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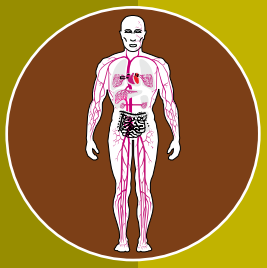

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Aryavaidyan is intended to encourage scientific writing and intellectual interactions among scholars, academicians, practitioners and students of ayurveda and allied subjects like Siddha, Unani, modern medicine, etc.

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The Chief Editor (Publications)
Arya Vaidya Sala, Kottakkal
Malappuram District
Kerala State
Pin - 676 503, India.

Phone : 0483 -2742225, 2746665
Fax : 2742210, 2742572
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SHOOT OF *PIPER LONGUM* L. - A PHYSICO-CHEMICAL AND PHYTOCHEMICAL SCREENING

Nitin Ujjaliya and R. Remadevi*

Abstract: Pippali (*Piper longum*) is a well known plant used in many home remedies as well as in āyurvedic formulations. Nowadays, the root of pippali is not easily available in the market; the stem cutting of *P. longum* is marketed as substitute. This work is an attempt to establish its preliminary pharmacognostical and physico and phyto-chemical standards which can be further compared with available standards of pippalīmūla (*Piper longum* root).

Introduction

Piper longum L. is a renowned medicinal plant belonging to the family Piperaceae (Fig I). It is an important ingredient in many āyurvedic formulations. The empirical data has revealed its efficacy in various diseases of digestive system such as loss of appetite, indigestion, flatulence, etc. and the ailments of respiratory system like cough, asthma, allergic rhinitis, etc. Popularity and demand of a drug increases the chance of its adulteration and substitution. Nowadays, the root of pippali is adulterated at different levels by its shoot. In this context, a study was carried out to compare the root and shoot of *Piper longum* on physico-chemical and phytochemical parameters. The plant-material i.e. powder of the shoot was subjected to a preliminary phytochemical screening for successive solvent extraction and also to a qualitative phyto-chemical screening for the detection of various plant constituents present in different extracts. The quality and purity of subjected material was assessed on various physico-chemical parameters and a histological section was taken to standardise and to confirm the identity of plant material.

Material and methods

The plant was collected from the botanical garden of Vaidyaratnam P.S. Varier Ayurveda College, Kottakkal, Kerala and authentically identified in the Department of Dravyaguṇa-vijñan using external morphological characters and histological section.

Histological study

Microscopic studies were done by preparing thin hand section of the shoot. The section was stained in safranin and mounted in glycerin and was studied for different characters and recorded.

Characteristics: - There is single layered epidermis over which a corrugated layer of cuticle is present. Below the epidermis there are

*Department of Dravyaguna, Vaidyaratnam PS Varier Ayurveda College, Kottakkal

2-3 layers of collenchymatous hypodermis with many sclereids. A discontinuous band of sclerenchyma is seen inner to the hypodermis. Just below this band, 2-3 layers of chlorenchymatous cells and 4-6 parenchymatous layers are present. (Fig. II)

The most distinguishing feature of anatomy of pepper stem is the distribution of vascular bundles. There is an outer ring of vascular bundles (cortical or peripheral), an inner ring of regular bundles and central or medullary bundles (Fig. III). The outer ring consists of small and large bundles arranged alternately; they are collateral, open and consist of a sclerenchymatous cap at the phloem end. Below the peripheral vascular ring, there is a wavy band of sclerenchyma consisting of 5-6 rows of cells. The parenchymatous pith lies inside the wavy band. Within this region, the medullary bundles (8-10) are arranged. Each bundle has sclerenchymatous cap on either end. These are also collateral and open. There is a mucilage canal in the centre which forms a continuous canal traversing the entire plant body. Secondary thickening is restricted to the peripheral bundles.

Physico-chemical constants

Total ash, water and acid insoluble ash, volatile oil content, moisture content, fibre content and sugar percentage were determined by using standard methods. Water soluble, cold alcohol

Fig. I: *Piper longum* L.

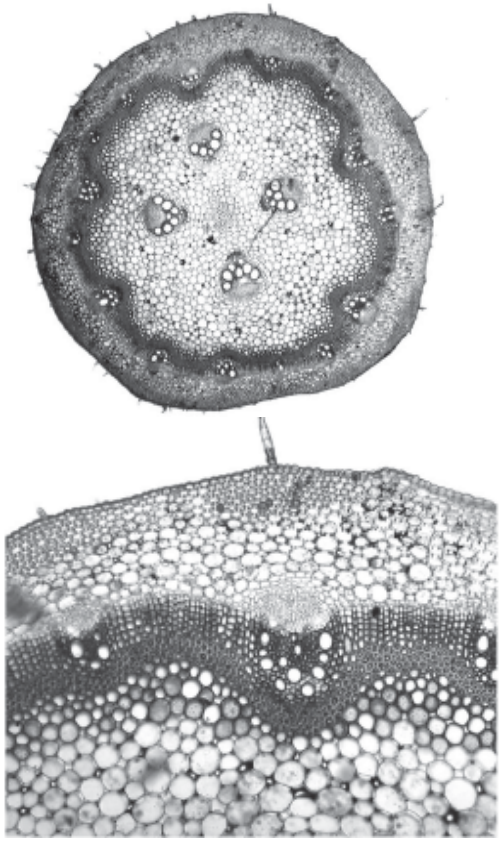

Fig. II
Chlorenchymatous and Parenchymatous cells

soluble and hot alcohol soluble extracts were obtained and measured. Successive solvent extraction was carried out by Soxhlet's method using solvent; petroleum ether, acetone and ethanol.

Physico-chemical screening

Ash values

Ash values are determined to evaluate quality and purity of the crude drug that contains inorganic radicals like phosphates, carbonates, potassium, magnesium and calcium. The residue after incineration is the ash content of the drug, which represents the inorganic salts naturally occurring in drugs or deliberately added to it as a form of adulteration. It helps to detect and check adulteration with exhausted drugs and to ensure the absence of an abnormal proportion of external mineral matter like soil or sand.

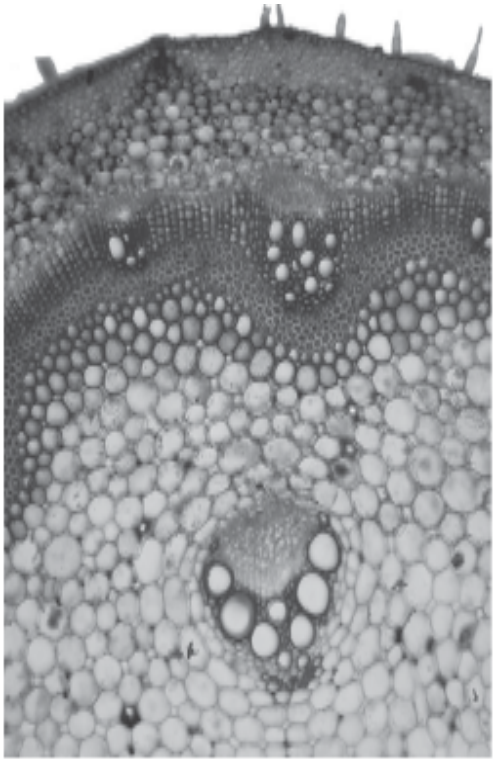

Fig. III
Medullary bundles

Moisture content

The moisture content is determined by using Dean and Stark's apparatus. Moisture content of a particular drug is the amount of moisture that particularly absorb by the drug on exposure to atmosphere after drying. The percentage of moisture content in the drug was calculated by dividing the reading of water content by the weight of the original sample taken and multiplying it by 100.

Volatile oil content

The volatile oil content was determined by distilling the drug with distilled water using Clevenger apparatus. The volatile oil evaporated and got condensed in the graduated tube. The content of the volatile oil was noted and percentage was calculated.

Sugar and fibre content

Total sugar, reducing sugar and fibre content of the drug were determined using standard method.

The physico-chemical analyses of shoot of *Piper longum* are tabulated in Table No. 1.

Extractive values

The commonly employed technique for separation of active substance from crude drug is called extraction, which involves the use of different solvents. Extraction itself may be performed by repeated maceration with agitation, percolation or by continuous extraction using Soxhlet apparatus. The solvent used for extraction should be in a position to dissolve appreciable quantity of chemical constituents.

