ISSN 0970 - 4086

Āryavaidyan

लाभानां श्रेय आरोग्यम्

Of all the gifts,
the most precious is health

Vol. XIX, No. 4
May - July 2006

A QUARTERLY JOURNAL OF
THE ARYA VAIDYA SALA - KOTTAKKAL

Vol. XIX., No. 4, May - July 2006

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FROM THE PAGES OF VĀGBHAṬA - LXXII

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Abstract: In this chapter, named Aṅgavibhāga of Śārīrasthāna, body as a whole, its subparts, functions, etc.; the relation between pañcamahābhūtas with the body, subparts, five senses, etc.; and the number and functions of bones, jālas, tendons, dhamanis, siras, etc. are explained.

अथातोऽङ्गविभागं शारीरं व्याख्यास्याम: ।
इति ह स्माहुरात्रेयादयो महर्षय: ।

(AthātoऽÅṅgavibhāgaṁ śārīraṁ
vyākhyāsyāma: ।
iti ha smāhurātreyādayo maharṣaya: ॥ 6 ॥)

Now we shall comment on Aṅgavibhāga, the third chapter of Śārīrasthānam, in which the body as a whole, its parts separately; and all their functions are explained; thus spoke the sage Ātṛeya and other ācāryas.

शिरोऽन्तराधिर्द्धौ बाहू सक्थिनीति समासत: ।
षडङ्गमङ्गं प्रत्यङ्गं तस्याक्षिहृदयादिकम् ॥ १ ॥

(ŚiroऽÅntarādhirddhau bāhū
sakthinīti samāsata: ।
ṣaḍaṅgamaṅgaṁ pratyaṅgaṁ
tasyākṣihṛdayādikam ॥ 1 ॥)

The head (śiras), the middle body - the trunk (antarādhi), two arms (daubhāhu) and the two thighs (sakthinī) are the main limbs (aṅgas) that constitute the six-limbed body (ṣaḍaṅga aṅga). The eyes, heart, etc. are the other important organs connected with these main limbs.

As the five aṅgas are firmly fixed into the middle body, it is termed as antarādhi. (आधीयन्ते शिर:प्रभृतय: पश्चावयवा यस्मीन् सोऽन्तराधि: – *सर्वाङ्गसुन्दरी व्याख्या*).

शब्द: स्पर्शश्च रूपं च रसो गन्ध: क्रमादुणा: ।
खानिलाग्न्यब्भुवाम् एकगुणवृद्ध्यन्वय: परे ॥ २ ॥

(Śabda: sparśaśca rūpaṁ ca
raso gandha: kramādguṇā: ।
khānilāgnyabbhuvām
ekaguṇavṛddhyanvaya: pare ॥ 2 ॥)

All living beings interact with the outer world through the senses i.e. sound, touch, sight, taste and smell. These are the characteristic properties of pañcamahābhūtas, from which are derived all the substances in the world, or the whole universe itself. So, the 'sound' is the specific property of 'kha' (ākāśa - ether), the 'touch' is of anila (vāyu - wind), the 'sight' of agni (fire), the 'taste' of ambu (water) and the 'smell' is of 'bhu' (earth). Besides its own specific property, each succeeding bhūta gains the property of its precedent one also. As ākāśabhūta does not have a precedent one, it has only one property - the sound. Thus

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vāyubhūta has two properties, śabda and spaṛśa; agni has three, śabda, spaṛśa and rūpa; besides these three, jalabhūta has a fourth one - rasa, as its own.. And the fifth bhūta 'bhu' (pṛthvi) has gandha as its own property and all the four properties of its precedent bhūtas.

तत्र खात् खानि देहेऽस्मिन् श्रोत्रं शब्दो विविक्तता ।
वातात्स्पर्शत्वगुच्छ्वासा वह्नेर्दृग्रूपपक्तय: ।। ३ ।।
आप्या जिह्वारसक्लेदा घ्राणगन्धास्थि पार्थिवम् ।

(Tatra khāt khāni deheऽsmin
śrotraṁ śabdo viviktatā ।
vātāsparśatvagucchvāsā
vahnerdṛgrūpapaktaya: ।। 3 ।।
Āpyā jihvārasakḷedā
ghrāṇagandhāsthi pārthivam ।)

Amongst these pañcabhūtas, the sky (kha) is the source of all orifices (khani - śṛotāmsi) in the body, the ears (the organs of sound perception) the sound and all empty spaces; the skin (the organ for touch perception), touch and respiration are originated from vāta (vāyu); the eyes (organs for perception of light and form), vision, and digestion are produced from agni (fire); the jalabhūta is the source of tongue (the taste perceiving organ), the taste, body fluids and moisture; the nose (the smell perceiving organ), smell and bones are derived from pṛthvībhūta (earth).

मृद्वत्र मातृजं रक्तमांसमज्जगुदादिकम् ।। ४ ।।
पैतृकं तु स्थिरं शुक्रधमन्यस्थिकचादिकम् ।
चैतनं चित्तमक्षाणि नानायोनिषु जन्म च ।। ५ ।।

(mṛdvatra mātṛjaṁ rakta-
māṁsamajjagudādikam ।। 4 ।।
Paitṛkaṁ tu sthiraṁ
śukradhamanyasthikacādikam ।
caitanaṁ cittamakṣāṇi
nānāyoniṣu janma ca ।। 5 ।।)

All the soft parts in the body, such as blood, muscles, marrow, etc. are the contributions of mother. All the stable parts such as arteries, bones, hair, semen, etc. are of father. The mind, the sense organs, and birth in various kinds of species are derived from soul (cetana/ātma).

सात्म्यजं त्वायुरारोग्यमनालस्यं प्रभा बलम् ।
रसजं वपुषो जन्म वृत्तिर्वृद्धिरलोलता ।। ६ ।।

(Sātmyajaṁ tvāyurārogya-
manālasyaṁ prabhā balam ।
rasajaṁ vapuṣo janma
vṛttirvṛddhiralolatā ।। 6 ।।)

The life span, health, enthusiasm, luster and strength are created by congeniality (sātmya). The origin of the body, its maintenance, development, growth and steadiness are furnished by rasa (the essence of food).

सात्विकं शौचमास्तिक्यं शुक्लधर्मरुचिर्मति: ।
राजसं बहुभाषित्वं मानक्रुद्दम्भमत्सरम् ।। ७ ।।
तामसं भयमज्ञानं निद्राऽऽलस्यं विषादिता ।
इति भूतमयो देह:.....

(Sātvikaṁ śaucamāstikyaṁ
śukḷadharmarucirmati: ।
rājasaṁ bahubhāṣitvaṁ
mānakruddambhamatsaram ।। 7 ।।
Tāmasaṁ bhayamajñānaṁ
nidrāऽऽlasyaṁ viṣāditā ।
iti bhūtamayo deha:.....)

Purity in all aspects i.e. mind, body and speech, belief in god, devotion in following virtuous paths, intelligence, etc. are creations of satvaguṇa. Pride, anger, talkativeness, envy, arrogance, etc. are produced by rajoguṇa. Fear, ignorance, sleep, laziness, dejection, etc. are

caused by tamoguṇa. Thus, all the features of the body are composed of pañcabhūtas.

……तत्र सप्त त्वचोऽसृजा: ।। ८ ।।
पच्यमानात्प्रजायन्ते क्षीरात्सन्तानिका इव ।

(.....tatra sapta tvacoऽsṛjā: ।। 8 ।।
Pacyamānātprajāyante
kṣīrātsantānikā iva ।)

After explaining the role of pañcabhūtas in the formation of the whole body, now the component parts are being described separately. The first description is about the skin, the outer covering of the body. During the course of the metabolic process of the blood, there originate seven layers of the skin just like the layer of scum forms on the surface of the boiling milk.

The name of these layers are: bhasmini, lohini, sveta, tāmṛa, vedhini, rohiṇi and māmsadhara. The thickness of each layer, their function and the diseases originating from each layer are explained in detail in Suśṛutasamhita (4th chapter, Śārīrasthānam)

धात्वाशयान्तरक्लेदो विपक्व: स्वंस्वमूष्मणा ।। ९ ।।
श्लेष्मस्नाय्वपराच्छन्न: कलाख्य: काष्ठसारवत् ।
ता: सप्त……..

(dhātvāśayāntarakḷedo
vipakva: svaṁsvamūṣmaṇā ।। 9 ।।
Śḷeṣmasnāyvaparācchanna:
kalākhya: kāṣṭhasāravat ।
tā: sapta.....)

The moisture present in between the tissues (dhātus) and their receptacles (āśayas) being processed by the heat present in each dhātu (dhātvāgni), and covered by the layers of mucous fibre and basement (chorion) membrane (jarāyu - apara) is transformed into the structure of a 'kala' just like the sap (vital juice) of a tree, processed by its own heat, to heartwood. These kalas are seven in number viz. māmsdhara, raktadhara, medodhara, śleṣmadhara, purīṣadhara, pittadhara and śukṛadhara.

…….सप्त चाधारा रक्तस्याद्य: क्रमात् परे ।। १० ।।
कफामपित्तपक्कानां वायोर्मूत्रस्य च स्मृता: ।
गर्भाशयोऽष्टम: स्त्रीणां पित्तपक्काशयान्तरे ।। ११ ।।

(.....sapta cādhārā
raktasyādya: kramāt pare ।। 10 ।।
Kaphāmapittapakvānāṁ
vāyormūtrasya ca smṛtā: ।
garbhāśayoऽṣṭama: strīṇāṁ
pittapakvāśayāntare ।। 11 ।।)

Similarly, there are seven ādharas (āśayas) in the body i.e. of blood (rakta), phlegm (kapha), undigested food (āma), bile (pitta), digested food (pakva), air (vāyu) and urine (mūtṛa). Women have eight āśayas including uterus (gaṛbhāśaya) situated between pittāśaya and pakvāśaya.

(This statement about the seat of the uterus seems to be an error occurred during copying or an addendum. Actually, the uterus is situated in between the bladder (vasti) and rectum (uttaraguda). In Aṣṭaṅgaśrīra of Vaidyaratnam P.S. Varier, this statement is rectified as - गर्भाशयोऽष्टम: स्त्रीणां वस्त्युत्तरगुदान्तरे)

कोष्ठाङ्गानि स्थितान्येषु हृदयं क्लोम फुप्फुसम् ।
यकृत्प्लीहोण्डुकं वृक्कौ नाभिडिम्भान्त्रवस्तय: ।।१२।।

(Koṣṭhāṅgāni sthitānyeṣu
hṛdayaṁ kḷoma phupphusam ।
yakṛtplīhoṇḍukaṁ vṛkkau
nābhiḍimbhāntravastaya: ।। 12 ।।)

The limbs inside the koṣṭa (gastrointestinal tract including thoracic cavity), such as heart (hṛdaya), esophagus (kḷoma), lungs (pupphusa), liver (yakṛt), spleen (plīha), caecum (uṇḍuka), kidneys (vṛkkā), duodenum (nābhi), sigmoid colon (ḍimbhā), intestine (āntra) and bladder (vasti), are situated in ādhāras or connected with ādhāras.

दश जीवितधामानि शिरोरसनबन्धनम् ।
कण्ठोऽस्रं हृदयं नाभिर्वस्तिः शुक्रौजसी गुदम् ।। १३ ।।

(Daśa jīvitadhāmāni
śirorasanabandhanam ।
kaṇṭhoऽsraṁ hṛdayaṁ nābhir-
vasti: śukraujasī gudam ।। 13 ।।)

The most important ten abodes of life are head (śiras), stump of the tongue (rasanabandhana), throat (kaṇṭha), blood (asṛa), heart (hṛdaya), duodenum (nābhi), bladder (vasti), semen (śukra), vital essence (ojas) and rectum (guda).

जालानि कण्डराश्चाङ्गे पृथक् षोडश निर्दिशेत् ।
षट् कूर्चाः सप्त सीवन्यो मेढ्रजिह्वाशिरोगताः ।। १४ ।।
शस्त्रेण ताः परिहरेच्चतस्रो मांसरज्जवः ।
चतुर्दशास्थिसङ्घाताः, सीमन्ता द्विगुणा नव ।। १५ ।।

(Jālāni kaṇḍarāścāṅge
pṛthak ṣoḍaśa nirdiśet ।
ṣaṭ kūrcā: sapta sīvanyo
meḍhrajihvāśirogatā: ।। 14 ।।
Śastreṇa tā: pariharecca-
tasro māṁsarajjava: ।
caturdaśāsthisaṅghātā:,
sīmantā dviguṇā nava ।। 15 ।।)

There are sixteen network-like structures (jālas) and tendons (kaṇḍaras) in the body. Also, there are six sharp brush-like structures (kūrcas) i.e. two in each hand, two in each leg, one in neck and one in penis; and seven sutures (sīvanis) i.e. one in penis, one in tongue and five on the head. These sīvanis should be avoided during surgical procedures. There are four muscle rope (māṁsarajjus) located on each side of the vertibral column i.e. two internal and two external. There are fourteen confederacies of bones (asthisaṅghātas) located in angle knees, groins, sacrum, head, axillae, elbow and wrists; and of eighteen sīmantas (boundary/dividing lines), five are located on head and the remaining fourteen on the same spots where the asthisaṅghātas are situated.

अस्थ्नां शतानि षष्टिश्च त्रीणि दन्तनखैः सह ।
धन्वन्तरिस्तु त्रीण्याह, सन्धीनां च शतद्वयम् ।। २६ ।।
दशोत्तरं सहस्रे द्वे निजगादात्रिनन्दनः ।

(Asthnāṁ śatāni ṣaṣṭiśca
trīṇi dantanakhai: saha ।
dhanvantaristu trīṇyāha,
sandhīnāṁ ca śatadvayam ।। 26 ।।
daśottaraṁ sahasre dve
nijagādātrinandana: ।)

The bones are three hundred and sixty in number, including teeth and nails. According to Dhanvantari, the bones are only three hundred, and the joints (sandhis) are two hundred and ten. But according to Ātṛeya they are two thousand.

The cause of this difference is that Dhanvantari considers the joints of bones only; but Ātṛeya takes all the joints of bones, muscles, tendons and blood vessels as sandhis.

स्नाव्नां नवशती पञ्च पुंसां पेशीशतानि तु ।। १७ ।।
अधिका विंशतिः स्त्रीणां योनिस्तनसमाश्रिताः ।

(snāvnāṁ navaśatī pañca
puṁsāṁ peśīśatāni tu ॥ 17 ॥
Adhikā viśati: strīṇāṁ
yonistanasamāśritā: ।)

There are nine hundred tendons (snāyus) and five hundred muscles (peśis). Women have twenty extra muscles pertaining to the uterus and breasts.

दशमूलसिरा हृत्स्थास्ता: सर्वंसर्वतो वपु: ॥ १८ ॥
रसात्मकं वहन्त्योजस्तन्निबद्धं हि चेष्टितम् ।
स्थूलमूला: सुसूक्ष्माग्रा: पत्ररेखाप्रतानवत् ॥ १९ ॥
भिद्यन्ते तास्तत: सप्तशतान्यासां भवन्ति तु ।

(daśamūlasirā hṛtsthāstā:
sarvamsarvato vapu: ॥ 18 ॥
rasātmakaṁ vahantyoja-
stannibaddhaṁ hi ceṣṭitam ।
sthūlamūlā: susūkṣmāgrā:
patrarekhāpratānavat ॥ 19 ॥
Bhidyante tāstata: sapta-
śatānyāsāṁ bhavanti tu ।)

There are ten prime blood vessels (mūlasiras) located in the heart. They transport the vital energy (ojas), which is in the form of food essence (rasa), to the whole body. All activities of the living beings are depended on them. They are stout in the root, but gradually becoming very thin at tips; they appear like the network-line on a leaf i.e. divide again and again, and become seven hundred in number.

तत्रैकैकं च शाखायां शत, तस्मिन्न वेधयेत् ॥ २० ॥
सिरां जालन्धरां नाम तिस्रश्चाभ्यन्तराश्रिता: ।

(tatraikaikaṁ ca śākhāyāṁ
śata, tasminna vedhayet ॥ 20 ॥
Sirāṁ jālandharāṁ nāma
tisraścābhyantarāśritā: ।)

Out of these seven hundred siras, one hundred are located in each hand and leg; of these, one sira named jālandharā and other three siras situated deep inside, should be protected from injury during surgical procedures.

षोडशद्विगुणा: श्रोण्यां, तासां द्वे द्वे तु वङ्क्षणे ॥ २१ ॥
द्वे द्वे कटिकतरुणं शस्त्रेणाष्टौ स्पृशेन्न ता: ।
पार्श्वयो: षोडशैकैकामूर्ध्वगां वर्जयेत्तयो: ॥ २२ ॥

(ṣoḍaśadviguṇā: śroṇyāṁ,
tāsāṁ dve dve tu vaṅkṣaṇe ॥ 21 ॥
dve dve kaṭikataruṇaṁ
śastreṇāṣṭau spṛśenna tā: ।
pārśvayo: ṣoḍaśaikaikām-
ūrdhvagāṁ varjayettayo: ॥ 22 ॥)

There are thirty-two siras in the hips (śroṇi); of which, two each are located in each groins (vaṅkṣaṇas) and buttocks (kaṭikataruṇa). These eight siras should not be touched with sharp instruments. On the sides of the body (pārśvas), there are sixteen siras. Of these, one on each side, which is going upside, is to be avoided during surgical procedures.

द्वादशद्विगुणा: पृष्ठे पृष्ठवंशस्य पार्श्वयो: ।
द्वे द्वे तत्रोर्ध्वगामिन्यौ न शस्त्रेण परामृशेत् ॥ २३ ॥
पृष्ठवज्जठरे तासां मेहनस्योपरि स्थिते ।
रोमराजीमुभयतो द्वे द्वे शस्त्रेण न स्पृशेत् ॥ २४ ॥

(Dvādaśadviguṇā: pṛṣṭhe
pṛṣṭhavaṁśasya pārśvayo: ।
dve dve tatrordhvagāminyau
na śastreṇa parāmṛśet ॥ 23 ॥
Pṛṣṭhavajjaṭhare tāsāṁ
mehanasyopari sthite ।
romarājīmubhayato
dve dve śastreṇa na spṛśet ॥ 24 ॥)

There are twenty-four siras on the back (pṛṣṭha) on each side of the vertebral column; of which, two each siras that are going upward should not be touched with sharp instruments. There are twenty-four siras in the abdomen (jaṭhara), of which, two located above the penis on each side of the line of hair (romarājī) should not be touched with sharp instruments.

चत्वारिंशदुरस्यासां चतुर्दश न वेधयेत् ।
स्तनरोहिततन्मूलहृदये तु पृथग्द्वयम् ।। २५ ।।
अपस्तम्भाख्ययोरेकां तथाऽपालापयोरपि ।

(Catvāriṁśadurasyāsāṁ
caturdaśa na vedhayet ।
stanarohitatanmūla-
hṛdaye tu pṛthagdvayam ।। 25 ।।
Apastambhākhyayorekāṁ
tathāऽpālāpayorapi ।)

There are forty siras on the thorax; of them, fourteen i.e. two each in each stanarohitas and in each statanmūlas, two in hṛdaya, one in each apastambhās and apālāpas are to be avoided.

