. *retusa*) is indicated in fever. Burning also will be relieved.

A kaṣāya prepared with iraṭṭimadhuram in half the normal dose, and water boiled with kariṅgāli (*Acacia catechu*) can be taken. Consumption of milk medicated with kuṟuntoṭṭi in the evening is effective. Application of Piṇḍataila or Kṣīrabala on the body, Āṟukālādi medicated oil (earlier detailed) on the head are indicated. In severe cases, irrigation can also be done on the head with this oil. Vaginal pain is to be treated by consuming Kṣīrabala or Dhānvantaram medicated oil. In general, symptomatic treatments are indicated.

Consume milk medicated with drugs capable of pacifying vāta with food for ten days. After ten days, easily digestible soups, light and compatible food, sudation and application of Balātaila on the body are good. From the fourth month onwards, she should refrain from indulging in sex.

Fever during pregnancy is difficult to manage and the heat of fever may cause malformations of the fetus. Apply nocake paste on the body of the pregnant woman. Drink water medicated from the following for the relief of fever:

Payasysā	*Ipomoea mauritiana*
Śāribā	*Hemidesmus indicus*
Toya	*Plectranthus vettiveroides*
Sevya	*Vetiveria zizanioides*
Toyada	*Cyperus rotundus*
Nāgara	*Zingiber officinale*

Apply medicated sesame oil on the body for the relief of fever. Fever is said to be relieved within seven days. Prepare a kaṣāya from the bark of ezhilampāla (*Alstonia scholaris*) as the liquid component, and fine paste of the following as solid component.

Musta	*Cyperus rotundus*
Amṛta	*Tinospora cordifolia*
Malayaja	*Santalum album*
Cuṇṭaver	*Solanum indicum* - root

Prepare a medicated oil from the juices of arayālila (*Ficus religiosa* - leaf), pālaila (*Alstonia scholaris* - leaf) and ciṭṭamṛtu (*Tinospora cordifolia*) as liquid component, and the fine paste of the following as solid component.

Musta	*Cyperus rotundus*
Amṛta	*Tinospora cordifolia*
Malayaja	*Santalum album*
Cuṇṭaver	*Solanum indicum* - root

Application of this oil is indicated in fever. Headache is relieved by application of butter on the head.

Application of oil, medicated with the juice of ponnaṅgāṇi (*Alternanthera sessilis*) and milk as liquid component, and fine paste of the following as solid component, relieves headache.

Koṭṭam	*Saussurea lappa*
Iraṭṭimadhuram	*Glycyrrhiza glabra*
Kadalippazham	*Musa paradisiaca*

A fine paste prepared from the following on application on the forehead (three times a day) relieves severe headache present in advanced stages of pregnancy.

Muttaṅga	Cyperus rotundus
Narunīṇṭi	*Hemidesmus indicus*
Candanam	*Santalum album*
Rāmaccam	*Vetiveria zizanioides*
Koṭṭam	*Saussurea lappa*

Kaccūram	*Kaempferia galanga*
Kūvaḷa-kkizhaṅgu	*Monochoria veginalis* - rootstock

Application of Kṣīrabala on the head is prescribed in persistent fever.

A kaṣāya prepared from the following is effective in pyrexia during pregnancy.

Madhukam	*Glycyrrhiza glabra*
Payasyā	*Ipomoea mauritiana*
Sāriba	*Hemidesmus indicus*
Amṛta	*Tinospora cordifolia*
Orila	*Desmodium gangeticum*
Mūvila	*Pseudarthria viscida*
Bala	*Sida rhombifolia* ssp. *retusa*
Musta	*Cyperus rotundus*

Diarrhea during pregnancy is relieved by consuming medicated water prepared from the following:

Durālabha	*Tragia involucrata*
Bala	*Sida rhombifolia* ssp. *retusa*
Vilva	*Aegle marmelos*
Nāgara	*Zingiber officinale*
Amṛta	*Tinospora cordifolia*

Vomiting is cured by consumption of medicated water prepared from vilva (*Aegle marmelos*) lāmajja (*Plectranthus vettiveroides*) and nocake powder. Fine paste of kustumburū (*Coriandrum sativum*) mixed with kāṭi, and a small quantity of honey can be taken to relieve vomiting caused by special desires (dauhṛda) during pregnancy.