Water soluble extracts of the drug mainly represents the percentage of organic

constituents such as tannins, sugars, plant acids, mucilage and glycosides. Alcohol soluble extracts mainly represents the percentage of organic constituents such as alkaloids, phenols, flavanoids, steroids and sugars present in the drug. (Table No. 2)

Successive solvent extraction, which is the extraction of the drug with organic solvents of increasing polarity, was applied for the isolation of active constituents from the crude drug. (Table No. 3)

Phytochemical screening

The extracts obtained were subjected to qualitative tests for identification of various plant constituents. The extracts obtained by exhausting crude drugs are indicative of approximate measure of their chemical constituents. (Table No. 4)

TABLE 1
Physico-chemical analysis of shoot of *P. longum*

Experiments	Percentage
1. Total ash	7.33 %
2. Water insoluble ash	4.66 %
3. Acid insoluble ash	0.28 %
4. Moisture content	12.0 %
5. Volatile oil content	1.00 %
6. Sugar content	
a. Total Sugar	2.30 %
b. Reducing sugar	1.70 %
7. Fibre content	1.00 %

TABLE 2
Percentage of water and alcohol soluble extractives

Name of extract	% of extract	Colour / Consistency
Hot water	36.0	Brown/dry
Cold alcohol	13.0	Leafy green/oily
Hot alcohol	24.0	Leafy green /oily

Detection of steroids

One ml of the extract was taken in a clean test tube and 3 ml of chloroform was added. Then a few drops of concentrated sulphuric acid were added through the sides of the test tube. Formation of a brown ring indicated the presence of steroids.

Detection of alkaloids

With Mayer's reagent:- Two ml of the extract was taken in a test tube and dried it by placing on a heating mantle. Then added a few drops of dilute hydrochloric acid and filtered into another test tube using a filter paper and a funnel. Then added a few drops of Mayer's reagent to it. Turbidity indicated the presence of alkaloids.

With Dragendroff's reagent:- Two ml of the extract was taken in a watch glass and one drop of Dragendroff's reagent was added and rubbed

TABLE 3
Successive solvent extractives

Experiments	%	Colour / Consistency
Petroleum ether	1.70	Dark green / Oily
Acetone	0.80	Green / Oily
Ethanol	5.00	Brown / Oily

TABLE 4
Qualitative phytochemical analysis of the extractives

Solvent	S	AM	AD	P	F	T
Petroleum ether	+	+	+	–	–	+
Acetone	+	+	+	–	+	+
Ethanol	+	+	+	+	+	+
Water	+	+	+	–	+	+
Cold alcohol	+	+	+	+	+	+
Hot alcohol	+	+	+	+	+	+

S - Steroids; AM - Alkaloid by Mayer's Reagent; AD - Alkaloid by Dragendroff's Reagent; P - Phenols; F - Flavonoids; T - Tannins

gently with a glass rod. Formation of an orange brown precipitate indicated the presence of alkaloids.

Detection of phenols

Two ml of the extract was taken in a test tube and a few drops of neutral ferric chloride were added to it. A deep blue or violet colour indicated the presence of phenols.

Detection of flavonoids

Two ml of the extract was taken in a test tube. A few drops of concentrated hydrochloric acid and a piece of magnesium ribbon were added to it. A reddish brown, magenta or pink colour indicated the presence of flavonoids.

Detection of tannins

A few ml of the extract taken in a test tube was added with a few drops of lead acetate solution. A yellow or white precipitate indicated the presence of tannins.

Result and discussion

The study of pharmacognostical feature of medicinal plants in general is an imperative process to know their quality, purity and to check for the adulterants and substitutes. As water is the universal solvent, the highest percentage of extracts is obtained in it and the least in acetone. Qualitative analysis suggested that steroids, alkaloids and tannins were present in all solvents while flavonoids present in all except petroleum ether. Phenols were present in all solvent except petroleum ether and water.

Conclusion

As *Piper longum* is an important plant used in Ayurveda so also the unavailability of its root increases the chance of adulteration. The above pharmacognostical, physico-chemical and phyto-chemical studies have significance in this regard. Phytochemical studies can help to predict the pharmacological actions and thereby can have a comparative analysis of the root and stem part; it will suggest the pharmacological similarity or dissimilarity between the parts.

Acknowledgement

The authors are grateful to the Department of Dravyaguna , V.P.S.V. Ayurveda College, Kottakkal for providing the facilities for this work and to Dr. Remashree, Deputy Director CMPR, AVS, Kottakkal and Dr. Shailja for their guidance in pharmacognostical study.

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EFFICACY AND SAFETY OF HERBO-MINERAL FORMULATION IN SCABIES

Azad Hussain Lone, Tanzeel Ahmad and G Sofi*

Abstract: Scabies is a common contagious pruritic eruption due to infestation by the mite *Sarcoptes scabiei* of the order *Acarina* and class *Arachnida*. The disease is usually contracted by close personal contact or by the sharing of contaminated towels, bed linen and clothing. The objective of the study was to assess the safety and efficacy of a Herbo-mineral Unani formulation in the management of scabies. The results showed the test formulation effective and statistically significant in the treatment of scabies. The overall compliance to the treatment was excellent and no obnoxious side effects were observed.

Introduction

Scabies is a skin disease caused by infestation with the mite *Sarcoptes scabiei*.[1] It is one of the common causes of itching dermatoses throughout the world infesting some 300 million persons each year.[2] It comes as a cyclical epidemic every 30 years, though in our country, it is also endemic, occurring worldwide, in both sexes and in all age groups and accounts for 2% of all dermatological patients.[3] Scabies is a common infectious skin disorder characterised by nocturnal itching and lesions are bilaterally found on the webs and sides of fingers. The pathogonomic burrows are short wavy and dirty appearing lines. Multiple small erythematous and often excoriated papules are usually present at the affected site.[4] Involvement of the genital areas in boys is pathognomonic. The characteristic features including itching, secondary eczematisation may occur elsewhere on the body but the face and scalp are never involved except in case of infants.[5]

In the Unani system of medicine, scabies is termed as *jarb* (wet itching). Its aetiology is attributed mainly to the *fasade dam* (blood impairment) produced by morbid humours (sanguineous, bilious). Usually the lesions are found in webs and sides of fingers.[6] The actual pathogenesis lies in the production of *hiddate dam* (abnormal heat in blood) due to which blood becomes more viscous and gets shifted towards the skin leading to the formation of papules/ vesicles accompanied with itching and exudation.[7] It is mostly found in those people who take excess of salty and sour food items and poor people including labourers who bath after prolonged intervals.[8] The famous Arab physician Ali Bin Ahmad Tabri has described *deedane jarb* (mites of scabies) as actual pathogenic organism of scabies.[9,10]

*Departt. of Medicine, National Institute of Unani Medicine, Kottigepalyia, Magadi Main Road Bangaluru-91

Materials and methods

The study was conducted in the Department of Medicine, National Institute of Unani Medicine, Bangalore, India. It was an observational randomised open trial. The objective of the study was to evaluate the safety and efficacy of a herbo-mineral cream in the management of scabies on modern scientific parameters. The patients were enrolled in the study from OPD of Medicine and Dermatology, NIUM, Bangalore. 50 patients with scabies qualifying in the inclusion criteria were selected after obtaining their informed consent. The patients were clinically assessed and diagnosed on the basis of thorough history, dermatological examination and skin scraping of the affected area. All the findings were recorded.

Inclusion criteria

- Clinically stable patients of scabies
- Patients of both sexes
- Patients between 10 and 60 years

Exclusion criteria

- Patients below 10 years and above 60 years.
- Patients with any systemic illness such as diabetes mellitus, cardiac, renal and hepatic diseases.
- Pregnant and lactating women
- Patients with other concomitant infections, eczema, impetigo, ecthyma, folliculitis, cellulitis, pedulosis, dermatitis, etc.

Subjective parameters

- Itching
- Multiple small erythematous or excoriated papules, papulovesicles and pustules on webs and sides of fingers, breast nipples and genitals of males
- Burrows in the form of short, wavy and dirty appearing lines.

Objective parameters

- Microscopic identification of mites, eggs or fecal pellets by skin scrapings and curettage.

Investigations

Routine investigations like complete haemogram, urine and stool examination, liver and renal function tests were done before treatment. Skin scraping of lesions was done before treatment for the purpose of diagnosis and after treatment also for the purpose of objective assessment of drugs.