ग्रीवायां पृष्ठवत्तासां नीले मन्ये कृकाटिके ।। २६ ।।
विधुरे मातृकाश्चाष्टौ षोडशेति परित्यजेत् ।

(grīvāyāṁ pṛṣṭhavattāsāṁ
nīle manye kṛkāṭike ।। 26 ।।
vidhure mātṛkāścāṣṭau
ṣoḍaśeti parityajet ।)

In the neck (grīvā), the number of siras is the same as in pṛṣṭha i.e. twenty-four. Of them, two nīla siras, two manya siras, two kṛkāṭika siras, two vidhura siras and eight mātṛkā siras should be exempted from application of sharp instruments.

हन्वो: षोडश, तासां द्वे सन्धिबन्धनकर्मणी ।। २७ ।।
जिह्वायां हनुवत्तासामधो द्वे रसबोधने ।
द्वे च वाच: प्रवर्तिन्यौ .....

(hanvo: ṣoḍaśa, tāsāṁ dve
sandhibandhanakarmaṇī ।। 27 ।।
jihvāyāṁ hanuvattāsā-
madho dve rasabodhane ।
dve ca vāca: pravartinyau .....)

There are sixteen siras in the upper and lower jaws (hanus); of which, two that join the two jaws should not be touched with sharp instruments. Siras are sixteen in the tongue (jihva) also, of them, two lower siras that are perceptors of taste and two, which induce speech, should not be cut.

.....नासायां चतुरुत्तरा ।। २८ ।।
विंशतिर्गन्धवेदिन्यौ तासामेकां च तालुगाम् ।

(.....nāsāyāṁ caturuttarā ।। 28 ।।
Viṁśatirgandhavedinyau
tāsāmekāṁ ca tālugām ।)

In the nose, siras are twenty-four; of them, two that are perceptors of smell, and one in the palate, should be avoided.

षट्पञ्चाशन्नयनयोर्निमेषोन्मेषकर्मणी ।। २९ ।।
द्वे द्वे, अपाङ्ग्योर्द्वे च तासां षडिति वर्जयेत् ।

(ṣaṭpñcāśannayanayor-
nimeṣonmeṣakarmaṇī ।। 29 ।।
Dve dve, apāṅgayordve ca
tāsāṁ ṣaḍiti varjayet ।)

There are fifty-six siras in the eyes, of which, two each in each eye perform the closing and opening of the eyelids; and the two that are located in the outer angles of the eyes (apāṅgas) should not be touched.

नासानेत्राश्रिता: षष्टिर्ललाटे, स्थपनीश्रिताम् ।। ३० ।।

तत्रैकां, द्वे तथाऽऽवर्त्तौ, चतस्रश्च कचान्तगाः ।
सप्तैवं वर्जयेत्तासाम् .....

(nāsānetrāśritāḥ ṣaṣṭir-
lalāṭe, sthapanīśritām ॥ 30 ॥
tatraikāṁ, dve tathāऽऽvarttau,
catasraśca kacāntagāḥ ।
saptaivaṁ varjayettāsām .....)

Out of 80 siras that are related to nose and eyes, sixty are located in the forehead; of which, seven i.e. one at sthapanī, two at āvarttas and four at he borderline of the hair, should be avoided.

.....कर्णयोः षोडशात्र तु ॥ ३१ ॥
द्वे शब्दबोधने शङ्खौ सिरास्ता एव चाश्रिताः ।
द्वे शङ्खसन्धिगे तासाम् मूर्ध्नि द्वादश तत्र तु ॥ ३२ ॥
एकैकां पृथगुत्क्षेपसीमन्ताधिपतिस्थिताम् ।

(...karṇayoḥ ṣoḍaśātra tu ॥ 31 ॥
Dve śabdabodhane śaṅkhau
sirāstā eva cāśritāḥ ।
dve śaṅkhasandhige tāsām
mūrdhni dvādaśa tatra tu ॥ 32 ॥
Ekaikāṁ pṛthagutkṣepa-
sīmantādhipatisthitām ।)

In the ears, siras are sixteen; of which, two that are perceptors of sound, are to be avoided. The same sixteen siras are related to temples (śaṅkhas) also; of them, two located at the joints of temples, should not be touched. In the head they are twelve and of which, eight i.e. one at each utkṣepa, five at sīmantas and one at ādhipati are to be avoided.

इत्यवेध्यविभागार्थे प्रत्यङ्गं वर्णिताः सिराः ॥ ३३ ॥
अवेध्यास्तत्र कात्स्न्येन देहेऽष्टानवतिस्तथा ।
सङ्कीर्णा ग्रथिताः क्षुद्रा वक्राः सन्धिषु चाश्रिताः ॥ ३४ ॥

(ityavedhyavibhāgārthe
pratyaṅgaṁ varṇitāḥ sirāḥ ॥ 33 ॥
Avedhyāstatra kārtsnyena
deheऽṣṭānavatistathā ।
saṅkīrṇā grathitāḥ kṣudrā
vakrāḥ sandhiṣu cāśritāḥ ॥ 34 ॥)

Thus, the discrimination of siras in each part of the body that are prohibited from doing venesection is described here in detail. Siras are ninety-eight in total. Besides these, those that are mixed together, knotty lumps, very small, curved and situated inside the joints are to be avoided from application of sharp instruments.

तासां शतानां सप्तानां पादोऽस्रं वहते पृथक् ।
वातपित्तकफैर्गुष्टं शुद्धं चैवं स्थिता मलाः ॥ ३५ ॥
शारीरमनुगृह्णन्ति पीडयन्त्यन्यथा पुनः ।

(Tāsāṁ śatānāṁ saptānāṁ
pādoऽsraṁ vahate pṛthak ।
vātapittakapharguṣṭaṁ
śuddhaṁ caivaṁ sthitā malāḥ ॥ 35 ॥
Śārīramanugṛhṇanti
pīḍayantyanyathā punaḥ ।)

Each one-fourth of these seven hundred siras i.e. one hundred and seventy five siras transport the blood mixed with vāta, pitta and kapha, and also pure blood separately. Thus the malas (doṣas) remaining in their normal places, maintain the body regularly, otherwise the body may get tormented.

तत्र श्यावारुणाः सूक्ष्माः पूर्णरिक्ताः क्षणात्सिराः ३६
प्रस्पन्दिन्यश्च वातास्रं वहन्ते, पित्तशोणितम् ।
स्पर्शोष्णाः शीघ्रवाहिन्यो नीलपीताः, कफ पुनः ३७
गौर्यः स्निग्धाः स्थिराः शीताः संसृष्टं लिङ्गसङ्करे ।
गूढाः समस्थिताः स्निग्धा रोहिण्यः शुद्धशोणितम् ३८

(tatra śyāvāruṇā: sūkṣmā:
pūrṇariktā: kṣaṇātsirā: ।। 36 ।।
Praspandinyaśca vātāsraṁ
vahante, pittaśoṇitam ।
sparśoṣṇā: śīghravāhinyo
nīlapītā:, kapha puna: ।। 37 ।।
gaurya: snigdhā: sthirā: śītā:
saṁsṛṣṭaṁ liṅgasaṅkare ।
gūḍhā: samasthitā: snigdhā
rohiṇya: śuddhaśoṇitam ।। 38 ।।)

Among them, those siras, which are dark brown or reddish brown in colour, small in size, instantly filling and emptying, and vibrating, are carriers of blood mixed with vāta. Those which are hot in touch, fast flowing, blue or yellow in colour are carriers of blood mixed with pitta; and those that are white, unctuous, firm and cold in touch are carriers of blood mixed with kahpa. If these signs are intermingled, it indicates the mixture of doṣas in the blood. Deep seated, evenly remaining unctuous and red coloured siras are carriers of pure blood.

धमन्यो नाभिसम्बद्धा विंशतिश्चतुरुत्तरा ।
नाभि: परिवृता नाभिश्चक्रनाभिरिवारकै: ।। ३९ ।।
नाभिश्चोर्ध्वमधस्तिर्यग्देहोऽयमनुगृह्यते ।

(Dhamanyo nābhisambaddhā
viṁśatiścaturuttarā ।
nābhi: parivṛtā nābhi-
ścakranābhirivārakai: ।। 39 ।।
Nābhiścordhvamadhastiryag-
dehoऽyamanugṛhyate ।)

There are twenty-four dhamanis attached to the nābhi; they surround the nābhi like the axle of a wheel surround by the spokes. The whole body is maintained by these dhamanis, which are spreading upwards, downwards and in horizontal directions.

Here it is not clear what is actually meant by the words 'dhamani' and 'nābhi'. In our basic treatises the words such as sira, sṛotas, nāḍi, dhamani, etc. are used as synonyms to denote the airy spaces in the body. (आकाशीयावकाशानां देहे नामानि देहिनाम्, सिरा: स्रोतांसि मार्गा: खं धमन्यो नाड्य आशया: – सु. शा. ९, *निबन्धसंग्रहम् व्याख्या*). Some hints such as स्रवणात् स्रोतांसि (sṛvaṇa= flowing) सरणात् सिर: (saraṇa=flowing), etc. are given to discriminate them from each other. As some substances are flowing through these channels (blood or something else), they are termed as sṛotas or sira. But, in the case of dhamani, there is no such a substance flowing through it. However, it has the potency to become swollen (dhmāta) when stimulated by impulses (ध्मानात् धमन्य) and to act accordantly. So, here the dhamanis should be considered as nerves (nāḍis), which carrying all types of impulses to their proper places and acting as per their stimulations and maintain the body balance well preserved.

These body-maintaining dhamanis are said to be attached to nābhi. Nābhi is generally known as umbilicus. But actually there are not such dhamanis attached to the umbilicus. It (nābhii) has many other meanings such as centre, chief, head, paramount sovereign, etc. which are also popular. So, here, it seems to be proper to take nābhi as the central part of the body - cerebrum and spinal code - to which are attached the dhamanis - the carriers of all types of impulses. Hence, here the words nābhi and dhamanis connote the central nervous system including cerebrum, spinal cord and all the nerves connected with it.

स्रोतांसि नासिके कर्णौ नेत्रे पाय्वास्यमेहनम् ।। ४० ।।
स्तनौ रक्तपथश्चेति नारीणामधिकं त्रयम् ।

(srotāṁsi nāsike karṇau
netre pāyvāsyamehanam ।। 40 ।।
stanau raktapathaśceti
nārīṇāmadhikaṁ trayam ।)

The channels (sṛotas) are nine in the body i.e. two nostrils, two ears, two eyes, anus, mouth and the penis; women have three more channels connected with breast and vagina. These are external orifices.

जीवितायतनान्यन्तः स्रोतांस्याहुस्त्रयोदश ।। ४१ ।।
प्राणधातुमलाम्भोन्नवाहीनि, अहितसेवनात् ।
तानि दुष्टानि रोगाय, विशुद्धानि सुखाय च ।। ४२ ।।

(jīvitāyatanānyanta:
srotāṁsyāhustrayodaśa ।। 41 ।।
prāṇadhātumalāmbho-
nnavāhīni, ahitasevanāt ।
tāni duṣṭāni rogāya,
viśuddhāni sukhāya ca ।। 42 ।।)

The internal channels are thirteen, which are the abode of life; they are the carriers of prāṇa, seven dhātus, three malas, ambhas (water) and anna (food). Due to the over indulgence in improper foods and activities, these channels get vitiated, and create various kinds of diseases. In normal state, they maintain health and happiness.

स्वधातुसमवर्णानि वृत्तस्थूलान्यणूनि च ।
स्रोतांसि दीर्घाण्याकृत्या प्रतानसदृशानि च ।। ४३ ।।

(Svadhātusamavarṇāni
vṛttasthūlānyaṇūni ca ।
srotāṁsi dīrghāṇyākṛtyā
pratānasadṛśāni ca ।। 43 ।।)

The channels are of the same colour of the particular dhātu which they carry. Some of them are round and stout, some very small, long in shape; and being divided again and again, they become like the network-lines of a leaf.

Now the general cause of the vitiation of these channels is being explained.

आहारश्च विहारश्च यः स्याद्दोषगुणैः समः ।
धातुभिर्विगुणो यश्च स्रोतसां स प्रदूषकः ।। ४४ ।।

(Āhāraśca vihāraśca yaḥ
syāddoṣaguṇai: sama: ।
dhātubhirviguṇo yaśca
srotasāṁ sa pradūṣaka: ।। 44 ।।)

Foods and activities, which are of the same qualities as that of the doṣas, and that which degrades the dhātus from their natural qualities - both these are causative agents to vitiate the channels.

Foods and activities that cause excessive increase of a particular doṣa, also vitiate those channels that are carriers of dhātus and malas connected with that particular doṣas. In the same way, if the dhātus become deprived of their qualities (viguṇa) due to the improper habits that also causes the vitiation of channels (Caraka).

अतिप्रवृत्तिः सङ्गो वा सिराणां ग्रन्थयोऽपि वा ।
विमार्गतो वा गमनं स्रोतसां दुष्टिलक्षणम् ।। ४५ ।।

(Atipravṛtti: saṅgo vā
sirāṇāṁ granthayoऽpi vā .
vimārgato vā gamanaṁ
srotasāṁ duṣṭilakṣaṇam ।। 45 ।।)

Over action, obstructed action, knots of the channels, moving through wrong paths - all

these are the signs of the vitiation of the channels.

विसानमिव सूक्ष्माणि दूरं प्रविसृतानि च ।
द्वाराणि स्रोतसां देहे रसो यैरुपचीयते ।। ४६ ।।

(Visānamiva sūkṣmāṇi
dūraṁ pravisṛtāni ca ।
Dvārāṇi srotasāṁ dehe
raso yairupacīyate ।। 46 ।।)

The holes of the channels are very minute like a fibrous stalk of lotus (bisa), and separating into far distant parts of the body; the essence of food (rasa) is collected and transported through these holes into all parts of the body.

व्यधे तु स्रोतसां मोहकम्पाध्मानवमिज्वरा: ।
प्रलापशूलविण्मूत्ररोधा मरणमेव वा ।। ४७ ।।
श्रोतोविद्धमतो वैद्य: प्रत्याख्याय प्रसाधयेत् ।
उद्धृत्य शल्यं यत्नेन सद्य: क्षतविधानत: ।। ४८ ।।

(Vyadhe tu srotasāṁ moha-
kampādhmānavamijvarā: ।
pralāpaśūlaviṇmūtra-
rodhā maraṇameva vā ।। 47 ।।
śrotoviddhamato vaidya:
pratyākhyāya prasādhayet ।
uddhṛtya śalyaṁ yatnena
sadya:kṣatavidhānata: ।। 48 ।।)

If any of these channels is injured, then there will be many complications such as loss of consciousness, trembling, flatulence, vomiting, fever, delirium, pain and obstruction of faeces and urine; and some times, even death may occur. So, the physician should inform the relatives about the patient's dangerous condition. He should extract the śalya (any foreign body causing danger to life) carefully and do treatment as directed for the suddenly occurred wounds.

अन्नस्य पक्ता पित्तं तु पाचकाख्यं पुरेरितम् ।
दोषधातुमलादीनामूष्मेत्यात्रेयशासनम् ।। ४९ ।।

(Annasya paktā pittaṁ tu
pācakākhyaṁ pureritam ।
doṣadhātumalādīnām-
ūṣmetyātreyaśāsanam ।। 49 ।।)

Pācaka pitta, the first one of the five divisions of pitta, has described earlier as the food digester - agni (pācakāgni). Some ācāryas like Ātṛeya do not consider pitta as agni that digests the food. According to them, the internal heat (ūṣma) produced by the intermingling of doṣas, dhātus and malas, is the conductor of digestion.

तदधिष्ठानमन्नस्य ग्रहणाद्ग्रहणी मता ।
सैव धन्वन्तरिमते कला पित्तधराह्वया ।। ५० ।।
आयुरारोग्यवीर्यौजोभूतधात्वग्निपुष्टये ।
स्थिता पक्वाशयद्वारिं भुक्तमार्गार्गळेव सा ।। ५१ ।।
भुक्तमामाशये रुध्वा सा विपाच्य नयत्यध: ।
बलवत्यबला त्वन्नमाममेव विमुञ्चति ।। ५२ ।।

(tadadhiṣṭhānamannasya
grahaṇādgrhaṇī matā ।
saiva dhanvantarimate
kalā pittadharāhvayā ।। 50 ।।
āyurārogyavīryaujo-
bhūtadhātvagnipuṣṭaye ।
sthitā pakvāśayadvārim
bhuktamārgārgaḷeva sā ।। 51 ।।
bhuktamāmāśaye rudhvā
sā vipācya nayatyadha: ।
balavatyabalā tvannam-
āmameva vimuñcati ।। 52 ।।)

The seat of this ūṣma is termed as grahaṇi because of its nature for withholding (grahaṇa)

the food. According to Dhanvantari, this is pittadharākala. It maintains the lifespan, health, valour, ojas, strength and also bhūtagnis and dhātvāgnis. Located at the entrance of pakvāśaya, and acting as a latch, it withholds the food for a limited time in āmaśaya itself, and after digesting well, carries it down to pakvāśaya. If grahaṇi is strong, this process goes on naturally; but, if it is weak, unable to withhold for a sufficient time, releases the undigested matter to pakvāśaya.

ग्रहण्या बलमग्निर्हि स चापि ग्रहणीबल: ।
दूषितेऽग्नावतो दुष्टा ग्रहणी रोगकारिणी ।। ५३ ।।

(grahaṇyā balamagnirhi
sa cāpi grahaṇībala: ।
dūṣite'gnāvato duṣṭā
grahaṇī rogakāriṇī ।। 53 ।।)

In normal state, agni is the strength of grahaṇi, and in other words, the strength of agni is grahaṇi itself. So, if the agni is vitiated by any cause, grahaṇi also becomes vitiated and creates various kinds of diseases.

यदन्नं देहधात्वोजोबलवर्णदिपोषणम् ।
तत्राग्निर्हेतुराहारान्न ह्यपक्वाद्रसादय: ।। ५४ ।।

(Yadannaṁ dehadhātvojo-
balavarṇadipoṣaṇam ।
tatrāgnirheturāhārānna
hyapakvādrasādaya: ।। 54 ।।)

The fact that the consumed food nourishes the dhātus, ojas, strength and colour, is due to the digesting power of agni, for the dhātus do not get any nourishment from the undigested food.