Consumption of husk of nocake powder with sugar relieves vomiting. Hiccough is relieved by consumption of milk medicated with vilva and bala. A kaṣāya prepared from punarnnava (*Boerhaavia diffusa*) and ārdraka (*Zingiber officinale*) also relieve hiccough.

The pregnant woman shall consume kaṣāya prepared from the roots of varṣābhu (*Boerhaavia verticillata*) mixed with ghee and jaggery, for the relief of edema, gastric pain and flatulence. Intake of a kaṣāya prepared from ārdraka mixed with milk and jaggery relieves edema and flatulence.

Intake of fine powders of pippli (*Piper longum*), ajamoja (*Trachyspermum roxburghianum*) and aśvagandha (*Withania somnifera*) relieves edema. Fine powders of jīrakam (*Cuminum cyminum*), pippalīdvayam (*Piper longum* and *Scindapsus officinalis*) and yaṣṭimadhu (*Glycyrrhiza glabra*), consumed with khanda (Sugar candy) is capable of increasing appetite. A kaṣāya prepared from bala, ikṣu (*Saccharum officinarum*) and goksṣura (*Tribulus terrestris*) on consumption relieves urinary tract infections.

A kaṣāya prepared from the following added with milk on consumption relieves pain during pregnancy.

Śuṇṭī	*Zingiber officinale*
Vilva	*Aegle marmelos*
Bala	*Sida rhombifolia* ssp. *retusa*

A kaṣāya prepared from the following with milk on consumption relieves pain in pregnancy.

Vilva	*Aegle marmelos*
Kāśmarya	*Gmelina arborea*
Takkarī	*Premna corymbosa*
Pāṭala	*Stereospermum colais*
Ḍuṇḍuka	*Oroxylum indicum*
Bala	*Sida rhombifolia* ssp. *retusa*

A kaṣāya prepared from the following relieves bleeding disorders (raktapitta), jaundice (kāmila), cough (kāsa), śvāsa (dyspnoea) and joint-pain (vātarakta), etc.

Pṛśniparṇi	*Desmodium gangeticum*
Bala	*Sida rhombifolia* ssp. *retusa*
Vāśa	*Justicia beddomei*
Cinnaruha	*Tinospora cordifolia*

A kañji medicated with ambaṣṭhā (*Hibiscus cannabinus*), dhātaki (*Woodfordia fruticosa*) viśva (*Zingiber officinale*), padmakesara (*Nelumbo nucifera* - pollen) and dīpyaka (*Trachyspermum ammi*), on consumption with buttermilk (takra) relieves bleeding and indigestion (grahaṇi).

Consumption of a powder prepared from the leaves of the following in curd relieves dysentery (raktātisāra) during pregnancy. Add a small quantity of honey before consumption.

Itti	*Ficus microcarpa*
Ñjāval	*Syzygium cumini*
Vaṭa	*Ficus benghalensis*
Aśvatha	*Ficus religiosa*

Intake of tūṣodaka (sour gruel) medicated with paṛacuṇda (*Mimosa pudica*), ampāzham (*Spondias pinnata*), pāccottittoli (*Symplocos cochin-chinensis*) and pātiri (*Stereospermum colais*) relieves dysentery. This medication is good in premature ejaculation also.

Māṣa (*Vigna mungo*) ground to paste in milk is to be consumed with milk and ghee for preventing abortion.

In the cases of threatened abortion, the following kaṣāyas mixed with milk shall be consumed up to the seventh month in order to sustain pregnancy.