The patients were advised to apply the herbo-mineral cream (*Zimade jarb*) on whole the body twice daily. The close relatives of patients including family members were advised to follow the prophylactic measures. The duration of treatment was 15 days and follow up was done weekly. The severity and assessment of different symptoms and signs (itching, papules, papulovesicles, pustules, skin scrapping) were rated on a 4-point scale (0=absent, 1=mild, 2=moderate, 3=severe). These were summed up for each patient at each assessment stage to obtain a Total Symptom and Sign Scale (TSSS) with a maximum value of 15 points.[11] The evaluation of efficacy in both the test and the control groups were observed on various symptoms and signs of patients. The whole data was tabulated and analysed using instant graph pad and difference in the treatment groups was considered significant at $P<0.05$ by using Student's 't' test.

Composition of herbo-mineral cream

The formulation was selected from Hamdard Pharmacopoeia of Eastern Medicine [12] and was procured from the department of Pharmacy, NIUM. Its ingredients are *gandhak* (Sulphur), *neela tutiya (*Copper sulphate*), kamila* (*Mallotus philippensis), murdar sang* (Lead

Monoxide) - 12 gram each and ghee - 48 gram.

Result and observation

Out of 50 patients, 10 patients failed to follow-up and were excluded from the study. The highest incidence was observed in the age group of 10-20 years; and 25 patients were males. The highest incidence of 28 (70%) was seen in lower socio-economic class. The demographic profile like age, sex, etc. is shown in the Table 1. The effect of the formulation on the subjective parameters like itching, papules, papulovesicles, etc. are shown in the Table 2.

Relief in itching may be due to *murratib* (emollient) effect of the ghee present in test formulation and also due to *mudammile qurooh* (cicatrizant) effect[13-15] of local application of *kamila* and *murdar sang*. Likewise, the improvement in papules, papulovesicles and pustules can be attributed to the *mujjafif* (desiccative) and *mudammile qurooh* (cicatrizant) effects of *murdar sang*, *neela tutiya* and *gandhak* along with *muhallil* (resolvent), *dafe taffun* (disinfectant) and *jali* (detergent) effects of *kamila* and *gandhak*.[13-15]

TABLE 1
Demographic profile

Description	No. of patients	%
1. Age group		
10-20	15	37.5
21-30	5	12.5
31-40	3	7.5
41-50	7	17.5
51-60	10	25
2. Sex		
Male	25	62.5
Female	15	37.5
3. Family history		
Positive	30	75
Negative	10	25
4. Dietary habits		
Non-vegetarian	25	62.50
Vegetarian	15	37.5

The effect of test drugs on objective parameters like skin scraping and TSSS is shown in the Table 3. The effect of the test formulation can be attributed to *qatile jaraseem* (antimicrobial), *jali* (detergent) and *dafe taffun* (disinfectant) activities[13-15] of its ingredients namely *gandhak*, *neela tutiya* and *kamila*.

Discussion

Unani system of medicine has a treasure of single as well as compound drugs that are being used in various skin disorders efficiently since the past. The test formulation produced significant effect on various symptoms and signs associated with scabies like itching, papules/ pustules/vesicles, Skin Scrap test and on TSSS. The overall improvement can be attributed to

TABLE 2
Effect of test drug on subjective parameters

Parameters	BT	AT
1. Itching		
- Mild	10 (25%)	0
- Moderate	10 (25%)	0
- Severe	20 (50%)	0
- Cured		40 (100%)*
2. Papules		
- Mild	06 (15%)	8 (20)
- Moderate	12 (30%)	0
- Severe	22 (55%)	0
- Cured		32 (80%)*
3. Papulovesicles	28 (70%)	0
4. Pustules	25 (62.5%)	0

* $p<0.005$ - Highly significant

TABLE 3
Effect of test drug on objective parameters

Parameters	BT	AT
Skin scraping test	28 (70%)$^{+ve}$	28 (70%)$^{-ve}$*
TSSS	7	2*

* $p<0.005$ - Highly significant

cicatrizant, detergent, desiccative, antimicrobial and anti-septic properties of various ingredients of *Zimade jarb* applied locally. This is in consonance with properties described by eminent Unani physicians like Ibne Sina[7], Razi[8], Al Tabri[9] and Najmul Ghani[13]

Conclusion

In the light of above discussion, it may be concluded that the herbo-mineral cream is safe and cost effective in the treatment of scabies. However, studies at an advanced level need to be carried forward.

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MULTIMODAL APPROACH IN THE MANAGEMENT OF ATTENTION DEFICIT HYPERACTIVITY DISORDER (ADHD)

Harish Kumar Singhal* and Abhimanyu Kumar**

Abstract: Attention Deficit Hyperactivity Disorder (ADHD) is a neuro behavioural developmental disorder primarily characterised by the co-existence of attention problem and hyperactivity in children. In āyurveda, this can be compared with bālonmāda. A double blind placebo controlled randomised trial was conducted to evaluate the effect of an āyurvedic compound in ADHD affected children. The medicines were effective in alleviating the symptoms.

Introduction

There are various medical problems where conventional medical science fails and alternative and complementary medical sciences, especially āyurveda, provide a remedy. Therefore, it is necessary to understand such medical problems from the āyurvedic point of view and evaluate the possibilities of drugs in their management rather than speculations.

Many children suffer from behavioral or psychiatric disorders during their development. Many of these problems are of a transient nature and are often overlooked. However at times, the severity may be distressing. Attention Deficit Hyperactivity Disorder (ADHD) is one of the behavioral disorders characterised by a persistent pattern of inattention and/or hyperactivity, as well as forgetfulness, poor impulse control or impulsivity, and distractibility (DSM APA 2006, Bahavnet.com 2006). ADHD accounts to as much as 50% of children who visited the psychiatric clinic. The prevalence of ADHD in school-going children in the West and India ranges from 5 - 10% (P. Malthi, *et al*, 2001). Two to four times more boys than girls are affected (Wolarich M L *et al* 1996, NIH 2000). It often continues into adolescence and adulthood and can cause a lifetime frustration of dreams and emotional pain.

In āyurveda, mind (manas) is said to be responsible for various psychological and behavioral functions and proper functioning of mind is needed to attain perfect mental health. Thus, it is of prime importance to know the functions of the mind in order to understand various psychological disorders like ADHD in āyurvedic perspectives.

ADHD in terms of āyurveda has no specific similarities to any disease but some references about abnormal behaviour can be seen under

**Deptt. of Kaumarbhritya, University college of Ayurveda, Rajasthan Ayurved University, Jodhpur (Raj)*
*** Deptt. of Balroga (Ay. Pediatrics), National Institute of Ayurveda, Jaipur, India*

features of vātaprakṛti and definition of insanity (unmāda) such as anavasthitacittatva, manovibhrama, buddhivibhrama, smṛtivibhrama, śīlavibhrama, ceṣṭāvibrama and ācāravibhrama.

There is no specific cause (nidāna) mentioned for ADHD in our classics. All the etiological factors and pathogenesis of the disorder described by contemporary sciences can be considered here to understand the nidāna and samprāpti of ADHD from an āyurvedic point of view. The various nidāna regarding ADHD in āyurvedic perspectives may be summarised under the following headings:

1. Predisposing factors:
   - Janmabalapravṛtta (garbhaja or antenatal factors)
   - Janmottara nidāna (post natal factors)
   - Social factors
   - Psychological factors
2. Main factors:
   - Ādibalapravṛtta (sahaja/inherited factors)
   - Samghātabalapravṛtta (accidental causes)
3. Precipitating factors:
   - Toxicological factors (viṣa)
   - Bhūtāveśaja factors
   - Dietary factors
   - Improper sleep

Whenever, an 'irrelevant satva child' indulges in prañjāparādha or is afflicted with manobhighāta of a recurrent nature, in an imbalance of mānasikadoṣa - raja and tama is the result. At this stage, the patient exhibits an exaggerated response to emotional disturbance. This phase of the illness can be called as sañcayāvastha. On continuation they reach the prakopāvastha in which psychic symptoms like cinta, vyākulata, bhaya and śoka develop. When psychic response overrides a limit and continues for a longer period, they start influencing the śārīrika doṣa. As there is already imbalance at biological level, śārīrikadoṣa, especially vāta, is predominantly vitiated, particularly prāṇa, udāna and vyāna followed by tarpakakapha and sādhakapitta. This stage, where both śārīrika and mānasika doṣa are involved, can be called as prasarāvastha. The combined effect of vitiated śārīrika and mānasika doṣa effects hṛdaya, manovahasrotas, and vulnerary dhātu and srotas resulting in sthānsamśraya of the disease which is a psycho-somatic phase. When numerous srotas are involved and the disease expressed obviously, the full blown phase of the disease enter into the stage of vyaktāvastha. After this stage the disease attains its chronicity or may get associated with other disorders such as bipolar disorder, PANDAS, obsessive and compulsive disorder and learning disorders. Now this is a stage in which the disease becomes disabling as śārīrika and mānasika doṣa potentiate each other in a vitiated situation, resulting in vicious cycle. For this reason, ADHD or manoviparya have both psychic and somatic manifestation.