अन्नं कालेऽभ्यवहृतं कोष्ठं प्राणानिलाहृतम् ।
द्रवैर्विभिन्नसङ्घातं नीतं स्नेहेन मार्दवम् ।। ५५ ।।
सन्धुक्षित: समानेन पचत्यामाशयस्थितम् ।
औदर्योऽग्निर्यथा बाह्य: स्थालीस्थं तोयतण्डुलम् ५६

(Annaṁ kāle'bhyavahṛtaṁ
koṣṭhaṁ prāṇānilāhṛtam ।
dravairvibhinnasaṅghātaṁ
nītaṁ snehena mārdavam ।। 55 ।।
Sandhukṣita: samānena
pacatyāmāśayasthitam ।
audaryo'gniryathā bāhya:
sthālīsthaṁ toyataṇḍulam ।। 56 ।।)

The food consumed at proper time (ref. Sūtṛasthāna 8/55,56) is brought down to koṣṭha by prāṇavāyu; there its dense structure is loosened by liquids and softened by the fat present. Then, agni, prompted by samānavāyu, digests it properly like the external fire cooks the rice.

आदौ षड्रसमप्यन्नं मधुरीभूतमीरयेत् ।
फेनीभूतं कफं, यातं विदाहादम्लतां तत: ।। ५७ ।।
पित्तमामाशयात्कुर्याच्च्यवमानं, च्युतं पुन: ।
अग्निना शोषितं पक्वं पिण्डितं कटु मारुतम् ।। ५८ ।।

(Ādau ṣaḍrasamapyannaṁ
madhurībhūtamīrayet ।
phenībhūtaṁ kapha, yātaṁ
vidāhādamḷatāṁ tata: ।। 57 ।।
Pittamāmāśayātkuryā-
ccyavamānaṁ, cyutaṁ puna: ।
agninā śoṣitaṁ pakvaṁ
piṇḍitaṁ kaṭu mārutam ।। 58 ।।)

Though the food is of all the six tastes, after entering the alimentary tract and mixing with the liquids, it becomes sweet and induces the production of frothy kapha. Then, after undergoing further burning process, it becomes sour, and slowly, falling from āmāśya, it

prompts the production of pitta. Fallen from āmāśya, it becomes dried, well digested, hardened and pungent by agni and induces vāyu.

भौमाप्याग्नेयवायव्या: पञ्चोष्माण: सनाभसा: ।
पञ्चाहारगुणान्स्वान् स्वान् पार्थिवादीन् पचन्त्यनु ५९

(bhaumāpyāgneyavāyavyā:
pañcoṣmāṇa: sanābhasā: ।
pañcāhāraguṇānsvān svān
pārthivādīn pacantyanu ॥ 59 ॥)

The fives ūṣmas (agnis) related to the five bhūtas viz. bhauma ūṣma, āpya ūṣma, āgneya ūṣma, vāyavyā ūṣma and nābhasa ūṣma, digest their own particular qualities of food.

These five bhūtāgnis are the parts of the jaṭharāgni, and get strengthened by it. Each bhūtāgnis digests substances of its own qualities.

यथास्वं ते च पुष्णन्ति पक्का भूतगुणान् पृथक् ।
पार्थिवा: पार्थिवानेव शेषा: शेषांश्च देहगान् ।। ६० ।।

(Yathāsvaṁ te ca puṣṇanti
pakvā bhūtaguṇān pṛthak ।
pārthivā: pārthivāneva
śeṣā: śeṣāṁśca dehagān ॥ 60 ॥)

Thus, being digested by their own bhūtāgnis, these qualities nourish the particular qualities of the body i.e. to which bhūta they belong; for instance, bhauma qualities of the food nourish only the bhauma quality of the body, āpya only āpya qualities and so on.

किट्टं सारश्च तत्पक्वमन्नं सम्भवति द्विधा ।
तत्राच्छं किट्टमन्नस्य मूत्रं विद्याद्घनं शकृत् ।। ६१ ।।
सारस्तु सप्तभिर्भूयो यथास्वं पच्यतेऽग्निभि: ।

(Kiṭṭaṁ sāraśca tatpakva-
mannaṁ sambhavati dvidhā ।
tatrāccaṁ kiṭṭamannasya
mūtraṁ vidyādghanaṁ śakṛt ॥ 61 ॥
sārastu saptabhirbhūyo
yathāsvaṁ pacyate'gnibhi: ।)

The food thus digested, is associated in two parts i.e. waste (kiṭṭa) and essence (sāra). Of these, the liquid part of the waste is known as mūtṛa (urine), and the solid part as śakṛt (faeces). The sāra is again digested by the seven dhātvagnis (ref. Sūtṛasthāna 11/34). In this process also, there occurs the assorting of sāra and kiṭṭa, and that is being explained in the following lines.

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COMPARATIVE STUDY OF TWO ANTI-DIABETIC AYURVEDIC FORMULATIONS

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Abstract: Diabetes is a state where the homeostasis of carbohydrate and lipid metabolism is improperly regulated by insulin. There are reports that about 143 million people all over the world suffering from diabetes mellitus. This paper is a comparative study of two anti-diabetic formulations viz. Katakakhadirādi kaṣāyam and Amṛtamehāri cūṛṇam in alloxan-induced Type-1 diabetes melitus in rats.

Introduction

Diabetes mellitus is a state where the homeostasis of carbohydrate and lipid metabolism is improperly regulated by insulin. There are an estimated 143 million people worldwide suffering from diabetes mellitus a figure, which is almost five times as much as the estimates ten years ago. The complications of diabetes mellitus are more dreadful than the disorder/ disease itself such as heart disease, kidney failure, nerve damage and amputations. In spite of many advances, the modern management of diabetes mellitus still remains unsatisfactory. Drug intolerance, hypersensitivity, resistance to insulin, the danger of acute and chronic complications, the fear of hypoglycemic episodes with sulfonylureas makes it all the more important to search out safe, effective and cheaper remedies. Such remedies could be explored from the huge wealth of ayurveda, which still remains unexplored on the modern technological advances. Comparing the potencies of two ayurvedic formulations i.e. Katakakhadirādi kaṣāyam (KKK) and Amṛtamehāri cūṛṇam (AMC) with the standard oral hypoglycemic drug Glibenclamide did this anti-diabetic study.

Materials and methods

Test drugs

Katakakhadirādi kaṣāyam:- The ingredient drugs in this formulation are kataka (*Strychnos potatorum*, khadira (*Acacia catechu*), dhāṭṛi (*Emblica officinalis*), vairi (*Salacia reticulata*), dāṛvi (*Coscinium fenestratum*), sāmaṅga (*Mimosa pudica*), viduḷa (*Homonia riparia*), rajani (*Curcuma longa*), pātha (*Cissampelos pareira*), cūtabīja (*Mangifera indica*), abhaya (*Terminalia chebula*) and abda (*Cyperus rotundus*).

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Amṛtamehāri cūṛṇam:- Amṛta (*Tinospora cordifolia*), mehārimūla (root of *Salacia reticulata*), dhātṛi (*Emblica officinalis*) and rātṛi (*Curcuma longa*) are the drugs used in this formulation.

Experimental animals

Adult male wistar rats weighing (140-180 gm) were housed for a week with 12:12 light and dark cycle with free access to food and water. The experiment protocol was approved by the CPCSEA (Committee for the purpose of control and supervision of experimental animals).

Dose conversion

The dose was calculated by extrapolation of the human dose based on the surface area[1].

Test drug preparation

KKK [1 gm / 200 gm.po (per oral)], AMC (180 mg / 200 gm, po), Glibenclamide (1 mg/kg, po) were made into a fine suspension using 1% sodium carboxy methyl cellulose (SCMC); the dose volume was 1 ml/100 gm body eight of rat; the route of administration of drugs was po (per oral) and normal control group received only 1% Sodium carboxy methyl cellulose (SCMC) for 10 days.

Short-term experiment and OGTT

In short-term experiment and Oral Glucose Tolerance Test (OGTT)[2], normoglycemic and glucose loaded hyperglycemic rats were used. In the case of normoglycemic experiment, twenty-four rats were fasted overnight and divided equally into four groups i.e. Control, Glibenclamide, KKK and AMC. After drug treatment, the blood-glucose was estimated at 0, 1st, 2nd and 3rd hour for all four groups by using one touch glucometer. In OGTT, an additional step was carried out i.e. all the animals received a glucose load of 1 gm/kg, po one hour prior to the administration of drugs.

Induction of diabetes

Diabetes mellitus was induced by injecting 4% alloxan monohydrate 150 mg/kg i.p. (intra-peritoneally) in normal saline[3]. Prior to it, rats were fasted overnight for 16 hrs. Since alloxan is capable of producing fatal hypoglycemia as a result of massive insulin release after a few hours of alloxan injection, 20% glucose i.p. was administered (1ml/100g) 4 hours after alloxan injection and then rats were fed with normal diet; and for next 24 hrs rats were kept on 5% glucose solution in feeding bottle[4]. Diabetes was induced on the 4th day after alloxan injection, and rats with blood-glucose over 250 mg/dl of blood was considered diabetic; the diabetic rats were divided into 4 groups with 6 animals per group, and separate group served as control group. The drugs administered were for 10 days[5].

Sacrifice and blood collection

All the animals were sacrificed on the 11th day under excess dose of ether anaesthesia and the blood was collected by carotid artery bleeding into a clean centrifuge tube. Prior to the sacrifice, the rats were fasted overnight with free access to water. The blood was centrifuged at 3000 rpm/10 minutes to get the serum. The serum was separated carefully and was used for the estimations of total cholesterol, HDL cholesterol, total protein, Serum Glutamate Oxalate Transaminase (SGOT) and Serum Glutamate Pyruvate Transaminase (SGPT). Immediately after the blood collection, the pancreas was dissected out and washed in normal saline; then preserved in a container having 10% formalin and given for the histopathological studies.

Liver was dissected out and washed in normal saline; and 1g of the tissue was weighed and homogenized in a homogenizer with 0.1m tris Hcl buffer (pH 7.4) to get 10% liver homogenate. The liver homogenate was centrifuged and the supernatant liquid separated carefully; and the anti-oxidant study such as Superoxide Dismutase (SOD), Glutathione Peroxidase (GPx), Catalase (CAT) was carried out. Estimation was also done to calculate liver protein. All enzyme estimations were taken at a particular nanometer for particular estimation using Shimadzu spectrophotometer UV-1601 model.

Estimations

The Blood-glucose was estimated by one-touch glucometer. Total cholesterol and HDL Cholesterol were estimated in serum by using cholesterol test kit by the method of Wybenga and Pilleggi[6]. Total protein was estimated in serum by using total protein test kit by Biuret method[7]. SGOT and SGPT were estimated by the method of Reitman and Frankel using GOT test kit and SGPT test kit respectively[8]. The SOD of liver homogenate was determined by the method of Marklund and Marklund[9]. The GPx and CAT of liver homogenate were estimated according to the method of Lawrence and Bank and Aeibi respectively[10].

Statistical analysis

All the groups were statistically evaluated and the significance of various treatments calculated by using one-way ANOVA followed by Dunnet 't' test. All the results were expressed as mean + Standard error mean (SEM) for six rats in each group. Even paired 't' test and students

TABLE 1

Normoglycemic experiment and Oral Glucose Tolerance Test

Group	Blood-glucose (mg/dl)						
	NORMOGLYCEMIC EXPERIMENT				ORAL GLUCOSE TOLERANCE TEST		
	at 0 hr	at 1 hr	at 2 hrs	at 3 hrs	at 0 hr	at 1 hr	at 2 hrs
Control	71.66 + 1.44	71.66 + 1.44	71.66 + 1.52	71.16 + 1.36	71.5 + 1.77	95.66 + 2.13	109.5 + 2.78
Glibenclamide	74.66 + 1.3	63.83 + 1.16	61.16 + 0.79	60.16 + 0.95*	74.83 + 1.48	77.33 + 2.65	60.66 + 1.04*
KKK	70.33 + 1.87	69.5 + 1.90	69.33 + 2.04	69.16 + 1.99[a]	69.5 + 1.68	92.66 + 1.89	101.33 + 1.52***
AMC	71.83 + 2.13	71.15 + 2.12	71.15 + 2.12	71 + 2.4[ns]	71.66 + 2.15	92.33 + 1.85	99.83 + 1.84**

Mean + SEM (Standard error mean).

The 3rd hour and 2nd hour readings for the test groups were compared with that of the control group using student 't' test.

Values are statistically significant at *P<0.001 ** P<0.02 and *** P<0.05 compared to Control group

ns - Not statistically significant

't' test were used to find out the statistical significance within the groups at different point of time and difference between the two groups respectively. The NCT [Negative Control (Diabetic control)] was compared with control group, test groups were compared with NCT and P<0.001 was considered to be statistically significant.

Results

Both KKK and AMC did not show any change in the normal blood-glucose values whereas Glibenclamide reduced the blood-glucose level to lesser than normal; it was the same with OGTT also. All the drugs showed a highly significant decrease (P<0.001) in the blood-glucose level, and the reduction rate of AMC was the best in comparison to KKK and Glibenclamide considering the severity of the diabetes in the rats that were being used in the AMC group. In the serum total protein, the test drugs showed a highly significant increase (P<0.001); the test drugs KKK and AMC showed an excellent highly significant decrease (P<0.001) in the serum total cholesterol showing an excellent hypolipidemic effect, and, on the other hand, showing an highly significant increase (P<0.001) in serum HDL cholesterol. On SGOT and SGPT, the test drugs showed highly significant decrease (P<0.001) in accordance with Glibenclamide, which also had

TABLE 2

Effect of drugs on blood-glucose and body weight

Group	Body weight (g)		Blood-glucose (mg/dl) of the following days of treatment					
	0 day	10 day	0 day	1st day	3rd day	5th day	7th day	10th day
Control	151.66 + 2.95	151 + 3.01	81 + 3.96	81.33 + 3.78	82.33 + 3.61	81.83 + 3.56	82 + 3.55	80.83 + 3.37
NCT	145.83 + 3.60	108.33 + 3.63	250.16 + 6.64	269.66 + 5.7	290.16 + 10.65	308.5 + 11.33	321.16 + 12.94	368 + 15.27
PCT	157.33 + 5.97	162 + 5.68*a	325.5 + 16.64	204.16 + 13.87	128 + 13.44	108.33 + 4.27 *aa	93.16 + 2.23	70 + 4.52 *bb *cc (80.76%)
KKK	160.66 + 5.01	159 + 4.58*b	385 + 16.64	328 + 20.72	319.5 + 20.7	282 + 10.26*aa	154.33 + 5.73	107.16 + 2.71 *bb *cc (70.88%)
AMC	165.33 + 4.96	165.5 + 5.22*c	441.3 + 2.86	305.33 + 8.54	292.66 + 8.6	112 + 6.08*aa	102.48 + 4.65	86.5 + 1.52 *bb *cc (76.5%)

*a, *b, *c - Statistically significant - P<0.02, P<0.01 and P<0.05 - respectively

*aa, *bb, *cc - Statistically significant - P<0.001. (The percentage denotes the effect of the drugs)

the same effect. The test drugs KKK and AMC showed an excellent highly significant increase (P<0.001) in the anti-oxidant status of SOD, GPx and CAT. The histopathological results of AMC showed promising results when compared to glibenclamide and KKK (Tables 1,2&3).

Discussion

The test drugs KKK and AMC brought the body weight to normal whereas PCT (Positive control – Glibenclamide) showed an increase in the body weight than normal. The test drugs KKK and AMC did not show any hypo-glycemic effect - the most worrisome side effect of oral hypoglycemic agents – and showed an excellent effect on the lipid profile and improved the antioxidant status in the diabetized rats. The results indicate that the drugs KKK and AMC possess highly significant anti-diabetic, hypolidemic and anti-oxidant potential. When the comparison is made between the three groups i.e. KKK, AMC and Glibenclamide, AMC proves to be the most efficient in all its effects i.e. anti-diabeitc, hypolipidemic and antioxidant potential; whereas KKK and glibenclamide is more or less of same potential though Glibenclamide is better than KKK in reducing the hyperglycemic status to normal blood-glucose range.

TABLE 3

The effect of drugs on serum total protein, cholesterol, HDL, SGOT, SGPT, etc.

Parameters	GROUPS				
	Control	NCT	PCT	KKK	AMC
Serum total protein (mg/dl)	6.44 + 0.17	3.70 + 0.18	6.23 + 0.19*	5.59 + 0.13*	5.86 + 0.19*
Serum total cholesterol (mg/dl)	106.42 + 4.4	183.33 + 7.46	115.43 + 4.7*	89.88 + 5.49*	81.83 + 2.98*
Serum HDL cholesterol	43.71 + 0.79	22.13 + 0.84	34.53 + 1.40*	39.52 + 0.88*	40.78 + 1.97*
SGPT (units/ml)	27 + 5.47	71 + 9.36	35.66 + 4.63*	29.3 + 10.17*	30.33 + 7.59*
SGOT (units/ml)	61 + 6.29	125.66 + 8.04	68 + 9.86*	66 + 12.57*	69.66 + 8.62*
SOD (units/mg/ protein)	6.49 + 0.24	3.05 + 0.11	4.058 + 0.17*	5.02 + 0.10*	5.16 + 40.07*
GPx (n moles of glutathione oxidized/ min/mg/of protein)	9.328 + 0.12	4.817 + 0.17	7.545 + 0.22*	6.945 + 0.13*	7.038 + 0.15*
CAT (n moles of H_2O_2 decomposed/min/ mg of protein)	52.70 + 3.26	31.70 + 1.86	45.57 + 2.24*	52.74 + 2.25*	57.24 + 2.03*

Mean + SEM for six rats in each group

* Statistically significant (P<0.001) compared to NCT.

Conclusion

The study revealed that AMC has an equipotent anti-diabetic effect compared to Glibenclamide; KKK also showed good effect but lesser compared to AMC and Glibenclamide. Both AMC and KKK did not show any hypoglycaemia, the most troublesome effect of the oral hypoglycaemic agents (Glibenclamide). Alloxan produces Type-1 diabetes mellitus in rats and the test drugs showed an excellent management of the diabetic state; all these indicate that these two ayurvedic formulations can play very effective role in the management of Type-1 diabetes mellitus. Both the formulations showed an equipotent effect in the restoration of the altered serum protein, SGOT, SGPT, etc. and an excellent reduction in the serum total cholesterol level. Both these restored the altered HDL cholesterol level to normal. All these indicate the efficacy of Amṛtamehāri cūṛṇam and Katakakhadirādi kaṣāyam in diabetic patients with an altered lipid profile. The findings like restoration of the altered lipid profile, etc. was new indications that tempt to initiate further studies of these formulations to find out their effect on kidneys, liver, etc.

Acknowledgement:

The authors are grateful to Dr.Praveen Varier (Arya Vaidya Sala Kotakkal, Chennai Branch) for his constant encouragement, interest and valuable guidance on the ayurvedic principles throughout the period of the study.

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PHARMACOGNOSTICAL STUDIES ON *JATROPHA GLANDULIFERA* ROXB.