First month:

Madhuka	*Glycyrrhiza glabra*
Sākabīja	*Tectona grandis* - seed
Payasya	*Lilium polyphyllum*
Suradāru	*Cedrus deodara*

Second month:

Asmāntaka	*Bauhinia variegata*
Kṛṣṇatila	*Sesamum indicum*
Tāmravalli	*Rubia cordifolia*
Śatāvari	*Asparagus racemosus*

Third month:

Vṛkṣādani	*Dendrophthoe falcata*
Payasya	*Lilium polyphyllum*
Lata	*Callicarpa macrophylla*
Utpala sāriba	*Ichnocarpus frutisence*

Fourth month:

Ananta	*Cynodon dactylon*
Śāriba	*Hemidesmus indicus*
Rāsna	*Alpinia galanga*
Padmā	*Nervilia carinata*
Madhuyaṣṭi	*Glycyrrhiza glabra*

Fifth month:

Bṛhatīdvaya	*Solanum indicum* *Solanum xanthocarpum*
Kāśmarya	*Gmelina arborea*
Kṣīrīśṛṅgatvaca	Bark and buds of Four fig trees

Sixth month:

Pṛśniparṇi	*Desmodium gangeticum*
Bala	*Sida rhombifolia ssp. retusa*
Śigru	*Moringa oleifera*
Svadamṣṭra	*Tribulus terrestris*
Madhuparṇika	*Tinospora cordifolia*

Seventh month:

Sṛṅgāṭakam	*Trapa natans* var. *bispinosa*
Visam	*Nelumbo nucifera* (stem)
Drākṣa	*Vitis vinifera*
Kaśeru	*Cyperus esculentus*
Madhukam	*Glycyrrhiza glabra*
Sitā	Sugar

Milk medicated with the following shall be taken on the eighth month.

Kapitha	*Limonia accidissima*
Vilva	*Aegle marmelos*
Bṛhati	*Solanum indicum*
Patola	*Trichosanthes lobata*
Ikṣu	*Saccharum officinarum*
Nidigdhika	*Solanum surattense*

Milk medicated with the following is indicated in the ninth month.

Śāribā	*Hemidesmus indicus*
Anantā	*Cynodon dactylon*
Payasyā	*Lilium polyphyllum*
Madhuyaṣṭi	*Glycyrrhiza glabra*

During the tenth month, intake of milk medicated with kṣīrakākoli is prescribed. Alternatively, milk can be medicated with yaṣṭimadhuka, nāgara and amaradāru (*Cedrus deodara*).

Gastric upsets and pain caused by deranged vāta is cured by consumption of suitable medicines in coconut water. Vilvādi kaṣāya detailed earlier shall be taken. Intake of butter medicated with Daśamūla is also effective.

Consume a kaṣāya prepared from bala (*Sida rhombifolia* ssp. *retusa*) with or without milk or ghee in all kind of pains during pregnancy. Other diseases during pregnancy shall be treated as per the respective treatments detailed. Special care is to be taken to see that hot and pungent medicines are excluded from the prescriptions. Sexual intercourse and strenuous exercises are prohibited.

NOTE TO THE CONTRIBUTORS

Contributions to Āryavaidyan are requested to be made in the following format:

- The article should be authentic and not published earlier.
- Contributions in the form of a research paper, review article, clinical observation or a book review are welcome from the fields of Āyuṛveda and allied subjects, naturopathy, Siddha, Unani, Homoeopathy, Yoga, Modern medicine, drug research, pharmacognosy, botany, phytochemistry and pharmacology. Publication will be made on the basis of the recommendation of an expert body.
- The main title, indicative of the content, should be brief. An abstract, not exceeding two hundred words, be prefixed to the article. English equivalents may be provided to Sanskrit terms [e.g. vīrya (potency), guṇa (property), etc]. Correspondence address including e-mail, and affiliations, if any, of the author be attached to the text.
- Tables, minimized to the extent possible, with suitable reference to the context can be attached to the matter.
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    1. John Bernar Hentory, *Clinical diagnosis and management by laboratory methods,* 17th Ed., WB Saunders Company, Philadelphia, pp 172-175, 1989.

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