The management of ADHD can be broadly divided into two measures - adravyabhūta cikitsa and dravyabhūtacikitsa.

Adravyabhūtacikitsa consist of satvāvajaya cikitsa, prakṛti based counselling and lifestyle management that include sadvṛtta and ācāra rasāyana. Dravyabhūtacikitsa is divided into two categories namely prophylactic and specific measures. Drugs, āhāra (dietetic regime) and śirodhāra come under specific measures.

Aims and objectives

- Conceptual and clinical studies of ADHD and its management on āyurvedic principles

- To help in alleviating core symptoms of ADHD
- To enhance memory
- To improve school performance and overall health status of the child
- Āyurvedic solution for ADHD without untoward effect.

Materials and method

The study was a double blind placebo controlled randomised trial. The subjects were screened from the OPD of PG Department of Bālaroga, National Institute of Ayurveda, Jaipur and from various schools in the surroundings of NIA by survey method.

Selection: - Total 55 children, between 6 - 15 years of age, were registered and out of which, 12 discontinued during the course of treatment. The selected patients were randomly divided into three groups keeping in mind that each group contains children from various grades, schools and socioeconomic status:

- Group A. This group (of 17 children) was given Syrup Āyurvedic Compound 1
- Group B. This group (of 14 children) was given up Āyurvedic Compound 1 + Śirodhāra
- Group C. This group (of 12 children) was given Placebo Syrup Āyurvedic Compound 2 (placebo)

Diagnostic criteria: - ADHD affected children were screened via pre assessment criteria based on DSM IV (revised) (Diagnostic and Statistical Manual for Mental Disorders)

Inclusion criteria:- i) Children between the age group of 6 and 16 years of both sexes accomplishing DSM IV criteria; ii) children with normal IQ.

Exclusion criteria:- Children having: i) illness like hearing loss, hypothyroidism, genetic disorder and seizure disorders; ii) mental disorders like conduct disorder, anxiety, depressive disorders, obsessive disorders and compulsive disorders; iii) schizophrenia; iv) muscular dystrophy v) congenital deformity and vi) history or symptom does not resemble with DSM IV criteria.

Discontinuation criteria: - Those suffering from acute or life threatening illness; unwillingness of the parents to continue the treatment.

Assessment criteria:- i) DSM IV Criteria; ii) IQ Assessment; iii) Attention span by Coefficient of Division; iv) Reaction time; v) Finger Dexterity Test.

Side effect evaluation criteria: - i) Insomnia; ii) loss of appetite; iii) stomach-ache; iv) headache; v) drowsiness; vi) tics and mites; vii) loss of growth; viii) anxiety.

Drug, dose and duration: - A hypothetical compound that contains three herbs in appropriate quantity was selected (Table 1) and named "Syrup Ayurvedic Compound 1". All the dried parts including fresh brahmi were collected and processed in the pharmacy of N.I.A, Jaipur and were transformed into a syrup form to increase the palatability of administration to the pediatric age.

The compound was given in dose 0.3 ml/kg per day in three divided doses for three months and

TABLE 1
Ingredients of āyurvedic compound 1

Name of drug	Part used	Proportion
1. Brahmi (*Bacopa monnieri*)	All part	15 parts
2. Aśvagandha (*Withania somnifera*)	Root	10 parts
3. Tagara (*Valeriana jatamansi*)	Root	10 parts

the patients were called for follow up every 15 days. Any discomfort or untoward side effects were also documented.

Placebo: Placebo for the study was also in the form of sugar based syrup having same colour and flavors.

Śirodhāra:- Śirodhāra (kṣīradhāra) is a method of pouring of cow's milk over forehead of patients in the form of a regular stream from a specific height of about 3-4 inches as mentioned in classics in a fixed oscillatory movement for 45 minutes a day for two weeks.

Assessment criteria: - The effect of the therapy on inattention and hyperactivity/impulsiveness were assessed based on the improvement in symptoms, attention span, reaction time, motor ability and DSM IV criteria after 90 days. IQ level were assessed after 3 months of treatment via 'Draw A Man' test.

Results

The effect of the therapy on the core symptoms like inattention, hyperactivity, impulsivity, etc. was highly significant statistically in Group A and B (Table 2).

Discussion

Demographic data

Age:- Maximum number (37.20%) of children were between 8-10 years of age followed by (23.26%) in 12-14 years and (20.93%) in 6-8 years of age groups. This data suggest that the ADHD starts in early primary school children (Taylor *et al* 1991, Safer, 2000) with gradual reduction of symptoms with growing of age. However, there is only minor attenuation of the symptoms during the childhood period.

Sex:- Maximum number of children (72.09%) were males. It was seen that all groups had male predominance and ratio of a male to female was 5:1 to 10.83:1. The overall prevalence rate of male to female ratio was 2.58:1. The finding is consistent with all the previous studies in India as well western countries that shows male predominance. (American Academy of Pediatrics, 1994, 2000,, Bhatia *et. al*, 1999, DSM - IV, Staller, Faraone *et. al* 2006)

Socioeconomic status:- 25.58% families of ADHD patients were lower middle class followed by 23.26 % lower class. While in group B 28.57% families belonged to higher and higher middle followed by 21.42% families of lower middle. These data suggest that ADHD enlisted the low socio-economic class as one of the etiological factors of the disease. (Biedermann *et. al*, 1995) This highlights that lower socio-economic status gives rise to malnutrition, mineral and vitamin deficiencies that contribute to develop ADHD. (Galland L, 1999). However, in another study it had reported that poor cognitive and learning problem is associated with Protein energy malnutrition in two year age group. (Guestry P *et al* 1998)

Educational status:- Maximum numbers (23.26%) of patients were studying in 1st std. followed by 18.60 % of 3rd std. While in Group B 28.57% were of 6th std. followed by 21.42% of 7th and 1st std. This support ICD-10 criteria that illustrate a prevalence of AD/HD 1.7% was found among primary school boys (Taylor *et al* 1991) as well as satisfy Indian scenario that showing a prevalence rate 5-10% in school going children (P. Malthi, *et al*, 2001, Chandra 1993.)

Dietary pattern:- Maximum number (600.47%) of patients were of mixed dietary pattern followed by 39.53% of vegetarian. The data