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Abstract: *Jatropha glandulifera* Roxb. belongs to the family Euphorbiaceae. There are reports about its efficacy in the treatment of skin diseases; and also its cardiotonic, antifungal, antihistaminic activities have been studied and reported. This paper deals with the pharmacognostic, preliminary phytochemical and microbiological studies of the plant *Jatropha glandulifera*. Numerical data like stomatal number, stomatal index, vein-islet number, vein termination number and palisade ratio are also dealt with.

Introduction

Since ancient period of civilization, the medicinal plants are known as one of the gifts of nature to cure number of diseases of human beings. The Knowledge of ayurveda has led to the discovery of many potent bioactive agents in modem drug development. About 38% of the present allopathic medicines owe their origin from plants. This study comprises of pharmacognostical, preliminary phytochemical and microbilogical studies of *J. glandulifera*. The plant belongs to the family Euphorbiaceae. Al-Yahya (1986) has reported that the plant is used in the treatment of skin diseases. Tariq (1983) has studied its cardiotonic, antifungal, antihistaminic activities; Mohamed *et al*., (1985) have studied its various pharmacological activities, and Rastogi *et al*., (1985) have reported its insecticidal activity. The plant occurs in plains from the coast in wastelands and scrubs jungles. It is distributed throughout India, Sri Lanka and Africa. The plant grows in dry condition and dry soil along the road side and open places.

Morphological description

Shrub to 2 (3)m; tender parts purplish; leaves deeply 3-5 lobed, 6-9x6.5-8 cm, base (sub) cordate, margin, serrate, serratures gland - tipped; apex shortly acuminate; petiole 6-12 cm; stipules branched, filiform, to 1.5 cm, gland - tipped; cymes ca. 12 cm; flowers unisexual; stamens 8, diadelphous, 5+3, inner longer; capsules 3 lobed, 2x1.5 cm. Distribution: - plains from the coast, in wastelands, scrub jungles, etc. (Mathew, 1992) (Fig 1a-c).

Materials and methods

The plant was found to grow in abundance on

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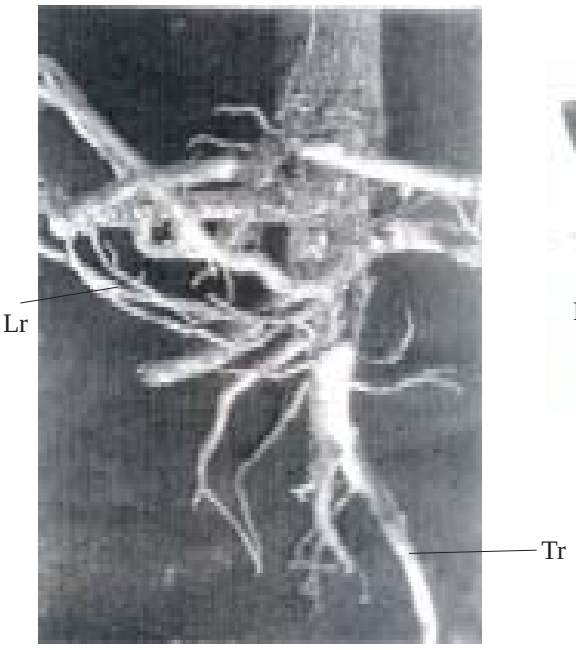
a



c

b

Fig. 1 a-c Morphological Features of *Jatropha glandulifera* Roxb.
a A flowering shoot bearing male flowers **b** A shoot having female flowers and fruits
c Root portion showing tap root and lateral roots

Mf Male flowers **Ff** Female flowers and fruits **Lr** Lateral root **Tr** Tap root

the roadside and waste lands in Chennai. Specimens were collected from the plants growing in wild condition and was authenticated by Dept. of Pharmacognosy, Sri Ramachandra college of Pharmacy, Sri Ramachandra Medical College & Research Institute (DU) Chennai - 600 116, India and the voucher specimen deposited for future reference.

Leaf, petiole and old root of the plant were cut and fixed in a solution containing 70% ethanol, formalin and acetic acid in the ratio of 90: 5: 5 ml. The materials were left in the fluid for three days after which they were washed in water and dehydrated with tertiary butyl alcohol; paraffin wax was infiltered and the specimens were embedded in wax for sectioning; with the help of rotary microtome, serial sections were taken to the thickness of 10 µm. Sections were stained with toludine blue which gives different colors to different tissues. Permanent sections were prepared in DPX mounting medium. Observation was made and the structural details were described. Photomicrograph was prepared with Nikon - alpha photomicroscope unit (Sass, 1940).

Quantitative microscopy (Kokate, 1990)

Stomatal number

The average number of stomata per square mm of epidermis is termed the stomatal number.

Methods: - Epidermal peelings were taken by pulling the epidermal layer with fingers. The number of stomata was counted and the stomatal number calculated.

Stomatal Index

The percentage proportion of the estimate divisions of the epidermis of a leaf converted into stomata is termed as stomatal index. The formula used was $\frac{S}{E+S} \times 100$ where 'S' is number of stoamata per unit area and 'E' number of ordinary epidermal cells in the same units area.

Vein-islet number

The term vein-islet is used to denote the minute area of photosynthetic tissue encircled by the ultimate division of the conducting strands. The number of vein-islets per square mm in the central part of the lamina mid way between the midrib and the margin is termed the vein-islet number.

TABLE 1

Stomatal number in Lower/Upper epidermis and Vein-islet Number

	No. of Epi. cells	No. of Stomata	Stomatal Index
STOMATAL NUMBER			
Lower Epidermis	18	9	33.3
	19	8	8
	22	10	31.2
	26	9	25.7
	15	9	37.5
Upper Epidermis	21	2	8
	18	1	5
	20	0	0
	24	1	4
	21	1	4.5

VEIN-ISLET NUMBER: 23, 21, 23, 25, 24, 23

Stomatal No. in lower epidermis:
Average = 32.2, Minimum = 25.7, Maximum = 37.5

Stomatal No. in Upper epidermis:
Average = 4.3, Minimum = 0, Maximum = 8

Average Vein-islet number = 22.5
Average Vein termination number = 24

Method: - The leaves were placed under microscope and the veins traced. The numbers of vein islet counted. (Table 1)

Extraction (Harborne, 1998)

The powdered material of dried leaves (750 g) was extracted with petroleum ether, chloroform and methanol by cold maceration technique (72 h) in the respective solvent successively. The extract was filtered and reduced to 2% of the original volume by in vacuo. Physio-chemical standards like total ash, acid insoluble ash, water-soluble extractive, alcohol soluble extractive, and preliminary phytochemical screening test like, test for alkaloids, phyto sterols, glycosides, flavonoids, proteins, gums and mucilage were carried out.

Anti-microbial activity studies (Sundaraj, 1996)

The concentrates of all the three extract of leaves were tested for antimicrobial activity against human and pathogens.

The organisms tested against were one gram positive and four gram negative aerobic bacteria. They were *Escherichia coli*, *Klebsiella pneumoniae*, *Pseudomonas aeruginosa*, *Salmonella typhi* and *Staphylococcus aureus*. All the organism were identified and obtained from the clinical specimens of Department of Microbiology. (Table 2)

TABLE 2

Effect of different extracts of *J. glandulifera* on human pathogenic bacteria

Organism	CONCENTRATION (µg/ml)							
	50		100		200		400	
	IZ	%I	IZ	%I	IZ	%I	IZ	%I
A. PETROLEUM ETHER EXTRACT								
Staphylococus aureus	21	23	27	30	31	34	32	35
Escherichia coli	22	24	24	26	30	33	36	40
Klebsiella pneumomae	18	20	20	22	22	24	28	31
Pseudomonas aerugmosa	25	27	28	31	31	34	34	37
Salmonella typhi	30	33	32	35	38	42	42	46
B. METHANOL EXTRACT								
Staphylococus aureus	28	31	30	33	31	34	32	35
Escherichia coli	16	17	17	18	20	22	26	28
Klebsiella pneumomae	20	22	21	23	23	25	24	26
Pseudomonas aerugmosa	18	20	21	23	23	25	24	26
Salmonella typhi	18	20	20	22	24	26	25	27
C. CHLOROFORM EXTRACT								
Staphylococus aureus	15	16	18	20	19	21	21	23
Escherichia coli	12	13	15	16	17	18	19	21
Klebsiella pneumomae	11	12	14	15	16	17	18	20
Pseudomonas aerugmosa	10	11	12	13	15	16	17	18
Salmonella typhi	12	13	16	17	17	18	19	21

Fresh culture was prepared by inoculating in Muller Hinton broth incubating at 37° C for 24 hours. As the standardised bacterial suspension, each microorganism was suspended in sterile broths and diluted to contain $l0^6$ colony forming units (CFU) per ml, and checked by matching the turbidity of the tube with MCFarland standard 0.5.

Evaluation of antibacterial activity

Muller Hinton agar (MHA) medium was used for preparation of plates. Medium (3.8g) was dissolved in 100 ml of distil water and sterilised, and 25 ml of the medium was poured to the depth of 4 mm. Then agar was set at ambient temperature. In each plate, well was cut from the agar in the center of the plate using a sterile corke borer of 8 mm dia. Sterile cotton swab was immersed into the standardized bacterial suspension pressed against wall of the tube to express excess fluid. MHA plates were inoculated by streaking with that swab. Streaking was done successively in three different direction to obtain even inoculum.

The concentrate extracts were weighed and dissolved in dimethyl sulfoxide (DMSO) to prepare extract solution of 1 mg of extract in 1 ml of DMSO. To each well, 50-200 µl of this extract was delivered using a sterile micropipette. The inoculated plates were incubated within 15 minutes of inoculation at 37° C for 24 hours. Then the plates were examined for any zone of growth inhibition. Inhibition zones were recorded as the diameter of growth free zones including the diameter of the well in mm at the end of incubation period.

Result and discussion

Leaf

Lamina is thick, glabrous even margins bear multicellular long stalked glands with sphereical head (Fig 2a). Adaxial epidermis single layered, epidermal cells rectangular to cuticle thick walled abaxial epidermis narrower than the adaxial epidermal cells. Palisade mesophyll single layered, spongy mesophyll consists of lobed cells which are loosely arranged.

Stomata

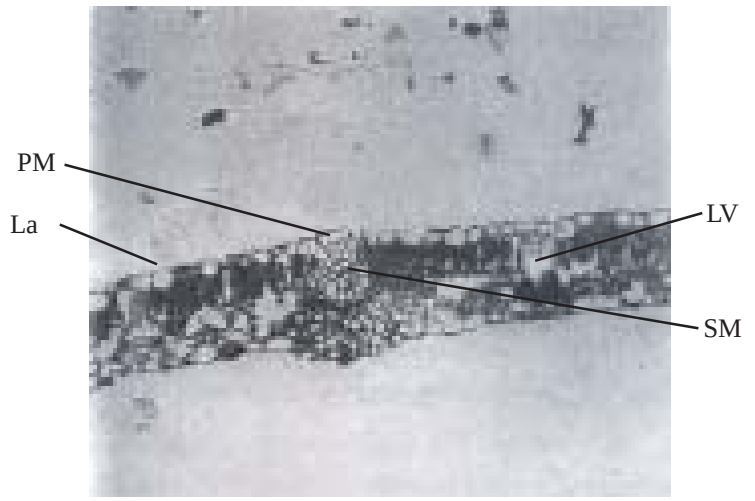
Stomata occurs only on the lower epidermis, very rare or absent on the upper epidermis. Stomatal type is paracytic with one subsidiary cell on their side of the stomata. Anticlinal walls of both upper and lower epidermal cells are straight, thick epidermal cells polygonal in shape.

Midrib

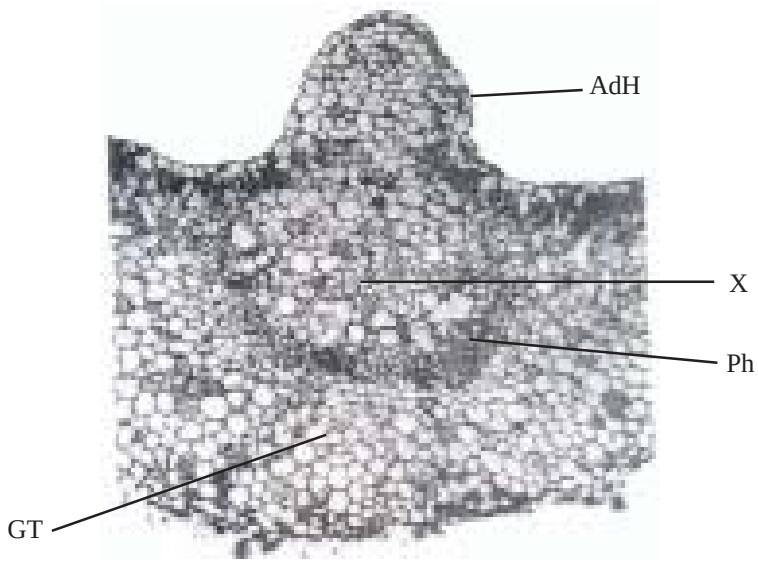
Shallowly hemispherical on the lower side, and broadly conical on the upper side (Fig 2b). Ground tissue of the midrib parenchymatous, compact and homogenous. Lacticifers are very frequent especially in the lower part of the midrib, vascular strand single arc shaped with a few radial rows of xylem elements and lower phloem tissue lateral views are not prominently projecting above the leaf surface. The view consists of few xylem elements and a few phloem cells and the vascular strand is enclosed within parenchymatous bundle sheath with abaxial and adaxial extensions. Huge druses of calcium oxalate are abundant in the mesophyll tissues of the leaf. Calcium oxalate prismatic crystals are abundant along the veins of the leaf.

Young stem

The stem is circular in transactional view; the surface is even and glabrous. The epidermis is single layered with rectangular cells. There is narrow zone of initial periderm beneath the epidermis, consisting of 4-6 layers of cells. The



a



b

Fig. 2 a-b Anatomy of leaf of *Jatropha glandulifera* Roxb.
a TS of lamina passing through a lateral vein **b** TS of leaf passing through the midrib

La Lamina **PM** Palisade Mesophyll **LV** Lateral Vein **SM** Spongy Mesophyll
AdH Adaxial Hump **X** Xylem **Ph** Phloem **GT** Ground Tissue

cortex is broad, homogenous in cellular composition and consists of thin walled compact angular and circular parenchymatous cells. Pith is also wider, homogenous and parenchymatous. The vascular cylinder is compact and continuous and varies in cross-sectional outline. The outer boundary of the vascular cylinder is marked by a thin, undulate zone of fibres. Xylem consists of radical rows of fibres, vessels and parenchymatous cells. Phloem occurs in random masses outside the xylem cylinder. Laticifers are quite abundant in the inner cortex and outer to the phloem.

Root

Old root measuring about 3 mm in diameter was studied (Fig 3a-c). The epidermis is broken and withered due to formation of secondary xylem and secondary phloem. The cortex is narrow and compressed. Secondary phloem is broad and occurs all around the xylem cylinder. Phloem consists of sieve tube members and parenchyma cells. The xylem cylinder is very wide and dense. It consists of wide angular vessels which are less in frequency. Xylem fibres and parechymatous cells are equally abundant. Xylem rays are narrow and one cell wide in transactional view of the xylem. The xylem elements are arranged in regular radial rows. In the central part of the root is occupied by tetrach primary xylem elements.

Petiole

The petiole showed some variation in the cross sectional outline as well as in the vascular system along its length from the base to the distal part (Fig 4a&b). Along the distal part of the petiole it is strongly circular in transactional view with shallow adaxial grooves. The ground tissues are homogenous and parenchymatous. There is a semicircular whorl of vascular strands and scattered masses of medullary strands. Along the middle part the petiole becomes bluntly conical with, adaxial open ring of 8 vascular strands. Below the middle part the outline of the petiole is ovate and the vascular strands increase in number and fuse laterally forming as elliptical outline. The proximal part of the petiole is wider than other parts. It is planoconvex with flat adaxial side. The vascular bundle occur in the same shape as the petiole that is the vascular ring is semicircular with flat adaxial side, apart from the main strands there are two accessory strands, one on each adaxial corner of the main vascular ring. The vascular bundles of the petiole are collateral and are arc shaped. Quantitative microscopy of the leaf was carried out

Preliminary phytochemical studies showed presence of steroids, triterpenoids, reducing sugars, alkaloids, coumarins, etc. (Table 3).