TABLE 2
Effect of therapy on the signs & symptoms

Parameters	Mean score			N	%	SD	SE (+)	't'	'p'
	BT	AT	Diff.						
1. Inattention									
Group A	02.35	01.39	0.96	09	40.79	0.3972	0.1324	07.2675	< 0.001
Group B	02.31	0.84	01.28	09	55.24	0.4318	0.1439	08.9000	< 0.001
Group C	01.61	01.35	0.25	09	16.01	0.1965	0.06550	03.93	< 0.02
2. Hyperactivity									
Group A	02.08	01.01	01.07	06	51.35	0.2666	0.1088	09.8448	< 0.001
Group B	02.17	0.75	01.42	06	65.36	0.4564	0.1863	07.6294	< 0.001
Group C	01.53	01.44	0.095	06	06.18	0.1364	0.0557	01.7048	> 0.10
3. Impulsivity									
Group A	02.40	01.27	01.12	03	46.87	0.1101	0.0635	17.71	< 0.001
Group B	02.10	0.74	01.36	03	64.28	0.1322	0.0763	17.67	< 0.001
Group C	01.58	01.55	0.03	03	01.89	0.3675	0.2122	0.1413	> 0.10
3. Changes in Co-efficient of Division of attention (CD)									
Group A	0.28	0.22	0.06	17	21.46	.08948	.0217	2.800	< 0.01
Group B	0.33	0.24	0.09	14	27.04	0.1002	0.0267	3.3826	< 0.001
Group C	0.27	0.24	0.03	12	13.53	0.1102	0.0318	1.1808	< 0.1
4. Change in Total Reaction Time									
Group A	1.33	0.88	0.44	17	33.29	0.2985	0.0724	06.1264	<0.001
Group B	1.63	0.77	0.86	14	52.53	0.4996	0.1335	06.4295	<0.001
Group C	1.43	1.23	0.19	12	12.13	0.6556	0.1892	0.1892	<0.10
5. Finger Dexterity Test (FDT)									
a. Time taken for Right hand									
Group A	5.64	5.20	0.43	17	7.78	0.5622	0.1363	3.2249	<0.01
Group B	5.96	4.56	1.40	14	23.47	1.1694	0.3125	4.4816	<0.001
Group C	6.47	6.38	0.09	12	1.44	1.8193	0.5251	0.1777	>0.10
b. No. of errors for Right-hand									
Group A	4.71	2.94	1.77	17	37.65	3.7872	0.9185	1.934	<0.10
Group B	3.28	1.84	1.44	14	43.91	1.6080	0.4297	3.3573	<0.01
Group C	3.85	3.61	0.23	12	6.06	2.0482	0.5912	0.3946	>0.10
c. Time taken for Left hand									
Group A	7.02	6.55	0.47	17	06.81	0.7290	0.1768	2.7080	< 0.02
Group B	6.95	5.86	01.08	14	15.63	01.520	0.4062	2.6759	< 0.01
Group C	8.10	7.98	0.12	12	01.52	01.1989	0.3461	0.3575	> 0.10
d. No. of errors for Left hand									
Group A	5.27	2.97	2.29	17	43.52	3.2559	0.7897	2.9052	< 0.02
Group B	4.62	2.39	2.22	14	48.23	2.2970	.6140	3.6302	< 0.01
Group C	4.08	3.99	0.09	12	2.24	1.2852	0.3710	0.2470	< 0.10

indicates that mixed diet dominates in proteins. Animal model studies showed that the coloboma mouse mutant has a hyperactive phenotype similar to that of ADHD. The hyperactive phenotype of this model is the result of a deletion of the Synaptosomal-associated protein 25 (SNAP-25 gene). (K Brophy, Z Hawi, 2002).

Sleep pattern:- Maximum number of patients (32.555%) showed moderate sleep pattern followed by 25.59% of patients with proper sleep hours. 20.93% of patients had excessive sleep, 9.30% of patients had disturbed sleep as well as less sleep, and only 2.33% of cases had delayed sleep. These data established a correlation of children suffering from ADHD with lack of sleep or sleep disorder. (Gozal *et al*, 2001,)

Delivery mode:- Maximum number (84.04%) of patients were born by normal mode of delivery followed by 6.98% forceps and 6.98% by LSCS.

Postnatal complications:- Only 6.98% patients suffered from birth asphyxia history followed by 4.66% peripheral cyanosis whereas 2.33% had neonatal hyperbilirubinemia. This explains that birth asphyxia can cause brain damage and it is considered as an etiological factor of ADHD.

Academic performance:- Maximum number (34.88%) of patient were suffering from poor academic performance followed by 20.93 % of very poor academic performance; 13.96% had good performance and 9.30% were of excellent academic performance. It is concluded that students with learning disabilities and ADHD often have dysfunctions in many areas of adaptive functioning, including self-esteem, school performance, and family relations. (Barkley, Anastopoulos, Guevremont and Fletcher, 1992).

Handedness:- 88.37% patients were using their right hand followed by 11.63 % of left-handed. The reason behind this is yet to be established and requires research on it.

Śārīrika prakṛti:- Maximum number (27.91%) of ADHD affected patients belong to vāta-pitta physical constitution followed by 20.93% of kapha-vāta constitution. Findings indicate correlation between vātapittaprakṛti and ADHD. Clinically it is evident that apart from symptom related to learning children with ADHD exhibits various emotional and behavioral symptoms among the attention problems; hyperactivity and tantrums are vātapitta predominant feature. Thus vātapittaprakṛti children are more prone to develop ADHD compared to other one.

Mānasikaprakṛti:- Majority (46.51%) of patients were having sātvika-rājasika type mental constitution followed by 20.93% of rājasika-sātvika constitution. Vāyumahābhūta is abundantly present in rajodoṣa. Therefore, rajodoṣa is significantly responsible for the energy, motivation and emotions. Its higher prevalence in study group can be correlated with various psychological and emotional states of mind as seen in ADHD. Therefore, the outcome is that inherited trait of rajas lead to severity of ADHD.

IQ:- Maximum number of patients (34.88%) were of (85-95) borderline I.Q followed by an average I.Q (20.93) which justifies DSM IV, in which it is clearly mentioned that the children suffering from ADHD had less IQ level when compared to other children of same age group.

Other specific findings in family:- Maternal smoking is a known risk factor for HKD in offspring. (Braun JM 2006) Therefore, the presence of a smoker in the family during the

antenatal and postnatal period may have a role. Majority of smokers (44.18%) followed by alcoholics (37.21%) in the families of patients justify that children of alcoholic parents are more prone to develop psychological disorders (Osterheld *et al* 1997).

ADHD subtypes:- Maximum number (48.84%) of patients were of predominantly inattentive nature followed by 25.58% of predominantly hyperactive impulsive as well as the same status was seen in combined type of ADHD that justify previous Indian as well as Western studies of predominance inattentive subtype. (Maya Mukhopadhyaya *et al*, 2003).

Effect of the drug

Result of Group B was highly significant statistically with a maximum gain percentage in all core symptoms of ADHD when compared to group A & C while group C showed negligible improvement.

Conclusion

On the basis of the result it can be concluded that both drug and drug along with śirodhāra are effective in alleviating the symptoms of ADHD, but drug combined with śirodhāra has much greater potential to ameliorate the symptoms of ADHD rather than the drug or placebo alone.

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ROLE OF PRIYAṄGVĀDI VARTI IN THE MANAGEMENT OF ŚVETAPRADARA (LEUCORRHOEA) - A CLINICAL AND CONCEPTUAL EVALUATION

Om Prakash Upadhyaya, Nisha Gupta and Mandavi Gautam*

Abstract: Leucorrhoea is a common gynaecological problem, which may occur at any time in the reproductive age or later. It is not a disease but a symptom of manifestation of a local (Genital tract) or systemic disorder. In āyurveda, leucorrhoea is described as the clinical entity termed as 'śvetapradara' and its management has broadly been described in almost all āyurvedic classics. A clinical study was conducted in 30 diagnosed cases with an objective of clinical and conceptual evaluation of the Priyaṅgvādi varti and Priyaṅgvādi ghanavaṭi in the management of śvetapradara on the basis of various scientific parameters. It was observed that the patients treated with Priyaṅgvādi ghana vaṭi showed significant improvement statistically in the symptoms of śvetapradara while the patients treated with Priyaṅgvādi varti showed highly significant improvement.

Introduction

It is Cakrapāṇi who explained first 'pāṇḍura asṛgdara' as śvetapradara in the commentary on Carakasamhita (Cikitsāsthānam 30). Śvetapradara is a symptom not a disease, thus etiopathogenesis of a principal disease would be an etiopathogenesis of this condition also. However, on the basis of clinical features it appears to be a disease of vitiation of kapha. Vitiated kapha produces white and painless vaginal discharge due to dominance of its liquid property. Besides whitish discharge, other symptoms like weakness, bodyache, backache, itching in vulva, irritable nature and early excretion may also be present.

In āyurvedic classics, ācāryas have described the treatment of śvetapradara along with a detailed description of the management of various gynecological disorders including indications of various herbal preparations (either in the form of oral or local use). In this context ācārya Caraka has described a principle that local use of kaṣāyarasa-dominant herbs in the form of yonivarti (vaginal pessary) along with honey is beneficial in the management of śvetapradara. Thus, this conceptual and basic principle was selected in the present clinical study.

Aims and objectives: - To undertake a clinical evaluation and the role of yonivarti in the management of śvetapradara on the basis of the above said principle of Caraka (Ci.30/120).

**Deptt. of Maulika Siddhanta and Samhita, National Institute of Ayurveda, Jaipur-302002, Rajasthan, India.*

Material and methods

Selection of patients: - A total of 30 clinically diagnosed patients of śvetapradara were selected from the O.P.D. / I.P.D. of N.I.A. Hospital Jaipur.

Exclusion criteria: - Patients having vaginal discharge along with other systemic disorders like syphilis, positive V.D.R.L., gonorrhoea, tuberculosis and aids were not registered.

Drugs

Purīṣasamgrahaṇīyamahākaṣāya (intestinal astringent decoction) in the form of Priyaṅgvādi kaṣāyavarti and Priyaṅgvādi ghanavaṭi along with Priyaṅgvādi kaṣāya yonīprakṣāḷana (vaginal douch) was selected. This kaṣāya has the properties like samgrāhi, sandhānaka, stambhana, ropaṇa, doṣapācana and āmapācana. It also possesses the properties of pacification of kapha and vāta. Thus the selection of drugs was aimed to achieve a control over the etiological factors, local infection and samprāpti-vighaṭana of śvetapradara. Purīṣasamgrahaṇīya-mahākaṣāya contains the following:

- Priyaṅgu (*Callicarpa macrophylla*)
- Anantā (*Hemidesmus indicus*)
- Āmrāsthi (*Mangifera indica*)
- Kaṭvaṅga (*Oraxylum indicum*)
- Lodhra (*Symplocos racemosa*)
- Mocarasa (*Bombax ceiba*)
- Samaṅga (*Mimosa pudica*)
- Dhātakīpuṣpa (*Woodfordia fruticosa*)
- Padma (*Clerodendrum serratum*)
- Padmakesara (*Nelumbo nucifera*)

Method of preparations

1. Priyaṅgvādi varti: - All ingredients of Purīṣa-samgrahaṇīyamahākaṣāya were taken in equal quantities and powdered. An essential quantity of *Gum Acacia* is mixed with water and boiled. The foresaid powder is then added to this. After preparing a homogenous mixture, a varti (pessary), thick like index finger, is prepared manually with the help of ghṛta.
2. Priyaṅgvādi ghanavaṭi:- Powder of all the ingredients of Purīṣasamgrahaṇīyamahā-kaṣāya is taken and added with 16 times water and boiled till the mixture remained is reduced to 1/8. This decoction is filtered and boiled again till it is converted into ghanasatva form. Finally tablets of 500mg in weight are prepared.
3. Priyaṅgvādi kvātha: - The decoction of Purīṣasamgrahaṇīyamahākaṣāya was made as mentioned above and mixed with honey for yonīprakṣāḷana.

Study design and treatment

30 diagnosed cases of śvetapradara were registered and assessed on the basis of a specially designed performa according to classical texts as well as modern texts and were divided into two groups i.e. Group A and B on the basis of the therapy given.

- Group A - 15 patients were given Priyaṅgvādi varti and subjected to priyaṅgvādi yonī-prakṣāḷana. The varti was placed in the vaginal canal at bed time for 30 days.
- Group B - 15 Patients were given Priyaṅgvādi ghanavaṭi in the dose of 2 tablets B.D. with water and subjected to priyaṅgvādi yonī-prakṣāḷana for 30 days.

Assessment criteria

Subjective improvement: - Physical and mental fitness.

Clinical: - The following classical symptoms of śvetapradara were assessed before and after the trial.

- Śvetasrāva from yoni (excessive vaginal whitish discharge).
- Śḷeṣmaḷasrāva from yoni (mucoid and sticky secretion per vagina)
- Kaṭīśūla (backache)
- Udarādhapradeśavedana (lower abdominal pain).
- Jaṅghavedana (pain in calf region)
- Aruci (anorexia)
- Śiraśśūla (headache)
- Yoni kaṇḍu (itching in external genitals)
- Mānasika aśānti (mental irritability)
- Daurbalya (general weakness).

Objectivities parameters: - Body weight, pulse rate, respiratory rate, blood pressure and temperature.

Laboratory investigation: - Blood test (Haemoglobin gm%, T.L.C., D.L.C., E.S.R) and Urine test (routine and microscopic examinations)

Mode of action of varti

As per āyurvedic classics, therapeutic effects of a drug depends on certain pharamacodyanamic properties of particular substances like rasa, guṇa, vīrya, vipāka, etc. It has been observed that all the drugs in the Purīṣasamgrahaṇīyamahākaṣāya possess kaṣāyadominant rasa. This kaṣāya rasa has a tendency of reducing kaphadoṣa and possesses stambhaka, sandhānakara, krimighna, śodhana and ropana properties. Priyaṅgvādi varti, when introduced through vaginal canal, acts as anthelmintic, anti-inflammatory, antiseptic, antibacterial and may also be useful in ulcer and erosions of vaginal canal. It is possible that a local application of this may produce local effects by purification and pacification of doṣas at that site. Thus application of varti is better than the oral preparation in the treatment of śvetapradara.

Observation and results

Vital statistics: - The study revealed preponderance of high incidence in the middle age group (21-40) with dominance of middle class females (56.67%). Majority (76.67%) of patients belonged to the vegetarian diet; married patients of vāta-kaphajaprakṛti (56.67%) consuming āvarāhāramātra (46.67%) with krūrakoṣṭha (46.67%) and madhymakoṣṭha (40%) along with hīnasamhanana. Majority of the cases had a duration of greater than one year (50%). They all had a regular type of discharge pattern.

Subjective improvement: - All the patients in both groups showed marked relief after the course of therapy. It was more so in the patients treated with Priyaṅgvādi varti.

Clinical recovery: - All the patients of group A showed highly significant response in the symptoms i.e. śvetasrāva (excessive vaginal whitish discharge), śḷeṣmaḷasrāva (mucoid and sticky secretion per vagina), etc. All patients of group B showed highly significant response ($p < 0.001$) in the symptoms of śvetapradara such as excessive, mucoid and whitish vaginal discharge, backache, etc. Patients of both groups showed highly significant correction in subjective observation. The percentage of improvement was mild (43.18 %) in group-B and higher (69.25 %) in group - A (Tale 1).

Objective parameters:- Patients of both the groups showed significant response in body weight and insignificant response in all the rest objective parameters. The percentage of response in body weight was mild (0.81 %) in group-B and higher (1.01 %) in group-A.

Laboratorial parameters: - Statistically significant changes were found in observations like Hemoglobin gm% in all the patients of both the groups. In urine examination, highly significant response ($p < 0.001$) was found in all the patients of both groups but the mean % of improvement was higher in group A (Table 2). This may be due to sandhānakara, ropaṇa, śodhana and krimighna properties of priyaṅgvādi varti. Locally more beneficial effects of this varti were noticed.

Discussion

In āyurveda, various types of local and oral treatment for śvetapradara (leucorrhoea) are described. Ācārya Caraka has mentioned the treatment principle of śvetapradara thus: "Dhārya madhuyuta varti:..." (Ci., 30/120) - which means local application of kaṣāyarasa dominant varti, along with honey is very beneficial in this case. This was the basic principle of this clinical study. On the basis of description regarding kaṣāyarasa available in various āyurvedic classics it is observed that the kaṣāyarasa has pharmacological properties like stambhana, śīta, kaphaśāmaka, śodhana, ropaṇa, kṛmināśana, etc. Due to these properties, applications of kaṣāya-rasa either in local or oral form is effective in leucorrhoea. Priyaṅgvādi varti, ghanavaṭi and yonīprakṣāḷana with these pharmaco-therapeutic properties are likely to break down the chain of reaction essential for the samprāpti of śvetapradara and check its progress without producing any side effects.