Microbiological studies

All the extracts of *Jatropha glandulifera*

TABLE 3

Preliminary phytochemical test for various extracts

Chemical Test	PE	CE	M
Steroids	+	+	+
Triterpenoids	+	+	+
Phenolic compounds	-	-	-
Alkaloids	-	-	+
Glycosides	-	-	-
Reducing sugars	+	+	+
Tannins	-	-	-
Saponin	-	-	-
Coumarin	+	+	+

PE - Petroleum Ether, CE - Chloroform Extract, M: Methanol

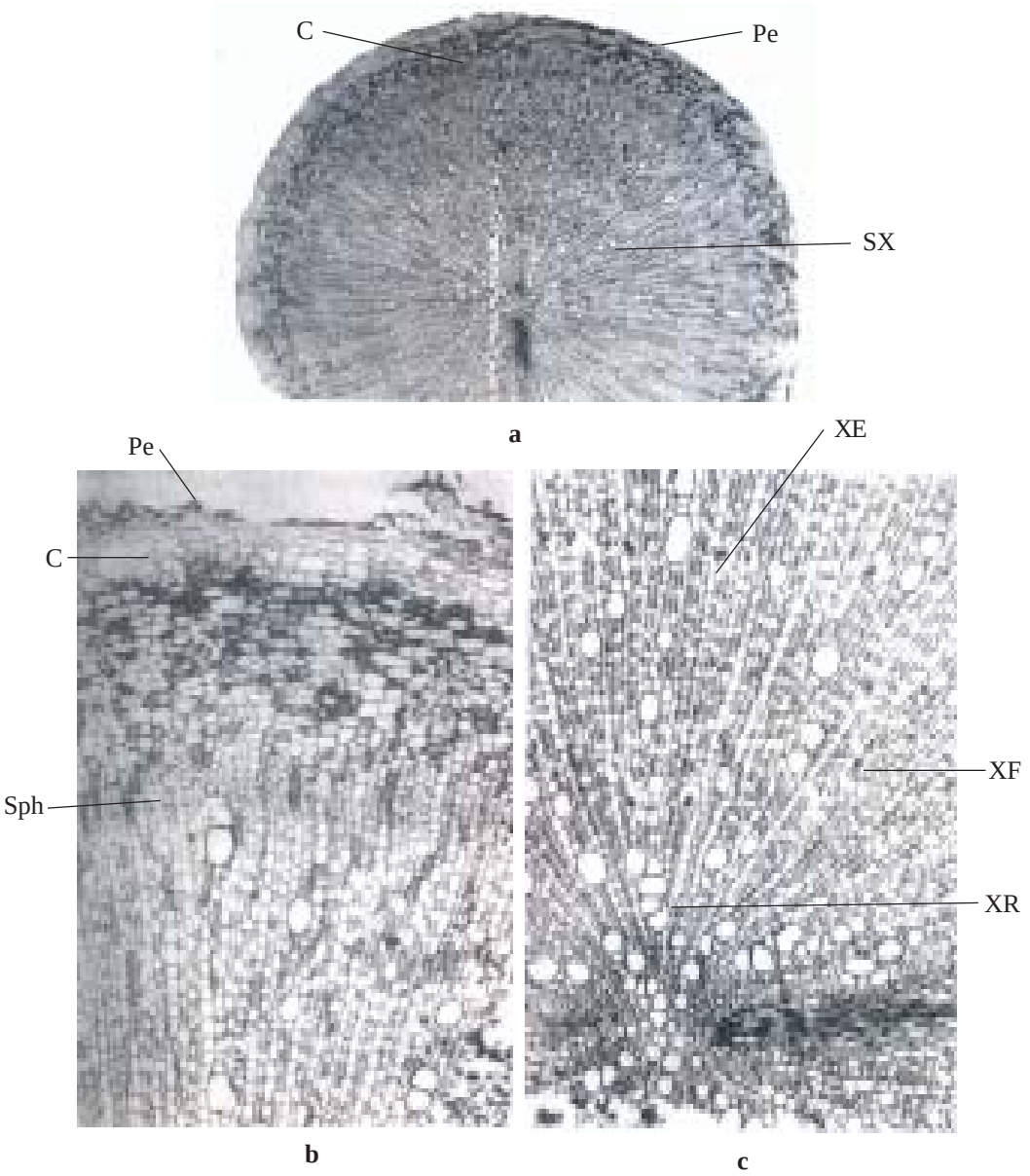


Fig. 3a-c Anatomy of root of *Jatropha glandulifera* Roxb.
a-c TS of root under low magnification

C Cortex **Pe** Periderm **SX** Seconday Xylem **SPh** Secondary Phloem
XE Xylem elements **XF** Xylem fibres **XR** Xylem rays

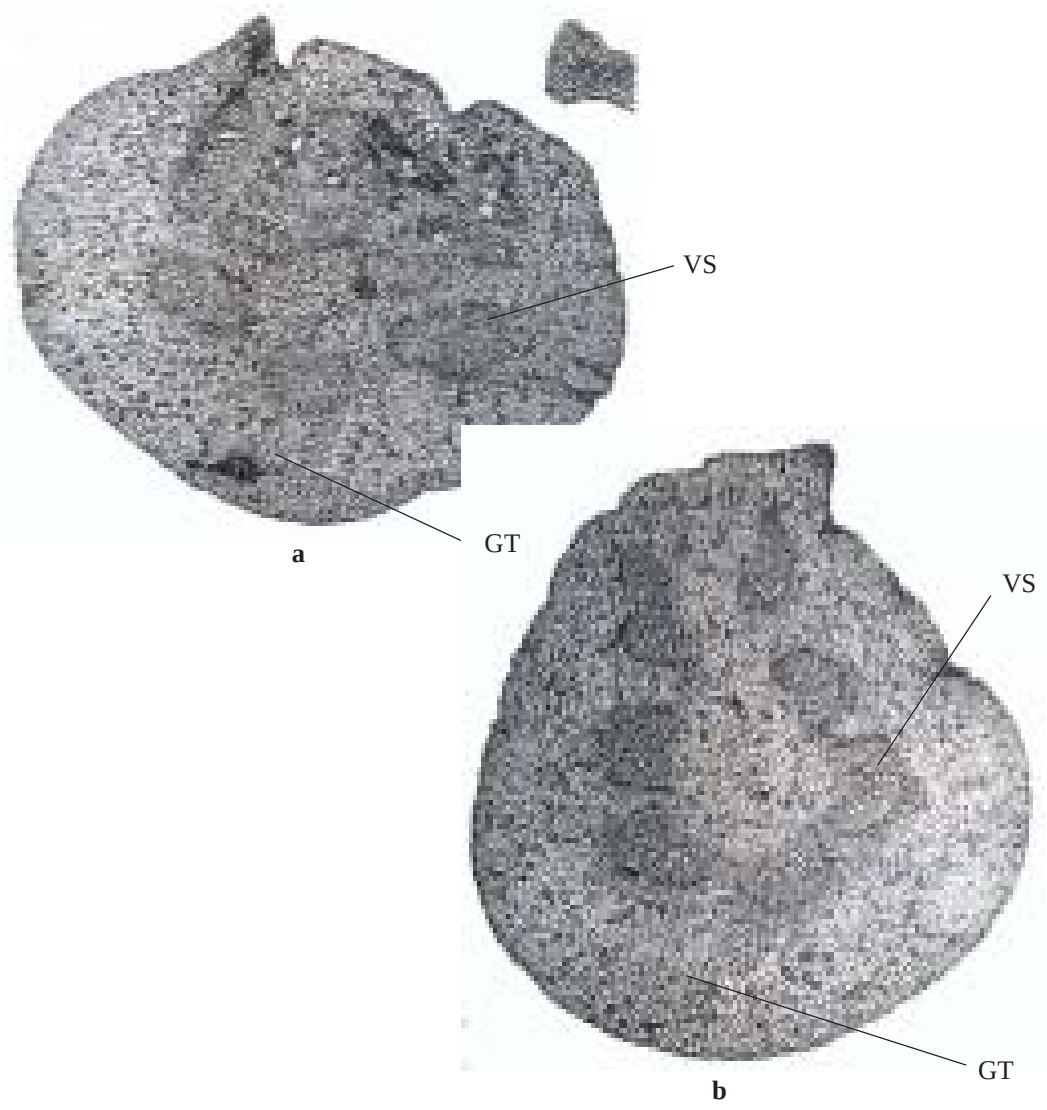


Fig. 4 a-b Transsectional views of the petiole along middle and distal parts
a TS of distal part of the petiole **b** TS of petiole just below the distal part

Ads Adaxial side **GT** Ground tissue **VS** Vascular strands

showed considerable activity against tested microorganism. Among the extracts, methanol extract showed more activity than the other two extracts (Table 2).

TABLE 4

Analysis of ash value extractive values

Parameter	Value (%w/w)
Ash value	6.5
Water soluble ash	4.5
Acid insoluble ash	3.3
Solvent	**Extract value (%w/w)**
Water	20.1
Alcohol	18.2
Petroleum ether	4.5
Chloroform	3.5
Methanol	6.5

Physico-chemical parameters

Air-dried well powdered leaves of *Jatropha glandulifera* were subjected to the physico-chemical analysis (Table 4).

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MYOPIA - A CLINICAL STUDY

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Abstract: Myopia is one of the major eye disorders. The important factor responsible for this disease is corneal curvature, which is also known as curvatural myopia. No complete remedial measures for the prevention and cure of this pathology is prevailed in the domain of modern ophthalmology. Ayurvedic classics include this eye disorder under timira and describe cakṣuṣya, indicating the drugs that improve the eyesight. This paper clinically evaluates the efficacy of ropanaputapāka, a procedure referred to in the ayurvedic texts for the management of eye diseases.

Introduction

Ayurveda is probably the most ancient science of life practiced in India, which deals not only with the diseases and their treatment but also lays emphasis on the maintaining a disease-free positive health. It suggests a definite round-the-year programme to keep healthy by combating the ill affects of seasonal variations and other natural forces acting on the body. Maintenance of good eyesight occupies an important place in this programme. A number of drugs and procedures have been suggested which rejuvenate the eyesight or at least prevent its deterioration.

Ācārya Suśruta describes 76 types of eye disorders in total, out of which, 12 disorders affect the vision in various degrees from haziness to complete blindness. It is interesting to note that many centuries before the 'Kepler's' description of refractive errors, ācārya Suśruta has been described a similar clinical picture under the heading of timira, a small fraction of which can be safely considered to include myopia on the basis of the following:

- Avyakṭadarśana or blurring of vision for distant and near objects as occurs in high myopia.
- Vihvaladarśana (perception of false images) is also a classical feature of one variety of timira, which occur in progressive myopia resulting from vitreous degeneration and ultimately retinal degeneration and detachment in advanced stage.
- Cardinal symptom of myopia i.e. difficulty in distant vision, which is also the feature of timira, causes when the vitiated doṣas are lodged in the upper part of the dṛṣṭimaṇḍala (visual apparatus).

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No remedial measures for the prevention and cure of this pathology prevail in the domain of modern ophthalmology. Spectacle work as crutches only and various surgical procedures are not free from recurrence and even complications. Therefore it opens the door to the other systems of medicine to suggest, experiment and contribute to alleviate or to check the deterioration.

Promotion of visual acuity was one of the aims of the ācāryas of the yore. The term cakṣuṣya, indicating measures or drugs that improve eyesight, is used often in ayurvedic texts. In the various texts, not only number of drugs, but also diet and regimens are told which are said to promote the visual acuity. There are 5 special therapeutic modalities of using the drugs in the ocular disorders applied in the form of lubrication, eye bath, irrigation, eye drops and collyrium. In the case of eye bath, extract of raw drugs prepared by cooking the drugs with flesh of animals, honey, milk and ghee, is put into the eyes after making a wall of 2 inches height around the eyeballs with black gram flour. Here, eye bath, which is said to promote the eyesight, has been selected for this study.

Materials and methods

Total 30 patients were selected from O.P.D. of I.P.G.T & R.A. Hospital, Jamnagar for the study. The diagnosis made on broad clinical features of timira and myopia was confirmed by determination of visual acuity, ophthalmoscopic and retinoscopic examinations.

Out of 30 patients, 56.66% was under the age group of 20-30 years and 36.66 % under 10-20 years; of which, 56.66% were males and 43.66% females. Maximum numbers of the patients (83.33%) were students and 20% of patients had positive family history. Majority of the patients was of middle class (73.33%) followed by lower and upper middle class (13.33%); majority (36.66%) were found to be watching T.V/computers; 46.66% showed predominance of vāta-pitta-pṛakṛti (physical constitution) and 53.33 % showed sātvika-rājasika-pṛakṛti (mental constitution); 63.33 % patients showed chronicity of the disease for 5 years. Majority (36.66%) of the patients showed visual efficacy 6/6 and less followed by 6/6 - 6/9 (26.66 %), 6/12-6/18 (16.66%) and 6/24-6/36 (20%).

Maximum numbers of patients (31.66%) showed diopteric power 0-1.00 D followed by 2.25 to 4.00 D (28.33%); 93.33 % of the patients were found to have simple myopia; blurring of vision was found in 76.66% followed by perception of false images in 70%. Headache and eyestrain was found in equal number in this series i.e. 96.66% each.

It was decided to treat one section of the patients by a popular type of eye-bath technique mentioned above which is referred to in ayurvedic texts by the term ropaṇa puṭapāka; this involves bathing of eyeballs with the expressed juice of cooked drugs specific for promoting eyesight after creating an artificial socket with a flour-paste along the margins of orbital socket in order to withhold juice for the desired length of time.

The patients were divided into two groups i.e. Group I - Treated group of 24 patients (48 eyes) - treated by healing eye bath. Group II - Control Group of 6 patients (12 eyes) - treated by distilled water in the same manner.

The following was composition of drugs used for eyebath:

Dāruharidra	*Berberis aristata*	14 g
Guḍūci	*Tinospora cordifolia*	13 g
Nirmali	*Strychnos potatorum*	13 g
Ajamāmsa	Meat (goat)	80 g
Madhu	Honey	50 g
Ghṛta	Ghee	60 g
Cow's milk		50 g

Preparation of the drug

The drug was prepared by slight modification from the classical procedure. 40g of the powdered drugs were soaked in 4 times of water. Then 80g of cleansed and minced meat of goat was crushed in mortar and then mixed with ghee, honey and cow's milk. This was mixed with already soaked drugs and all the drugs were cooked in pressure cooker for about 20 minutes. After cooled down, the extract was taken out and filtered with fine filter, and preserved in the steel container. The quantity obtained was approximately 50g, sufficient for one sitting.

Methodology of eyebath

Mode of application: - The patient was made to lie down in supine position on a table, in a chamber, free from dust, wind and direct sun rays. Two even, firm and compact circles were formed with the help of paste of black gram flour, one around each eyeball. Then, the prepared extract was poured from 2 fingers height over the closed eyes, up to the level of eyelashes. The extract was lukewarm, and the patient was asked to blink slowly.

Period of retaining the drug: - The drug retained over the eyes for about 15 minutes. After 15 minutes, the medicine drained out by making a hole in the outer wall of the circle. Then the circles removed and mild fomentation done in and around the orbital fosssae.

TABLE 1

The effect of healing eye-bath on cardinal symptoms, visual efficacy and on clinical refraction of myopia on patients of treated group (n+24)

Description	Mean Score		% of Relief	Paired 't' test			P value
	BT	AT		SD (+)	SE (+)	't'	
CARDINAL SYMPTOMS							
Bluring of vision	2.33	1.16	49.78	0.48	0.09	11.86	<0.001
Perception of false images	1.50	0.70	5.33	0.69	0.15	5.14	<0.001
Eye strain	1.30	0.17	86.95	0.34	0.07	<0.001	<0.001
Headache	1.39	0.13	90.64	0.44	0.09	13.46	<0.001
VISUAL EFFICACY							
Right eye	44.58	51.25	14.95	7.61	1.55	4.28	<0.001
Left eye	49.16	57.50	16.94	7.61	1.55	5.36	<0.001
CLINICAL REFRACTION							
Right eye	2.87	2.43	15.24	0.19	0.04	10.79	<0.001
Left eye	2.59	2.12	18.09	0.24	0.05	9.26	<0.001

The apt time for administration of the drug is forenoon or evening; the dose is the quantity equal to filling up to the eyelashes, and the duration is three days; a gap of seven days was given before the next sitting.

Assessment criteria

- Objective: - Ophthalmoscopic examination and Retinoscopic examination.
- Subjective: - Visual acuity (Snellen's Chart reading) and Improvement in signs and symptoms.

Scoring pattern for assessment of results:- The improvement in signs and symptoms were noted by adopting the suitable scoring pattern. The grading of cardinal symptoms was done from 0 to 4 grade.

Results

The eyebath therapy was found to be very effective; there was considerable relief in cardinal symptoms i.e. in indistinct vision (49.78% - statistically significant) perception of false images (53.33%), eyestrain (86.95%) and headache (90.64%). The effect of visual acuity therapy was 14.95% (P<0.001) in the right eye and 16.94% (P<0.001) in the left. On clinical refraction, the therapy provided 15.24% (P<0.001) relief in the right eye and 18.09% (P<0.001) in the left. The overall effect of the eyebath therapy was as found to be very effective (Table 2).

TABLE 2

Total effect of eyebath on patients of treated group

Effect	No. of patients	% of Relief
Cured	0	0
Markedly improved	15	62.5
Improved	7	29.2
Unchanged	2	08.3

Discussion and conclusion

In this study, patients were having myopia up to 4.0 Diopters. Patients of high myopia were excluded as they are usually having associated degenerative changes in the eyeball i.e. fundus and vitreous degeneration; those with normal fundus picture only kept for this study.

Most of the drugs used for eyebath were having efficacy of improving the eyesight (cakṣuṣya) and their compound was effective in mitigating all the three humors. *Strychnos potatorum* is said to enhance the eyesight by eliminating the vitiated humors and mitigate the vāta and kapha factor. *Berberis aristata* pacifies the pitta doṣa

TABLE 3

The effect of distilled water on cardinal symptoms of myopiaon patients of control group (n+6)

Cardinal symptoms	Mean Score		% of Relief	Paired 't' test			P value
	BT	AT		SD (+)	SE (+)	't'	
Dimness of vision	1.83	1.50	18.21	0.51	0.26	1.26	>0.10
Perception of false images	1.16	1.16	-	-	-	-	-
Eye strain	1	0.83	16.66	0.40	0.16	1.00	0.10
Headache	1	0.66	33.00	0.51	0.26	1.26	>0.10

and improves the eyesight. *Tinospora cordifolia* mitigates tṛidoṣas and give nourishment to the eyeball by the quality of its rasāyana property. Ghee and cow's milk that pacify vāta, pitta, etc. has got rasāyana action also. Honey that pacifies pitta and kapha, has got the capacity to improve the eyesight also; flesh of goat also pacifies the vāta and pitta. So, the overall effect of the compound drug was mitigating tṛidoṣas that are responsible for myopia (timira).

In this procedure, the medicine retained for long time over the eyeball facilitates the faster absorption of the drug into the eyeball by the virtue of its pressure effect; and it increases the blood circulation towards eyeball and thus improves the visual acuity.

The important factor responsible for myopia is corneal curvature (curvatural myopia). Here, as the eye is completely covered with medicine, due to pressure it exerts on the eyeball and there may be some change in the curvature of the cornea, which in turn result into change of refractive error of the eye.

In this study only three sittings, each of three days were done. Possibly if it is repeated for longer time it may further decrease the refractive error of the eye.

Acknowledgement:
The authors would like to acknowledge with respect, the help received from the authorities of I.P.G.T& R.A, and Gujarat Ayurveda University, Jamnagar.

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COMPARATIVE CLINICAL STUDY OF LAUHA BHASMA AND MAṆḌŪRA BHASMA ON PĀṆḌUROGA

P.K. Sarkar, P.K. Prajapati and A.K. Chaudhary*

Abstract: Lauhabhasma and Maṇḍūrabhasma are the two famous ayurvedic formulations that are described in ayurvedic classics for the management Pāṇḍuroga (iron deficiency anaemia). This paper is a comparative clinical study to assess the efficacy of Lauhabhasma and Maṇḍūrabhasma.

Introduction

In the global campaign of health for all, promotion of proper nutrition is one of the eight elements of primary health care. Nutritional indicators have been developed to monitor health for all. Greater emphasis has now been laid on integrating nutrition into primary health care systems and formulating a national dietary goal to promote health and nutritional status of the families and communities[1].

Iron deficiency has been recognized as commonest nutritional deficiency disorder. All most all ayurvedic classics describe this deficiency disorder by the name of pāṇḍuroga and recommend formulations of *lauha* (iron) for their management[2]; it was this reason why Pāṇḍuroga was selected for the comparative clinical trial of Lauhabhasma and Maṇḍūra bhasma - the two famous formulations of incinerated iron - in comparison with the standard drug, dried ferrous sulphate.