In this study, application of varti along with yonīprakṣāḷana was found to give better results than the oral application of ghanavaṭi along with yonīprakṣāḷana. It is possible due to the local application of kaṣāya-dominant varti that produces local effects by its śodhana, ropaṇa and kṛmināśana properties. It was also observed that śvetapradara is not a systemic disease; it is

TABLE 1
Pattern of clinical recovery in 15 patients of śvedapradara in group A and B

Symptoms	Group - A				Group - B			
	n	Mean%	t	p	n	Mean%	t	p
Excessive vaginal discharge	15	79.05	8.36	<0.001	15	55.42	10.23	<0.001
Mucoid vaginal discharge	14	83.71	5.99	<0.001	14	53.27	8.14	<0.001
Backache	11	59.81	5.19	<0.001	12	50.00	9.09	<0.001
Lower Abdominal pain	14	66.65	7.77	<0.001	13	17.04	2.25	<0.02
Pain in calf region	13	87.34	12.1	<0.001	12	47.43	8.3	<0.001
Anorexia	12	29.37	2.79	<0.01	07	23.24	0.21	<0.10
Headache	08	40.00	2.63	<0.02	08	33.15	3.26	<0.01
Vaginal itching	14	90.50	8.52	<0.001	09	50.00	12.44	<0.001
Mental irritability	13	23.83	2.74	<0.01	10	23.07	2.25	<0.05
General weakness	10	22.22	2.40	<0.02	10	18.75	1.97	<0.05
Whitish vaginal discharge	15	83.96	9.61	<0.001	15	66.67	12.30	<0.001
Frigidity	08	86.84	6.34	<0.001	10	23.80	03.0	<0.01
Mild pain in vagina	09	69.44	7.69	<0.001	06	50.37	05.15	<0.001
Anaemia	11	22.24	2.41	<0.02	08	21.71	02.07	<0.05

TABLE 2
Pattern of laborotrial changes (blood/urine test) in group A & B

Objective parameters	Group - A				Group - B			
	n	Mean%	t	p	n	Mean%	t	p
1. Blood test:	11	59.81	5.19	<0.001	12	50.00	9.09	<0.001
Haemoglobin	15	3.83	2.10	<0.05	15	3.85	2.58	<0.02
T.L.C.	15	9.31	2.07	<0.05	15	4.86	1.60	<0.10
Neutrophils	15	0.43	0.53	<0.10	15	1.39	0.72	<0.10
Lymphocytes	15	1.50	0.85	<0.10	15	5.27	1.0	<0.10
Eosinophils	13	15.50	1.55	<0.10	12	13.2	0.69	<0.10
Monocytes	13	12.37	0.97	<0.10	12	4.86	0.43	<0.10
Basophils	06	24.92	0.99	<0.10	06	20.00	0.75	<0.10
E.S.R.	15	12.74	1.77	<0.10	15	9.92	1.16	<0.10
2. Urine test:								
Pus cells	11	72.75	7.09	<0.001	05	50.00	6.96	<0.001
Epithelial cells	10	64.28	4.09	<0.001	08	60.97	5.30	<0.001
W.B.C.	08	64.10	7.17	<0.001	07	58.31	3.85	<0.001
Albumin	04	66.67	4.76	<0.01	07	50.00	4.07	<0.001
Others	08	71.43	10.42	<0.001	11	66.91	4.33	<0.001

mainly a local disease in origin; that was why local application in the form of varti showed a highly significant improvement than that of the oral application in the form of ghanavaṭi.

Conclusion

It can be concluded that local application of kaṣāya-dominant varti along with honey can be used effectively in the management of śvetapradara.

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TIMIRA (PRESBYOPIA) AND ITS MANAGEMENT WITH TRIPHALĀGHṚTAM - A CLINICAL STUDY

Biswanath Bhattacharya*

Abstract: A clinical study to assess the efficacy of tarpaṇakarma by Triphalāghṛtam on presbyopia cases was conducted in 40 patients of both sexes in the age group of 40 years to 55 years. The therapy was so effective that 50% of patients improved and there were no recurrences of the symptoms.

Introduction

Among the sensory organs, the most important is eyes, because they feed the brain with information by converting light into coded mental activity, although nobody can distinguish the code. But its mechanism can be compared to the simple technique of an optical instrument like camera. The functions of both are same but in a camera the picture is the end result whereas the retinal image is the first step of a transmitted message. The sayings like 'sarvendriyāṇām nayanam pradhānam' underscore the importance of eyes, hence the study of eyes has always been given much emphasis.

Suśruta, the pioneer of Śalya and Śālakya tantras, has given more emphasis in the description and management of dṛṣṭigatarogas (Suśrutasamhita, Uttaratantra). According to Suśruta, there are 76 types of netrarogas and among them, dṛṣṭigatarogas are of 12 types. Timira is one of the main dṛṣṭigataroga, which closely resembles with errors of refraction and presbyopia.

Presbyopia is a physiological anomaly of accommodation due to senile age, which usually manifests at the age of 40 years. When the patient cannot accommodate the very minute objects distinctly within 25 cm distance from the eye due to loss of plasticity of the lens and weakness of the ciliary muscles and suspensory ligament, the lens fails to become more globular i.e. it fails to increase its dioptric power. Such a person cannot see printed words within the normal distance of reading. But when he holds further away from that normal distance i.e. more than 25 cm. he can read.

Although the concept of presbyopia belongs to modern ophthalmology, it closely resembles or almost is parallel to the concept of some āyurvedic phenomenon, which Suśruta and other ācāryas have dealt with while describing

* *Department of Shalakya Tantra, Rajib Gandhi Memorial Ayurvedic College & Hospital, Belley Sankarpur, Post- Kushdanga, Dist.- 24 Parganas (N), West Bengal*

the management of timiraroga.

Clinical studies have already been conducted on tarpaṇakarma with Triphalāghṛtam in the cases of presbyopia, in Gopabandhu Ayurveda Mahavidyalaya, Puri, Orissa. Taking this into the consideration, the present study was designed to evaluate the clinical efficacy of Triphalāghṛtam as tarpaṇanetrakriyākalpa in the cases of timira (presbyopia).

Materials and methods

Study design: - A total of 40 diagnosed cases of presbyopia between the age group of 40 to 55 years in both sexes were selected from the Gopabandhu Ayurveda Mahavidyalaya and Hospital (PG Department Salakyatantra) under Utkal University, Puri, Orissa.

Drug: - Triphalāghṛtam, consists of āmalaki (*Emblica officinalis*), harītaki (*Terminalia chebula*), bibhītaki (*Terminalia bellirica*) and ghṛta (ghee) was prepared by Ghṛakalpana as described in the texts. It is one of the best formulations indicated in all netrarogas as well as dṛṣṭigatarogas, especially in timiraroga.

Dose and duration: - 15 ml on each eye for 30 minutes per day for a period of 30 days.

Assessment criteria:- Assessment was made on the basis of certain parameters like testing with near vision chart and the data was recorded under a) cured, b) improved and c) not improved. The assessment was done in two phases: 1st after 15 days and 2nd after completion of the course i.e. after 30 days.

Observation and results

After 30 days' treatment, complete cure was noted in 11 cases, improvement in 18 cases and no improvement in 11 cases in the right eye. In the left eye, complete cure was noted in 11 cases, improvement in 14 patients and no improvement in 15 cases. (Table 1)

Discussion

The present study was carried out to find out a suitable remedy in exchange of glass for the presbyopia. The modern ophthalmologists have postulated a number of theories from the etiology to treatment of presbyopia, but none of them meet exact findings except prescribing the glasses according to the optical errors.

Suśrutasamhita has extensively explained the refractive errors and anomaly of accommodation under dṛṣṭigataroga. Its description about anatomy, physiology, pathology and therapeutic measures in a treatment are more comprehensive even today.

Conclusion

After completion of Tarpaṇakarma, the symptoms of presbyopia like visual acuity and dioptric power were improved in maximum number of patients and there were no recurrence of the symptoms; hence it can be concluded that the trial drug Triphalāghṛtam applied in the mode of tarpaṇakarma is effective in presbyopia.

TABLE 1
Clinical assessment of results (n = 40)

Effect	Right eye		Left eye	
	AT_1	AT_2	AT_1	AT_2
	No. (%)	No. (%)	No. (%)	No. (%)
Cured	1 (2.5)	11 (27.5)	1 (2.5)	11 (27.5)
Improved	18 (45)	18 (45)	15 (37.5)	14 (35)
Not improved	21 (52.5)	11 (27.5)	24 (60)	15 (37.5)

AT_1 - After 15 days of treatment; AT_2 - After 30 days of treatment

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EFFICACY OF ĀMALAKĀYASARASĀYANA IN THE MANAGEMENT OF PREMATURE AGEING (AKĀLAJA JARA)

Samarakoon S.M.S and Chandola H.M*

Abstract: Ageing is a natural phenomenon.Rate of ageing is determined by one's biological, social, life style and psychological conditions; and adversity of which leads to accelerated form of ageing, which is termed as akālaja jara in āyurveda. The aims of the study were to evaluate the classical formulation - Āmalakāyasarasāyana (AR) on selected subjective to assess the overall outcome on quality of life in premature ageing patients on objective parameters. The results showed improvement of symptoms to a significant level.