Materials and methods

Preparation of test drugs

Lauhabhasma and Maṇḍūrabhasma were prepared in practical laboratory of Department of Rasaśāstṛa and Bhaiṣajyakalpana, I.P.G.T. & R.A., Gujarat Ayurveda University. Scraps of wrought iron and maṇḍūra (rusted iron) were procured from local market, made into coarse powder by hammering and then subjected to śodhana (purification) according to traditional ayurvedic procedure. For this purpose, the materials were heated to red hot and quenched in particular liquid medias for 42 times[3] and then subjected to māraṇa (incineration) according to traditional procedure. For this purpose, one part of the materials were mixed with 1/12th part of purified cinnabar (hiṅguḷa, HgS) and levigated by aloe gel for 6 hours[4]. Pellets were prepared from this levigated doughy mass and taken into earthen crucibles faced together, and the junction sealed by mud-

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smeared clothes. This apparatus, called as śarāva sampuṭam was subjected for heating in electric muffle furnace. Heating of materials confined to this apparatus is called puṭapāka in ayurveda. Burning was continued approx. for 3 hours. When cooled down (approx. after 48 hours), the apparatus taken out and opened to get the incinerated iron powder. The procedures repeated for 7 times and finally the prepared test drugs (Lauhabhasma and Maṇḍūra bhasma) were collected separately in sterile glass container for further clinical study.

Inclusion criteria

The patients of 12 to 60 years having classical symptomatology of pāṇḍuroga i.e. iron deficiency anaemia were selected from OPD and IPD of I.P.G.T. & R.A. Hospital, Gujarat Ayurveda University. A special clinical proforma was prepared incorporating selected symptoms and signs like hṛdayaspandana (palpitation), śrama (fatigue), śvāsa (shortness of breath), dauṛbalya (weakness), pāṇḍuta (pallor), etc. based on both the ayurvedic and modern description. Also, laboratory investigations like haemoglobin level (below 11.5 g/dl), mean corpuscular volume (MCV) (below 76 fL), serum iron (below 35 µg/dl), total iron binding capacity (TIBC) (more than 400 µg/DL), percentage of saturation of transferrin (<10%), etc. were taken into consideration.

Exclusion criteria

Those having haemoglobin level below 5 g/dl, pregnant and lactating women, those having iron deficiency anaemia with cardiac complication, patients of diabetes mellitus, malignancy and those with gastroctomy, gastro jejunostomy, sprue syndrome having defective absorption, etc. were excluded from the study.

Assessment criteria

The results of the therapy were assessed after completion of treatment schedule on the basis of improvement in the selected symptoms and signs based on both ayurvedic and modern descriptions, and investigation conducted before and after the treatment. On the basis of improvement in the conducted laboratory investigations, the results of therapy were categorized under four categories viz. marked improvement, moderate improvement, mild improvement and no change

Posology

Drug: - Both the test drugs (Lauhabhasma and Maṇḍūrabhasma) and reference standard drug (dried ferrous sulphate) were given in capsule form. The powdered drug (62.5 mg) was filled in gelatin capsule of 250 mg capacity admixed with potato starch.

Dose: - Generally, the dose of Lauhabhasma and Maṇḍūrabhasma is ¼ to 2 ratti (30 to 250 mg) per day[5]. In this study, both the bhasmas were prescribed in the dose of ½ ratti (62.5 mg) twice a day i.e. 1 ratti (125 mg) per day. Reference standard drug was also given in the same dose schedule.

Duration: - According to classical reference, Lauhabhasma and Maṇḍūrabhasma are prescribed to the patients of pāṇḍu and kāmala for the duration of 1 month[6]. Keeping this view in mind, the treatment schedule was continued for 30 days for all the drugs.

Direction and diet: - The drugs were prescribed to be taken 1 hour before or 3 hours after the intake of food. Antacids were restricted during the treatment schedule. Also, lemon and jaggery were prescribed to be taken with each meal.

Follow up

All the patients were reviewed after each 7 days for a period of 60 days (1 month treatment schedule and 1 month follow-up schedule).

Study protocol

Total 30 patients were registered for the clinical trial and divided randomly into 3 groups. Group I and II were treated by Lauhabhasma (125 mg/day) and Maṇḍūrabhasma (125 mg/day) respectively. Group III was treated by reference standard drug i.e. dried ferrous sulphate (125 mg/day).

The treatment schedule was continued for 30 days; the dose of both the test and standard drug was twice daily, and follow up done for next 30 days. Unwanted effects of drugs, if any during the total period (60 days) were noted. Laboratory investigation of blood and serum of each patient was carried out before commencement and after completion of the treatment.

Statistical analysis

The data obtained were analyzed statistically by paired 't' test, and the values expressed as mean + SEM (standard error of mean). The level of $P<0.05$ and $P<0.01$ was considered as statistically significant and highly significant respectively. Level of significance was noted and interpreted accordingly.

Results

Distribution of patients: - Out of 30 patients, 80% were female and 20% male. And 20% of patients were of vāta-paittik pṛakṛti, 33.3% kapha-paittik pṛakṛti and the remaining 46.7% pitta-vātika pṛakṛti.

Total 22 patients i.e. 8 patients out of 10 from standard control group (ferrous sulphate), 7 patients out of 10 from Lauhabhasma treated groups and 7 patients out of 10 from Maṇḍūra bhasma treated group, were completed the treatment and follow-up schedule.

TABLE 1

Effect of therapy on haematological parameters

Group	Haemoglobin level (g/dl)		Total RBC count (10^6/[l)		Mean corpuscular volume (*f*2)	
	Bt	At	Bt	At	Bt	At
Ferrous sulphate[a] (125 mg/day)	10.4 + 0.7	11.2 + 0.9** ↑	4.71 + 0.2	4.68 + 0.2	70.7 + 3.6	75.5 + 3.5**
Lauha Bhasma[b] (125 mg/day)	09.4 + 0.7	10.5 + 0.7**	4.27 + 0.3	4.28 + 0.2	70.2 + 3.3	76.4 + 1.5*
Maṇḍūra Bhasma[b] (125 mg/day)	10.3 + 0.5	12.0 + 0.5**	4.52 +0.2	4.64 + 0.2	71.0 + 1.0	76.2 + 1.0**

Mean + SEM

Bt = Before the treatment; At = After the treatment, a = 8 patients in the group, b = 7 patients in the group

* $p<0.02$; ** $p<0.01$ (paired student 't' test); = increase; = decrease

Effect of therapy on general symptoms:- Analysis of the data related to improvement in general symptoms in different treatment groups reveal 28.6% patients of pāṇḍutā, 57.1 % patients of śṛama, 100% patients of śvāsa, 83.3% patients of hṛdayaspandana and 42.9% patients of dauṛbalya got relief in the Lauha bhasma treated groups. In the case of Maṇḍūra bhasma treated group and standard control group, the data obtained were 28.6%, 42.9%, 75%, 100%, 14.3% and 12.5%, 28.6%, 50%, 83.3% 28.6% respectively.

Effect on haematological parameters: - The data pertaining to the effect of tests and standard drugs on haematological parameters revealed statistically highly significant (P<0.01) increase in mean haemoglobin level in both the test drug groups and standard control group; and statistically highly significant (P<0.001) increase in mean corpuscular volume (MCV) was observed in Maṇḍūrabhasma treated group and standard control group. Statistically significant (P<0.02) increase in MCV was found in Lauhabhasma treated group and a minute alteration in total RBC count in all the treated groups was found to be statistically non-significant. (Table 1)

Effect of on biochemical parameters: - The data revealed statistically highly significant increase (P<0.01) in serum iron and percent saturation of transferrin. The total iron binding capacity was found highly significant decrease (P<0.01) in all the treated groups. (Table 2)

Comparative effectiveness: - The comparative study of both the test drugs was made by the method of unpaired 't' test. It was done on the basis of improvement in haemoglobin level, serum iron and total iron binding capacity in comparison to reference standard drug. A statistically significant improvement (P<0.05) in haemoglobin level and total iron binding

TABLE 2

Effect of therapy on biochemical parameters

Group	Serum iron ([g/dl)		TIBC ([g/dl)		Percent saturation of Transferrin (%)	
	Bt	At	Bt	At	Bt	At
Ferrous sulphate[a] (125 mg/day)	31.3 + 1.5	39.0 + 1.3**	434.9 + 19.0	402.9 + 16.0	7.3 + 0.5	9.8 + 0.5**
Lauha Bhasma[b] (125 mg/day)	29.1 + 3.1	38.8 + 2.8**	474.3 + 21.9	436.1 + 17.1	6.3 + 0.7	9.1 + 0.9**
Maṇḍūra Bhasma[b] (125 mg/day)	29.0 + 1.5	40.1 + 1.5**	446.0 +12.0	390.9 + 13.6	6.5 + 0.4	10.3 + 0.5**

Mean + SEM
Bt = Before the treatment; At = After the treatment, a = 8 patients in the group, b = 7 patients in the group
** p<0.01 (paired student 't' test); = increase; = decrease

capacity, and an insignificant, but apparent, improvement (P>0.05) in serum iron level was observed in Maṇḍūrabhasma treated group in comparison to standard control group. Also, an apparent improvement in haemoglobin level, serum iron and total iron binding capacity was found in Lauhabhasma treated group, but the observed changes found to be statistically insignificant (Table 3).

During clinical trial, 2 patients from standard control (ferrous sulphate treated) group were complaining of colicky pain and another 2 patients from the same group were complaining of constipation. No such complaint was noticed in Lauhabhasma and Maṇḍūra bhasma treated groups.

Discussion

Analysis of the data related to improvement in general symptoms in different groups reveal the most symptomatic relief in Lauhabhasma treated group, followed by Maṇḍūrabhasma treated group and least symptomatic relief in standard control group. Reference standard drug contain only iron compound, whereas both the test drugs contain iron compound along with other trace elements. Both the test drugs may function in other system also and give an overall improvement. As Lauhabhasma contains more trace elements, it exhibits better response in improvement of general symptoms than Maṇḍūrabhasma.

Almost complete remission in symptoms like śvāsa and hṛdayaspandana were observed in all the groups. In iron deficiency anaemia, oxygen carrying capacity of RBC is diminished due to reduction in mean corpuscular haemoglobin (MCR) and mean corpuscular volume (MCV). So, to supply the required amount of oxygen according to tissue demand, heart has to do more work; accordingly hear rate increases, tachycardia and palpitation occurs and respiratory rate also increases, and patients feel shortness of breath on efforts. Iron supplement causes increase in MCH and MCV and leads to increase in oxygen carrying capacity of RBC and thereby improvement in heart rate and that leads to remission in palpitation and shortness of breath. Other symptoms may need longer duration of therapy for complete remission, those are probably attributable to lack of tissue iron.

In iron deficiency anaemia, microcytic and hypochromic morphology of RBC is seen. Not much variation occurred in total RBC count. In iron deficiency state, iron store depletion refers to an imbalance between normal physiological demand and the level of dietary iron intake[7]. And, in this state, absorption of dietary iron is increased up to 5 to 6 fold[8]. Supplement of oral iron preparations cause

TABLE 3

Comparative effect of test drugs in improvement on objective parameters

Group	Improvement in		
	HB level (g/dl)	S. iron ([g/dl)	TIBC ([g/dl)
Ferrous sulphate	0.9 + 0.2	07.6 + 0.8	32.0 + 4.8
Lauha Bhasma[a]	1.0 + 0.2	09.2 + 2.1	38.1 + 7.1
Mandura Bhasma[a]	1.7 + 0.2*	11.1 + 1.7	55.1 + 9.7*

Mean + SEM

a = in comparison with standard drug (dried ferrous sulphate); = increase; * p<0.05 (unpaired student 't' test)

increase in iron absorption leading to synthesis of haemo 10 bin. So, haemoglobin level and mean corpuscular volume were increased highly significant.

Conclusion

On the basis of obtained subjective and objective data, it may be concluded that effect of Lauhabhasma is more on subjective parameters and Maṇḍūrabhasma has better efficacy on objective parameters in patients of pāṇḍuroga (iron deficiency anaemia). On results of this research work it may be concluded that Maṇḍūrabhasma is therapeutically equally good and sometimes better than Lauhabhasma.

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MAINTENANCE OF MENTAL HEALTH - THE AYURVEDIC WAY

Sunil Prakash Sharma and Ajay Kumar Sharma*

Abstract: According to ayurveda, adequate samayoga (harmony) of indriyārtha, prajña and pariṇāma (kāla) is regarded as the basis of complete health. Whenever this harmony is disturbed it precipitates various diseases. One should understand what is hita and what is ahita for attaining total health, both mental and physical. This paper briefly discusses the aetiology and pathogenesis of mental disorders based on ayurvedic principles.

Introduction

About 500 million people are believed to be suffering from stress-related, neurotic and somatic (psychological problems that manifests as physical ailments) disorders all around the globe. A further 200 million suffer from mood disorders, about 83 million from mental retardation, 30 million from epilepsy, 22 million from dementia and 16 million from schizophrenia.

In India, the morbidity rate of mental disease is about 18-20 per 1000, and the types of mental illnesses and their prevalence are very much the same as in other parts of the world. According to a survey of 1991, the number of mental hospital beds and qualified psychiatrists in the country are far below from the actual requirement.

Ayurvedic scholars consider the mental and physical diseases as two separate subjects. However, no clear-cut line of demarcation has been drawn between the mental and psychological diseases, and a flexible psychosomatic approach has not been worked out. There is detailed description of mental or psychiatric disorder in ayurveda, which includes unmāda, apasmāra, atatvābhiniveśa, bhaya-harṣa-śoka, kāma, etc.

It is felt that psychological diseases have posed a serious challenge to human civilization, particularly in the Western Countries where materialism has reached the saturation point. The attempts so far made in this direction by the psychologists and psychiatrists to safe guard human beings from the onset of various mental disorders have not so far done the desirable results. At this juncture, it will be worthwhile to know about the approach of ayurveda on

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this subject. In ayurveda, stress has been laid on a psychosomatic approach in the management of various mental disorders. Caraka describes that life denotes the samyoga (annexation) of śarīra (physical body) indriya (conative and cognitive organs), sattva (mind) and ātman (soul)[1]. Further he adds that śarīra is influenced by manas and likewise manas by śarīra[2]. Similarly, physical and mental disorders may interchangeable[3]. All these highlight the holistic approach of ayurveda.

Aetiology and pathogenesis

According to ayurvedic principles there are three major causes for the development of a disease viz. asātmendriyārthasamyoga, prajñāparādha and pariṇāma[4].

Asātmendriyārthasamyoga means the deficient, excessive and perverted use of various senses. Prajñāparādha is the perverted use of dhī, dhṛti and smṛti; this lead to sarvadoṣaprakopa[5]; it regards as the fault of intellect or understanding. Pariṇāma i.e. kāla, includes the deficient or excessive or perverted incidence in the seasons (ṛtu). There is greater possibility of occurrence of diseases, due to the upsetting of normal equilibrium of doṣas in the body.

These three major causes have been termed as the trividharogāyatana; in other words, these three factors are the abode of diseases. So it is clear that asātmendriyārthasamyoga, prajñā-parādha and pariṇāma represent stressful state of affected individual.

The fundamental and foremost objective of ayurveda is svasthasya svāsthya samrakṣaṇa[6]. Diseases can be prevented with the help of ayurvedic principles and practices, and this is important especially in the context of mental disorders. Ayurvedic classics elucidate the various measures that deal with the prevention of various diseases; some of the important measures detailed in this regard include:

- Nidānaparivarjana
- Dinacarya (including rātricarya)
- Ṛtucarya
- Sattvāvajaya
- Sadvṛtta
- Ācārarasāyana
- Medhyarasāyana
- Yoga and meditation
- Dhāraṇīya and adhāraṇīya vegas
- Trayopastambha

Nidānaparivarjana is that one should avoid all the factors that may cause various diseases[7]. This plays an important role in the promotion of health and prevention of mental disorders. Prajñāparādha and asātmendriyārthasamyoga are important factors to be considered in the pathogenesis of mental disorders; hence ayurveda advocates that one should not indulge in such activities.

Dinacarya (including rātṛicarya) means the daily routine/activities. According to this, one should awake before sunrise, do proper śauca vidhis, abhyaṅga, exercise and follow suitable dietary practices and rules of dharma, artha and kāma. Vāgbhaṭa advocates that one who properly sees his daily routine and follows proper dinacarya and rātricarya never suffers from diseases[8]. Aṣṭāṅgahṛdaya says that one should take proper/light food in the evening, and after appraising his day's activities, should go to bed; and before going to sleep he should remember the god[9].

In ayurveda, great emphasis has been laid down on the concept of observance of ṛtucarya. It

includes dietetic and behaviouristic regimens according to the seasons. These regimens are to be followed properly for maintaining sound health and prevention of diseases. Ayurvedic classics refer to śodhanakālas (purificatory seasons); the śodhanakarmas are intended to maintain the balanced homeostasis of doṣas in the human body.

Caraka defines satvāvajaya as a mind control therapy in which stress has been laid on restraining of mind (manonigraha) from unwholesome arthas (objects)[10]. Manonigraha leads to a higher mental level and normalises the mental doṣas (rajas and tamas). This can also be used as a tool for preventing the mental disorders.

Sadvṛtta means right codes and conducts i.e. leading a righteous life; close to nature. These conducts may be related to personal or religious, social, mental and or behavioral practices. Sadvṛtta leads to maintenance of proper mental and social health. Caraka instructs that one should seek the good and avoid the evils. One should speak only that which is true, and be conducive to the good qualities of all creatures and regard all creatures as himself[11]. He further adds that every man should follow the path of brahmacarya, jñāna, dāna, maitri, karuṇa, harṣa, upekṣa and praśama[12].

Carakasamhita refers to ācārarasāyana in detail[13]. Like sadvṛtta, ācārarasāyana commends righteous thoughts and actions. One who follows virtuous thoughts and actions attains complete health due to the rasāyana effects of ācāra. In this regard, some of the directions to be followed are: be truthful, never indulge in violence, do charitable/noble actions, do labour but do not be fatigue; one should have the qualities of japa, śauca and dhīrata; follow ideal pattern for sleep and wakefulness; should have liberal mind and interest in adhyātma, knowledge of deśa, kāla, etc. Caraka emphasises that the manifestation of psychic disorders are, some time, due to attainment of the undesired as well as non-attainment of the desired things or goals. This points out the importance of righteous goals and so also the proper efforts to be put to achieve such goals.

Medhyarasāyanas are specially related to promotion of mental health. These rasāyanas possess psychotropic, anxiolytic and intellect promoting effects[14]. Caraka describes four specific medhyarasāyanas viz. śaṅkhapuṣpi (*Convolvulus pluricaulis*), maṇḍūkaparṇi (*Centella asiatica*), madhuyaṣṭi (*Glycyrrhiza glabra*) and guḍūci (*Tinospora cordifolia*).

Medhya drugs are used for treating various psychosomatic disorders. Rasāyana therapy is not only related to specific drugs but this therapy consists of proper use of auṣadhi, āhāra, vihāra and ācāra. Proper use of rasāyana drugs results in rejuvenation of all dhātus and tissues, and enhance immunity levels and improve physical and mental health.

Yoga and meditation: - Yoga means to unite, to combine or to integrate. This represents a state of union or integration - the union of the individual soul or consciousness with the cosmic divine or supreme soul; or total integration of the physical, mental, intellectual and spiritual aspects of the human personality. In ayurveda, yoga is the base of manovijñāna. It has both the preventive and curative aspects regarding various mental disorders.

Dhāraṇīya vegas are the urges that are to be

restrained and adhāraṇīya vegas are the natural urges which are not to be restrained. Dhāraṇīya vegas are immensely related to mental health. The wise man control the impulses for greed, grief, fear, anger, vanity, etc[15]; all these are emotional factors that are to be surmounted. The concept of dhāraṇīya vegas is more of preventive nature in reference to disease management and if properly followed, will lead to ideal mental health.

Trayostambha:- In ayurveda, proper diet (āhāra), sleep (nidra) and celibacy (brahmacarya) are called the trayostambha (tripods) of life[16]. Healthy state of our body depends largely on how we follow the regimen related to these three pillars. The healthy dietary regimen, sleeping and waking patterns and healthy sexual practices lead maintenance and perseverance of proper health. These are the fundamental factors that play a major role in the prevention of various psychic and psychosomatic disorders.

Conclusion

Ayurveda is the science of life. According to ayurvedic concepts, adequate samayoga (harmony) of indriyārtha, prajña and pariṇāma (kāla) is regarded as the basis of complete health. Whenever this harmony is disturbed it precipitates various diseases in our body. One should understand what is hita and what is ahita for attaining total health, both mental and physical.

One who follows proper diet and lifestyle, who always acts thoughtfully, who does not entangle himself unduly in the objects of the senses, who is charitable, who behaves affectionately with all living creatures, who speaks the truth, who believes in forgiveness and who serves with humility to those who are wise; is never exposed to diseases[17].

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11 नैकः सुखी, न दुःखशीलाचारोपचारः । नानृतं ब्रूयात् । नाधीरो नात्युच्छ्रितसत्त्वः स्यात्, न सर्वाभिशङ्की । सर्वप्राणिषु बंधूभूतः स्यात् । (च.सू.)

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13 सत्यवादिनमक्रोधं.....यथोक्तान् ससमश्नुते । (च. चि.)

14 मण्डूकपर्ण्या स्वरसः प्रयोज्यः
क्षीरेणयष्टी मधुकस्यचूर्णम् ।
रसोगुडूच्यास्तु समूलपुष्प्याः
कल्कः प्रयोज्यः खलु शङ्खपुष्प्याः ।।
आयुः प्रदान्यामयनाशनानि
बलाग्निवर्णस्वरवर्धनानि ।
मेध्यानिचैतानि रसायनानि
मेध्याविशेषेण च शंखपुष्पी ।।
इति मेध्य रसायनानि । (च. चि.)

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नैर्लज्जयेर्ष्यातिरागाणामभिध्यायांश्च बुद्धिमान् ।।
(च. सू.)

16 त्रय उपस्तम्भा इति – आहारः
स्वप्नो ब्रह्मचर्यमिति । (च. सू.)

17 नित्यं हिताहारविहारसेवी
समीक्ष्यकारी विषयेष्वसक्तः ।
दाता समः सत्यपरः क्षमावा–
नाप्नोपसेवी च भवत्यरोगः ।। (अ. हृ. सू.)

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ANTIOXIDANT AND MEMBRANE STABILIZING EFFECT OF VITAMIN E IN ELDERLY PEOPLE

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Abstract: Free radical mediated oxidative stress has been implicated in a number of diseases. Vitamin E could be important for protecting lipids against oxidation and subsequent injury. Therefore, supplementation with vitamin E is beneficial to elderly people to prevent oxidative damage and hemolysis. Here, the authors attempt to study the antioxidant and membrane stabilizing property of vitamin E in elderly people.

Introduction

Immune response in elderly individuals has been reported to improve after micro-nutrient supplementation. Considering the biological function of vitamin E as an important preventing factor for lipid peroxidation, and on the basis of existing parallelisms between some characteristics of ageing and different symptoms of vitamin E deficiency, a possible influence of this vitamin on the ageing process was postulated[1]. á-tocopherol (vitamin E) is accepted to act as an active antioxidant by scavenging reactive peroxy radicals that propagate chain reaction in the nonenzymatic autoxidation of lipids in vivo[2,3]. All of the major classes of biomolecules may be attacked by free radical species but lipids are the most susceptible. Cell membranes are rich sources of polyunsaturated fatty acids (PUFA), which are readily attacked by oxidizing radicals. The oxidative destruction of PUFA by deleterious free radical reactions is known as lipid peroxidation[4,5]. Vitamin E, a lipid soluble component of biological membranes, is located predominantly in cellular and sub-cellular membranes serves as a potent radical chain-breaking antioxidant to protect membrane phospholipids against peroxidation, presumably by functioning as an electron donor to free radicals[6]. Here is an attempt to study the antioxidant and membrane stabilizing property of vitamin E in elderly people.

Materials and methods

The study group included 34 elderly people selected without known bias between 60-75 years of both sexes attended the Geriatric Camp organized by the Kasturba Medical College on the occasion of World Elder's Day. All subjects gave written consent before the beginning of the study. Information regarding chronic

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illnesses, smoking, alcohol consumption, drug-intake, etc. were obtained by questionnaires, and then the subjects were divided into four groups viz. a). Normal elderly group (n= 13), b) Diabetics (n= 8), c) Hypertensive (n=7) and d) Diabetics-hypertensive (n=6). The control group included 15 healthy individuals of both sexes between 20-32 years.

Sample collection

Random venous blood samples were collected into heparinized bottles. The blood was centrifuged within 3 hrs of collection at 3000 rpm for 10 minutes. Plasma was collected carefully and used for the assay of Vitamin E. RBC's were mixed with 0.9% saline and centrifuged. Supernatant was removed. The process repeated 3 times to prepare RBC suspension, which was used for the assay of oxidative hemolysis of erythrocytes.

The Plasma á-tocopherol was measured using Emmorie Engel reaction by the method of Bieri *et al*[7] and the values expressed in milligrams per liter. Oxidative hemolysis of erythrocytes was estimated by the method of Kartha and Krishnamurthy[8] and the values expressed in percentage.

Statistical analysis

Mean and standard deviation calculated separately for all the groups and compared across the groups using Kruskal-Wallis test. Post-hoc comparison done and the significance were derived for each pair-wise comparison. The 'p' value <0.05 was considered statistically significant.

Results

The plasma vitamin E concentration found to be decreased significantly in all the four groups ($p<0.0001$) when compared to normal young controls (Table 1). When compared to normal young controls, the oxidative hemolysis found to be highly increased in normal elderly people ($p<0.0001$), elderly diabetic patients ($p<0.0001$) and also significantly increased in elderly hypertensive patients ($p<0.001$) and elderly diabetic-hypertensive patients ($p<0.05$) (Table 2). A negative correlation was obtained between oxidative hemolysis of erythrocytes and vitamin E levels.

TABLE 1

Comparison of Vitamin E in all the elderly group (Mean+S.D.)

Particulars	Normal Young (n=15)	Normal Elderly (n=13)	Elderly Hepertensive (n=7)	Elderly Diabetic (n=8)	Elderly Diabetic-Hepertensive (n=6)
Vitamin E	12.24 + 1.23	8.04 + 0.67	8.39 + 0.44	8.06 + 0.92	8.19 + 0.56
'p' Value		<0.0001	<0.0001	<0.0001	<0.0001

n = number of samples

S.D. = Standard Deviation

'p' Value = Probability of chance being cause for the differences in the mean of the two groups

Discussion

The study showed a significant decrease in the plasma vitamin E levels in the elderly people irrespective of the presence or absence of diabetes and hypertension. Vitamin E that inactivates the free radicals was found in the cytosol, plasma and extra-cellular environment[9-11]. It has been associated with a reduction in lipid peroxidation, platelet adhesiveness and thrombosis[12,13]. Vitamin E also modulates synthesis of prostaglandins and other host defenses which are important for immune response[14,15]. Decreased vitamin E may increase the risk of coronary heart disease, hypertension and stroke in the elderly people. The etiology of cardiovascular diseases includes oxidation of low-density lipoprotein (LDL) cholesterol, increased platelet adhesiveness and arterial stiffness. By stabilizing the free radicals implicated in these casual factors, vitamin E could reduce the initiation or severity of the disease in elderly people[16,17]. Vitamin E may slow the progression of atherosclerosis by blocking the oxidative modification of LDL cholesterol and then decrease its uptake into the arterial lumen.

Oxidative hemolysis of erythrocytes was significantly increased in elderly people irrespective of the presence or absence of diabetes and hypertension. The oxidation of erythrocyte membranes serves a model for the oxidative damage of biomembranes[18,19]. The oxidation of erythrocytic membranes induced by free radicals were studied, and it was found that free radicals generated in the aqueous phase attack the membrane to induce the chain oxidation of lipids and proteins and eventually cause hemolysis[20,21].

The oxidative hemolysis of erythrocytes induced by free radicals can be inhibited by chain-breaking and lipid soluble antioxidant vitamin E. Niki E. *et al* studied the oxidative hemolysis of erythrocytes and its inhibition by free radical scavengers[20]. It has observed that an inhibitory effect of á-tocopherol incorporated into phosphotidyl choline liposomes on the hemolysis of human erythrocyte membranes and that the lipid peroxides formed in the phosphotidyl choline liposomes were

TABLE 2

Comparison of Oxidative hemolysis in all the elderly group (Mean+S.D.)

Particulars	Normal Young (n=15)	Normal Elderly (n=13)	Elderly Hepertensive (n=7)	Elderly Diabetic (n=8)	Elderly Diabetic-Hepertensive (n=6)
Oxidative Hemolysis	0.88 + 0.51	1.75 + 0.45	1.93 + 0.42	1.77 + 0.95	2.48 + 2.95
'p' Value		<0.0001	<0.001	<0.0001	<0.05

n = number of samples

S.D. = Standard Deviation

'p' Value = Probability of chance being cause for the differences in the mean of the two groups

transferred to erythrocyte membranes which eventually caused membrane vesiculation and hemolysis (Inoue *et al*)[19]. Another possible mechanism of hydrogen peroxide-induced hemolysis involves the oxidation of membrane sulfhydryl groups (Mezick *et al*)[22]. Antioxidants such as vitamin E may act by preventing such SH-group oxidation and thereby inhibiting the H_2O_2 induced hemolysis.

Hence we conclude that supplementation of vitamin E may prevent further oxidative injury in elderly people and it should be considered as an adjunct to the established cardio-protective measures such as smoking abstention, avoidance of obesity, adequate physical activity, control of high blood pressure and hyperlipidemia.

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FORMULATION AND HPTLC FINGERPRINT TECHNIQUE FOR AN AYURVEDIC FORMULATION CONTAINING *CENTELLA ASIATICA*

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Abstract: The demand for herbal products has been steadily increasing. It is often a difficult task to verify the validity of herbal products for their quality as well as therapeutic efficacy and safety. *Centella asiatica* plant contains the phytoconstituents which enhances the memory power. Its extract is the main ingredient in the commercially available memory improving formulations. *Centella* tablet, an ayurvedic formulation, was formulated and standardized in our laboratory. This paper deals with a fingerprint method adopted to validate the *Centella* tablets by HPTLC technique.

Introduction

Centella tablet preparation contains only one ingredient i.e. *Centella asiatica* Linn.f., along with the pharmaceutical additives. This tablet is mainly used as brain tonic to increase memory power. This herb produces intellectual improvement in mentally retarded children. Triterpenoid fraction of this plant improves the conditions in patients with venous hypertension and post phlebitis syndrome. Most of the commercially available memory improving formulation uses *Centella asiatica* as the major ingredient. Considering the necessity of the standardization of these formulations, the *Centella asiatica* tablet was formulated and a fingerprint of the formulation was developed by HPTLC and compared with that of the standard *Centella* extract. The physical evaluation of the tablet was carried out by doing disintegration test, weight variation test, and friability and hardness tests.

Materials and methods

The equipment used for the study were: Rotary tablet punching machine, CAMAG HPTLC equipped with a sample applicator LINOMAT IV, twin trough plate development chamber, TLC scanner III and integration software and CATS 4.02 (Switzerland).

The leaves of *Centella asiatica* were collected from the medicinal plant garden and dried under shade. After complete drying they were powdered and passed through the sieve 100.

The tablet was formulated by wet granulation method using starch paste as the binder. Required amount of sodium benzoate was dissolved in hot water and a paste was prepared by the addition of required amount of starch to

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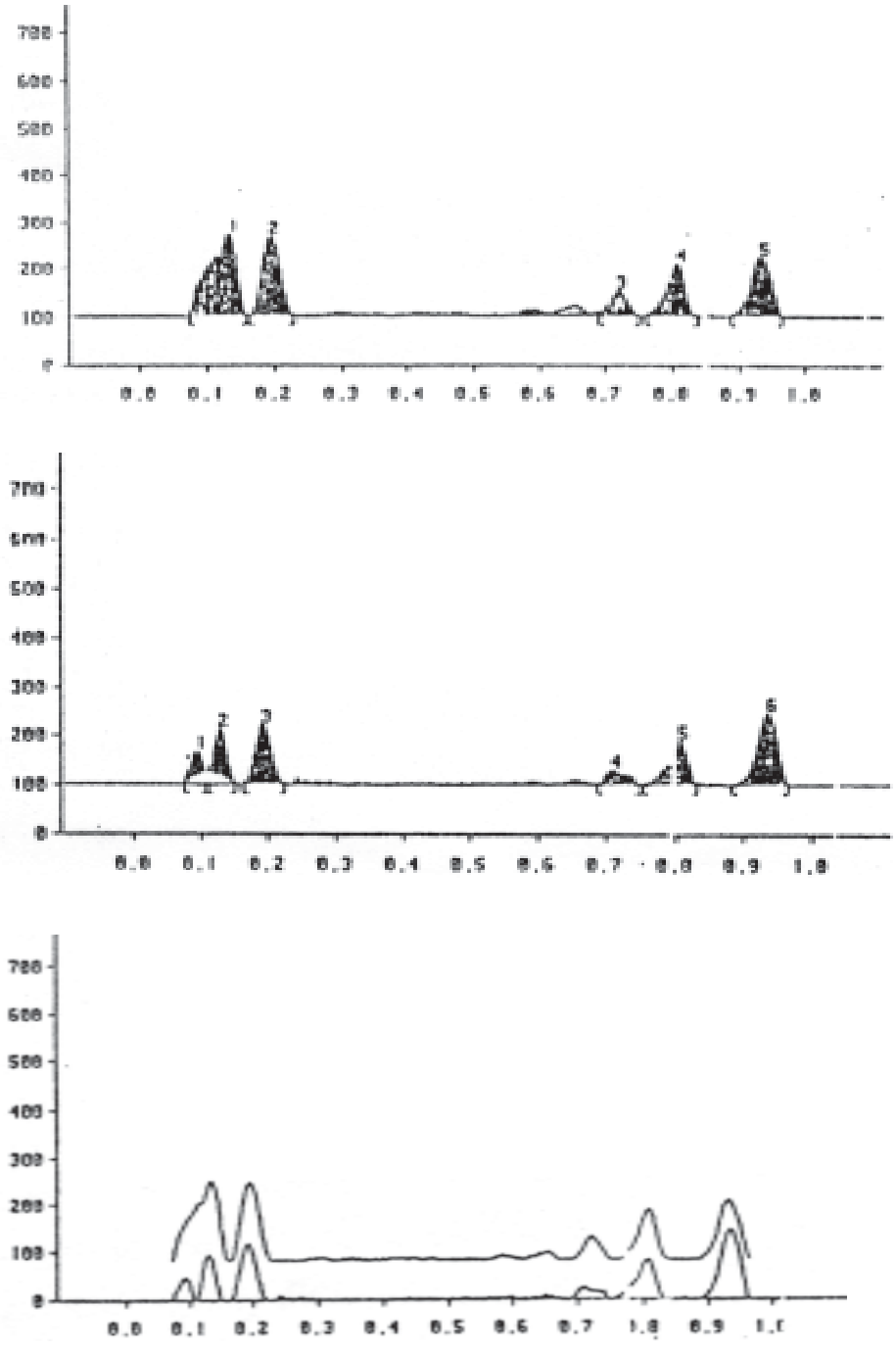

the hot water. The starch paste was slowly added and the granules of the powder were prepared. The granules were dried and the required amounts of Talc and Magnesium stearate were added. The granules were mixed and the tablets were punched in the rotary punching machine with the weight of 500 mg per tablet.

The following tests were done to evaluate the tablets according to the procedure as in Indian Pharmacopoeia:

- Weight variation test
- Disintegration test
- Hardness test
- Friability test

Development of HPTLC fingerprint

Preparation of standard extract:- 100g of *Centella asiatica* powder was extracted with 500 ml of methanol by stirring at 50°C for 1 hour. The extract was filtered through What Mann filter paper No. 1. The filtered extract was concentrated under reduced pressure of 25 inches of mercury to remove the solvent. The extract powder was obtained by drying the concentrated extract under vacuum. The yield of extract obtained was 9% w/w. 10 mg of the extract was dissolved in 10 ml of methanol (10 mg/ml). This extract was used to develop the fingerprint.

Preparation of tablet extract:- The same procedure as above was repeated with 100g of powdered tablets, and 10mg of the extract obtained was dissolved in 10 ml of methanol and used for developing the fingerprint.

Thin Layer Chromatography:- 5µl of the standard and tablet extracts were applied on the silica gel pre-coated HPTLC plates (Merck, 10 x 10 cm) by Linomat IV applicator. The plate was dried and developed by ascending mode in the solvent system Chloroform: Methanol: Water (18:9:0.6). The plate was dried and scanned by CAMAG TLC Scanner III at 254nm.

Results and discussion

There were totally 5 spots in the standard *Centella* extract with the Rf values of 0.07, 0.16, 0.69, 0.76 and 0.87 respectively. The *Centella* tablet extract was found to contain 6 spots with Rf values of 0.07, 0.11, 0.16, 0.69, 0.76 and 0.86 respectively. By the peak matching and comparison of Rf values, all the constituents of the standard extract of *Centella asiatica* was found to be present in the *Centella* tablets. All the quality control tests for the tablets were found to comply with the standards of Indian Pharmacopoeia (Table 1).

TABLE 1

Physical parameters of the tablet

Evaluation tests	Results
Weight variation	Complies (>5%)
Disintegration	Complies (9min. 40 Sec.)
Friability	Complies (0.68%)
Hardness	Complies (2.4 kg/cm^2)

Acknowledgement

We are thankful to the TIFAC Centre and the Management of JSS College of Pharmacy for their help in the successful completion of study.

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KAŚYAPASAṀHITĀ: THE ANCIENT WISDOM IN CLINICAL DIAGNOSIS

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Abstract: Diagnosis is an art, and of course, it is a science too. Ayurvedic classics give much emphasis to the prognostication and rational management of curable disorders. In the field of pediatrics, specially concerning infants and children, it is very difficult to assess the pathology; and to make a perfect diagnosis in them is rather complex as they are unable to express their problems in words. This paper briefly discusses the significance of the diagnostic importance referred to in Kaśyapasaṁhitā, especially in Vēdanādhyāya, in the field of pediatrics.

Introduction

The diagnostic process is one of the greatest challenges in medicine. The correct diagnosis of the underlying disorder and its probable etiology is crucial for the rational management and prognostication. In the field of pediatrics, it is very difficult to assess the pathology especially to make a perfect diagnosis in infants and children, because, here, the interrogation as regards the patient is concerned is not applicable. The diagnosis here is to be based on elicitation of symptoms and its analysis and interpretation in the light of knowledge and experience of the pediatrician. It is a distressing fact that today the physicians are becoming mere technocrats and are losing the art of clinical diagnosis.

The scope of Kaśyapasaṁhitā

Ayurveda give much emphasis to the prognostication and the rational management of curable disorders. It says that an astute physician is endowed with sharp and sensitive senses especially keenness of observation. During the last decade, there has been a revolution in imaging technology by the introduction of ultrasound, C.T. scanning, nuclear magnetic resonance and positron emission tommography. In India, these sophisticated diagnostic techniques are neither available nor affordable everywhere in every case. Hence a competent physician is one who can make correct diagnosis without the help of these sophisticated techniques. Kasyapasamhita, one of the ancient wisdoms that deal with

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kaumārabhṛtya (pediatrics), has the upper-hand regarding the diagnosis and treatment as a whole. Vēdanādhyāya of Kaśyapasaṁhitā imbibes useful observations of fundamental diagnostic importance. This chapter, the lime-light of Kaśyapasaṁhita, comprises not only the clinical features but also the prodromal features of various diseases, thereby enabling the physician to provide prophylactic treatment in time prior to manifestation of the disease. Suśrutasaṁhita also uphold this fact. It says:

सञ्चयेऽपहृता दोषा लभन्ते नोत्तरा गतिः ।
ते तूत्तरासु गतिषु भवन्ति बलवत्तराः ।। (सु.सू. २१/३७)

The above facts have paramount importance in the field of pediatrics as the children are more prone to diseases, and since various organ systems are not fully developed, pathologies inhabiting children are not easy to manage. Kaśyapa says:

पीड्यमानस्य रूपाणि ज्वरच्छर्द्यतिसारिषु ।
वैद्यो दृष्टैव जानीयात् कृच्छ्रं सर्वं न सिध्यति ।।
(सू. २५/५०)

The follwing are the peculiarities of the chapter titled Vēdanādhyāya:

1. All the Important and common disorders are mentioned in this very chapter
2. It comprises of the observed features regarding common disorders encountered in pediatric practice
3. While making the observations, attention is paid to the whole child rather than merely his body organ
4. Classical groups of nonspecific and specific features form the basis of diagnosis
5. In the cases of some diseases, a characteristic group of general features constitute the key to perfect diagnosis e.g. in Galagraha
6. The features described under various diseases are precisely much scientific; e.g. under Udaraśūla, it says: स्तनं व्युदस्यते रौति चोत्तानश्चावभज्यते । उदरस्तब्धता शैत्यं मुखस्वेदश्च शूलिनः ।।
7. Disorders of various systems e.g. gastro intestinal system, urinary system, integumentary system etc., along with the diseases pertaining to E.N.T. are described.
8. Fever is the commonest symptom encountered in various diseases. For its early detection, and management the prodromal features are mentioned.
9. The sequence of description simulate with that of other ayurvedic classics i.e. Carakasaṁhita, Suśrutasaṁhita and Mādhavanidāna; e.g. pāṇḍu and kāmala; hiccā and śvāsarōga.

It describes the feature of 'uttāna arbhajyan' i.e. lying supine is very pertinent, as infants likes to in prone position which is not even depicted in the modern system of medicine.

Conclusion

Vēdanādhyāya of Kaśyapasaṁhitā, as a whole, should be considered as the principal key to diagnostic perfection. By employing the method of observation and elicitation many diseases, which are not described here, can also be easily diagnosed. Thus its latitude is much vast and it constitutes a magnificent practical approach to clinical diagnosis in the field of pediatrics.

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ANTI-HYPERLIPIDAEMIC EFFECT OF *SIKANJEBEEN SADA* IN HYPERLIPIDAEMIA

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Abstract: Hyperlipidaemia (*Fart-e-Tadassum Fil Dam*) is a major health problem both in developed and developing countries. The total cholesterol level is an important determinant of coronary heart disease. Although the well-known hypo-lipidaemic agent 'statin therapy' reduces the mortality and morbidity associated with coronary artery disease, most of them do not achieve the low-density lipoprotein (LDL) cholesterol level; besides, it also has a lot of side effects like increased lithogenecity of bile, nausea, abnormal liver function and myosytis. The unani formulation *Sikanjebeen Sada* is an anti-hypolipidaemic (*Qat-e-Dasomat*) drug using since very early time. This paper discusses the anti-hypercholesterolemic and anti hyper triglyceridaemic activity of *Sikanjebeen Sada*

Introduction

Hyperlipidaemia is a condition in which the lipid levels i.e. serum triglceride, serum cholesterol, chylomicrone, LDL, VLDL and HDL - any one or all, may rise. According to Harrison, hyperlipidaemia is a state in which serum cholesterol and serum triglyceride levels are raised to 250 mg/dl or 4.5 m mol/d1[1]. The normal range of serum cholesterol and triglycerid is 150-250 mg/dl; however, with respect to Indians, the normal level is regarded as 150-200 mg/dl due to their low socio-economic and nutritional status[2].

In the unani system of medicine, only macroscopic details of lipids (*shahmiyat*) are available. Some times they are described as white and semi liquid mass with the name *samine* and *riwai*. According to Abu Sahal Maseehi, Ibn-e-Sina and Razi, they are part of blood by which organs get their nourishment and are inevitable for health[3–6]. Hyperlipidaemic state has also not been explored in ancient days, but Galen[7], Rhazi[3] and Ibn-e-Sina[4] have pointed out that increased amount of fat in the body may rupture the vessels and cause bleeding, paralysis, dyspnoea, syncope and even sudden death.

According to unani concept, when the amount of lipids increase in the blood it leads to increased viscosity and stickiness (*ghilzat* and *lazojat*) of blood that reduces lumen of vessels which results in arteriosclerosis and

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hypertension (*Tasallub-e-Sharain* and *Zaghtuddam Qavi*). To treat this condition Unani philosophers have recommended the use of natural substances that reduces the viscosity and stickiness of the blood. The *Sikanjebeen Sada*, a unani formulation of Honey and Vinegar in 1:1, claims to be beneficial in hyperlipidaemia as it reduces the viscosity and stickiness of blood.

Hyperlipidaemia is broadly divided into two groups, i.e. primary hyperlipidaemia and secondary hyperlipidaemia. The exact cause of primary hyperlipidaemia is not known. However, firstly there is some genetic and hereditary relationship and secondly low activity or absence of lipoprotein lipase enzyme that cause primary hyperlipidaemia. On the other hand, secondary hyperlipidaemia is not an ailment rather than an end result of several diseases such as Myxoedema, Cushing Syndrome, Hepatic and Renal disorders.

Scientifically, increased level of chylomicrone and VLDL is known as hyperlipidaemia. Technically, increased level of serum triglyceride and serum cholesterol is known as hypertriglyceridaemia and hypercholesteroleamia respectively; whereas, the condition in which serum triglyceride and LDL levels increase simultaneously above the normal level is called combined hyperlipidaemia. All these conditions may be found simultaneously or individually depending upon the nature of diet, absorption, digestion and metabolism.

Prior to the 19th century, hyperlipedaemia was not in focus but it came into limelight after the discovery of lipids and their role in diabetes mellitus, hypertension, coronary artery diseases and atherosclerosis. Hyperlipidaemic induced diseases like coronary artery diseases and cerebro-vascular diseases and its other complications have a correlation with hyperlipidaemia. This has been explored by several survey and clinical trails conducted in India and abroad.

Materials and methods

Anti-hyperlipidaemic (*Maan-e-Fart-e-Tadassum Fil Dam*) study was carried out on 30 patients selected from OPD/IPD of Ajmal Khan Tibbiya Collage, AMU, Aligarh, during the period 2001-2003. The duration of study was for 45 days and the periodicity of assessment was 0 day, 15th day, 30th day and 45th day.

Obese, hypertensive, atherosclerotic patients, and those having history of angina pectoris, palpitation of and on, and those having lipid level over 200 mg/dl were selected for the study.

And patients of 60 years above and 15 years below of age, mentally ill, prisoners, and those suffering from diabetes mellitus, cushing syndrome, renal diseases, hepatic ailments, those having positive history of myocardial infarction and those who were taking antihyperlipidaemic treatment were excluded from the study.

The honey was collected from apiculture farm of Aligarh, and vinegar prepared by fermentation process at home. *Sikanjebeen Sada* was prepared according to *Biaz-e-Kabeer*, Vol. 2., at Dawakhana Tibbiya College, Aligarh Muslim University, Aligarh, with Sp. gravity of 28 and pH. 5.25.

The test drug i.e. *Sikanjebeen sada* was administered in the dose of 25 ml twice a day before breakfast and an hour after dinner. The patients were informed of the expected benefits

and hazards and no concomitant treatment was allowed. The total duration of study was for 45 days, and the follow up carried out at the interval of 15 days i.e. 0, 15, 30 and 45 day on the basis of investigations. The observations and results were tabulated and analysed statistically by calculating the mean and standard deviation followed by applying paired 't' test.

Observations and results

The observation and result are broadly divided into two groups, i.e. base line observations (observations recorded before starting the treatment), and follow-up observations (observations recorded during and after treatment).

Base line observations

Age: - Out of 30 cases, 21 (70%) belonged to higher risk age i.e. in between 31-40 years.

Sex: - It was observed that 25 (83.34%) cases were females and only 5 cases (16.66%) belonged to the male sex.

Temperament: - The incidence of hyperlipidaemia found maximum (83.33%) in phlegmatic, 13.33% in bilious and 3.33% sanguineous temperament.

Life Style: - Out of 30 cases, the sedentary life style was positive in 27 (90%) cases, while mild and moderate exercise was positive in 6.66% and 3.34% of cases respectively.

Dietary habits: - It was observed that 23 (76.66%) cases belonged to the group using mixed diet and seven cases vegetarian. Among 30 cases, 19 cases were using approximately 100-200 g fat in daily diet, while 11 cases were using less than 100g /day; and according to type of fat, 21 cases i.e. 70%, were using mixed fat and 9 i.e. 30% cases using saturated fat.

Follow-up observations

Serum cholesterol: - To analyse the effect of test drug on serum cholesterol level, the total number of cases were divided into five groups. Each group had an interval of 10 mg/dl. During observation, the mean serum cholesterol level in group A found 205.10 mg/dl before treatment, and it found reduced to 181.10 mg/dl at the end of the study; statistically, the effect was significant ($p< 0.001$). In-group B, the average serum cholesterol level was 214.57 mg/dl at the beginning of treatment and at the end the level it reduced to 189.00 mg/dl; it was also significant ($p< 0.029$). The average serum cholesterol level was 225.85 mg/dl and 232.40 mg/dl in the group C and D respectively before the treatment, and it found reduced to 197.71 and 191.00 mg/dl respectively at the end of study. The effect of test drug on both groups was significant ($p< 0.001$, $p< 0.005$). The average serum cholesterol level of group E was 250 mg/d1 at the starting, which became 190.00 mg/dl. The effect of drug statistically was significant. ($p< 0.001$).

Serum triglyceride: - To evaluate the effect of test drug on serum triglyceride level, the total number of cases i.e. 30 divided in to 6 groups. The average serum triglyceride level in-group A before treatment was 204.00 mg/dl, and it reduced to 186.33 mg/dl after the treatment. Similarly, in-group B it was 219.25 mg/dl and became 189.10 mg/dl at the end of study. The effect of the test drug on both the groups was found significant ($p<0.001$, $p<0.023$). In-group C, the average serum triglyceride level 226.00 mg/dl found to be reduced to 186.66 mg/dl; the significance was at $p< 0.007$. In the case of group D and E the mean serum triglyceride level was 237.00 and 246.00 mg/dl respectively

at 0, day, and 203.83 and 207.50 mg/dl at the end of study; the effect of test drug was significant in groups D ($p< 0.007$), E ($p< 0.106$) and also in F ($p<0.011$).

Discussion

Many of anti-hyperlipidaemic drug have adverse effect on liver function and other micro-enzyme systems. When lipoprotein lipase enzyme becomes active, there is decrease in total cholesterol due to elevated catabolism of triglyceride in very low-density lipoprotein and chylomicrones, and rise in the HDL cholesterol. *Sikanjebeen Sada*, has claimed to possess antihyperlipidaemic, anti-hyper-nausient and hepato-protective properties, because honey contains many enzyme like, diastase, invertase, saccharase, catalase, peroxides and lipase. Similarly, vinegar also contains many enzymes like fennantase, saccharase, convertase, catalase, lipase, etc. The combination of both activates hepatic micro enzyme system, and leads to enhance lipid catabolism and their acceleration. Due to this, most of the unani physicians are in the favor of the use of *Sikanjebeen Sada* in the cases of hyperlipidaemia.

Conclusion

The laboratory observations proved that *Sikanjebeen sada* used in the cases of hyperlipidaemia has a good efficacy in reducing the serum cholesterol and serum triglyceride; it has as pointed out by ancient physicians like Ibn-e-Sina, Razi, Maseehi and Jalinoos, etc. This is only a pilot study and the results obtained may be confirmed by a double blind study.

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Aryavaidyan Vol. XIX., No. 4, May - July 2006, Pages 252 - 254

ANTI-EMETIC EFFECT OF MAYŪṚPIÑCHĀ BHASMA IN THE MORNING SICKNESS – A COMPARATIVE STUDY

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Abstract: Morning sickness is a common gynaecological problem characterized by nausea, vomiting headache, giddiness, etc. in the morning. This paper briefly evaluates the antiemetic effect of Mayūṛpiñchā bhasma on patients of morning sickness in comparison with Meclizine HCl.

Introduction

Modern anti emetics and anti-histaminics drugs may relieve morning sickness but leave many side effects like drowsiness, CNS depression, tachycardia, vertigo, etc. Therefore, an attempt was made to find a safe and effective ayurvedic anti-emetics with scientific data and statistical validation.

Materials and methods

Of 60 diagnosed cases of morning sickness, 20 were taken in each group i.e. test group, control group and standard group.

Inclusion criteria: - Patients with clinical features of morning sickness mentioned in the ayurvedic texts; and in the age group of 18-35 having 3-5 times frequency of vomiting were selected.

Exclusion criteria:- Patients below 18 years and above 35 years, those having epilepsy, gastritis, jaundice, drug-induced vomiting, tachycardia, G.I. obstruction, severe vomiting and dehydration were excluded from the study.

Drug schedule:- Mayūṛpiñchā bhasma (250 mg) with honey (2½ gm) was administered to 20 patients in the test group; honey only (2½ gm) administered to patients in the control group; and Meclizine HCI (Tab. Pregnidoxin) 25 mg - 2 tablet at bed time till vomiting stops for maximum period of 60 days was administered to patients in the standard group.

Assessment:- Prior to the treatment, the history of the patients i.e. nature of occupation, history of past/present complaints, drug used, primary and secondary gravida, habits like alcoholism, smoking, tobacco chewing, dietary habits, family history, etc. were assessed and recorded.

Each patient was subjected to general physical examination. Laboratory tests like urine (pregnancy test), blood (Hb%), etc. were conducted before and after the treatment. All

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the patients were advised to report once in 15 days to record clinical symptoms.

Result and discussion

After the treatment, the patients in the test group showed significant relief in morning sickness. It was observed that the presence of Sodium, Potassium, Calcium in Mayūṛpiñchā bhasma might have contributed to compensate electrolytic imbalance in morning sickness and giddiness, which were 100% relieved in patients of the test group.

Increased percentage of progesterone hormone at pregnancy leads to generalized decrease in smooth muscle motility; and decreased intestinal motility causes to increase the gastric emptying time, thereby reflux action of gastric content takes place that stimulates the CTZ (vomiting centre) and vomiting. The Mayūṛ-piñchā bhasma that contains Mg, Al, Mn and antacids like Ca, have characteristic features of decreasing smooth muscle tone in the body. This cause to increase the smooth muscle motility and thereby decrease the gastric emptying time, thus no reflux action and the vomiting stops.

A considerable increase in Hb% was observed in the patients of the test group. This may be due to the presence of Fe and Zinc in Mayūṛ-piñchā bhasma; general weakness was found to be relieved in 85% of patients in this group.

TABLE 1

Duration taken to relieve the symptoms

Symptoms	No. of cases (%) BT	No. of cases (% of relief) during treatment				No. of cases (%) AT
		15 Days	30 Days	45 Days	60 Days	
GROUP - I						
Nausea	20 (100%)	6 (30%)	13 (65%)	1 (5%)	-	0 (0%)
Vomiting	20 (100%)	6 (30%)	13 (65%)	1 (5%)	-	0 (0%)
Headache	11 (55%)	9 (82%)	1 (9%)	1 (9%)	-	1 (9%)
Ammenorrhea	20 (100%)	-	-	-	-	20 (100%)
Giddiness	5 (25%)	5 (100%)	-	-	-	0 (0%)
General weakness	13 (65%)	9 (70%)	2 (15%)	-	-	2 (15%)
Drowsiness	2 (10%)	2 (100%)	-	-	-	0 (0%)
GROUP - II & III						
Nausea	20 (100%)	3 (15%)	9 (45%)	2 (10%)	2 (10%)	4 (20%)
Vomiting	20 (100%)	3 (15%)	10 (50%)	2 (10%)	2 (10%)	3 (15%)
Headache	14 (70%)	5 (36%)	5 (36%)	-	-	4 (28%)
Ammenorrhea	20 (100%)	-	-	-	-	20 (100%)
Giddiness	13 (65%)	5 (38%)	3 (23%)	2 (15%)	-	3 (24%)
General weakness	14 (70%)	2 (14%)	3 (22%)	2 (14%)	-	7 (50%)
Drowsiness	9 (45%)	1 (11%)	2 (22%)	2 (22%)	-	4 (45%)

BT - Before treatment; AT - After treatment

TABLE 2

The mean Hb % before and after treatment in the Test and Standard groups

Groups	BT Mean + SD	AT Mean + SD	Test
Group I	9.68 + 0.94	13 + 1.01	't' test
Group III	11.33 + 1.47	11.8 + 1.21	't' test

Highly significant at p=0.001

Conclusion

From the observations and results during 15, 30, 45 and 60 days' of treatment, a significant antiemetic effect of Mayūṛpiñchā bhasma with honey was noted and compared to that of Meclizine HCl.

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