Introduction

Ageing has been defined as a progressive and generalised impairment of functions resulting in a loss of adaptive response to stress with a growing risk of age-associated diseases. The people over 60 years are accepted globally as the older population[1]. Caraka considers that old age starts at 60 years of age, while Suśruta opines old age starts at 70. Normal aging can be distinguished as universal biological changes that occur with advancement of age and is unaffected by disease and environmental influences, which is known as chronological ageing and according to āyurveda, kālaja jara. In contrast, the accelerated ageing is strongly affected by environmental, lifestyle and some disease-conditions which are related to ageing but not due to natural ageing. This condition is known as akālaja jara[2a]. The body humours (tridoṣa), basic tissues (saptadhātu), organs (indriya), body channels (srotas) and digestive and metabolic capacity (agni) are affected in ageing process, which manifest in physical as well as functional levels[3].

Vāgbhaṭa and Śārṅgadhara were the first to mention how ageing proceeds and whether it starts simultaneously in all tissues or from a particular part of the body. According to this view some qualities are deteriorated in each decade of life beginning from birth; for instance, at the end of first, second, third, fourth, fifth, sixth, seventh, eighth, ninth and tenth decade i.e. loss of growth, complexion, intellect, skin luster, reproductive capacity, vision, hearing and functions of mind and sense organs respectively. Śārṅgadhara had a similar view with a mild modification considering maximal life span of 120 years and dividing it into 12 decades. According to him, chronological deteriorations that take place in each decade are childhood

*Institute for PG Teaching & Research in Ayurveda, Gujarat Ayurved University, Jamnagar-361008, India

(bālya), growth (vṛddhi), complexion or body's glow (chavi), intellect (medha), skin properties (tvak), vision (dṛṣṭi), reproduction (śukra), valour (vikrama), reasoning capacity (buddhi), state of motor organs (karmendriya), mind (cheta) and finally life (jīvita)[4]. In this way, the process of ageing begins in the 4th decade of life and the effect is more obvious from the fifth decade.

Though, the rate of ageing is genetically predetermined; lifestyle, dietary habits, addictions, mental makeup, social and family life, medication, and many other environmental factors may influence the ageing process and their unfavorable effects cause premature ageing (akālaja jara). Among hundreds of theories of ageing, free radical theory has remained rational over time as it provides many realistic explanations for the process of ageing. The changes induced by free radicals are believed to be the key cause of ageing and disease. Diet, active and stress-free living play an unparallel role in neutralising free radicals thereby retarding ageing and age related diseases as well[5a]. Rasāyana drugs have a role in minimizing free radical induce damages in premature ageing. Āmalakāyasarasāyana (AR), which is a classical formulation formulated from the ingredient of Vayasthāpanakaṣāya, was prepared as per classical references[6a].

Aims and objectives

The study was designed to assess the efficacy of AR on various subjective and objective parameters on persons who are clinically more aged than their actual age and to evaluate it therapeutically as an anti-ageing medicine.

Materials and methods

A total of 51 premature-ageing patients who attended the O.P. department of Kāyacikitsa of I.P.G.T. & R. A. Hospital, Gujarat Ayurveda University, Jamnagar, during April 2009 to April 2010 were included in the clinical study. The study was cleared by Institutional Ethics Committee of I.P.G.T & R.A of Gujarat Ayurved University.

Inclusion criteria: - Patients aged between 30-60 years having signs and symptoms of premature ageing were selected irrespective of sex, education, socio-economic status or religion.

Exclusion criteria: Patients below 30 and above 60 years, suffering from any chronic systemic disease such as DM, HTN, COPD and malignancies which are due to some other pathologies and who are on any chronic medication.

Method of study: - The study was a randomised single blind clinical one. All patients were subjected to routine haematological, biochemical and urine examinations before and after the treatment. The premature ageing patients were prescribed Āmalakāyasarasāyana, 1g thrice daily for 10 weeks in empty stomach with honey and ghee as anupāna. All the patients were advised to correct their dietary faults and adjust life style as per their prakṛti. After completion of treatment, patients were observed for 1 month and all parameters were re-assessed.

Assessment criteria

Subjective criteria:- Improvement was assessed by scoring of chief complaints, associated symptoms, symptoms of doṣa, dūṣya, mala and srotas, which were authenticated by previous studies[7], Hamilton anxiety rating scale[8], Hamilton depression rating scale, mānasabhāvaparīkṣa[7,9] before and after the treatment.

Objective criteria:- Assessment of health parameters[10] such as walking time and hand-grip power, etc., physical exertion test (PET),

and routine hematological, bio-chemical investigation and urine examination were the objective criteria. Anthropometric parameters such as height, weight, body mass index (BMI) and the ponderal index (PI)[5b] were investigated in every patient before and after the treatment. The obtained results were categorised according to the percentages given as follows: Cured - 100% relief; Marked improvement - 76% to 99% improvement; Moderate improvement - 51% to 75% improvement; Mild improvement - 26% to 50% improvement; Unchanged - <25% improvement in all the signs and symptoms.

Result and discussion

Chief complaints: - The results showed that AR along with ghee and honey has effect on improving the symptoms related to dhātukṣaya and vātavṛddhi which are the main pathological basis behind premature ageing (Table 1). All the ingredients of AR have vayasthāpana, rasāyana, balya, bṛmhana, vṛṣya, āyuṣya, śoṇitāsthāpana, agnidīpana, śrotośodhana and tridoṣaśamaka properties. AR increases agni and cleanse srotas by its anulomana and agnidīpana properties which in turn enhances proper nutrition to the individual dhātu. Ghee and honey by its samskārānuvartana[6b] and yogavahi nature further potentiate the effect of AR. The synergistic and cumulative effect of both the drug and the vehicle promote nutrition to

TABLE 1
Effect of Āmalakāyasarasāyana on chief complaints and associated symptoms of 51 premature ageing patients

Symptoms	Mean score		% of relief	S.D	S.E	't'	p
	BT	AT					
I. Chief complaints							
- Tvakpāruṣya	1.57	1.40	12.05	0.38	0.05	3.07	<0.001
- Śḷathasāra	1.60	1.38	16.29	0.420	0.06	3.55	<0.001
- Śḷathamāmsa	1.53	1.02	40.69	0.51	0.07	6.63	<0.001
- Śḷatha asthi	1.220	0.415	71.95	0.401	0.06	12.85	<0.001
- Śḷathasandhi	1.18	0.47	66.66	0.46	0.07	10.41	<0.001
- Khālitya	1.723	0.787	61.34	0.247	0.04	25.97	<0.001
- Kāsa	1.00	0.20	80	0.45	0.20	4.00	< 0.01
- Śvāsa	1.17	0.43	65	0.45	0.082	8.93	<0.001
- Utsāhahāni	1.38	0.69	53.17	0.69	0.69	9.56	<0.001
- Parākramahāni	1.32	0.98	26.42	0.48	0.075	4.55	<0.001
- Pauruṣahāni	1.32	1.00	26.78	0.55	0.10	3.10	<0.001
- Prabhāhāni	1.55	1.39	11.36	0.37	0.056	2.85	< 0.01
II. Associated symptoms:							
- Indigestion	1.26	0.26	88.17	0.00	0.00	(+inf)	<0.001
- Constipation	1.62	0.02	98.93	0.54	0.08	20.33	<0.001
- Altered sleep	1.43	0.50	71.21	0.45	0.07	13.67	<0.001
- Palpitation	1.22	0.96	21.73	0.45	0.09	2.79	< 0.01
- Altered urination	1.12	0.19	87.5	0.25	0.062	15.00	<0.001
- Fatigue	1.36	0.40	78.00	0.19	0.03	34.29	<0.001
- Weakness	1.41	0.53	70.4	0.39	0.06	15.79	<0.001

saptadhātu and simultaneously pacify vitiated vāta to normalcy. This gradual transformation of the dhatu enhanced by AR improves up on the symptoms of pre-mature ageing significantly.

Associated symptoms: - The improvement of indigestion, constipation, altered sleep pattern, altered urinary pattern, fatigue and weakness was highly significant, whereas palpitation was significant (Table 1). Most of the ingredients of AR are of uṣnavīrya and agnivardhaka. Harītakī is having anulomana[11a], while punarnava is of mūtraḷa and nephroprotective[12a]. Guḍūcī, maṇḍūkaparṇi and āmalakī is having adaptogenic properties which relieve stress. AR along with ghee and honey increase appetite, ease bowel movements and relieve urinary symptoms. Moreover, rasāyana and balya properties of AR enhance nutrition of dhātu by which fatigue and weakness are relieved. Collectively ghee and honey pacify tridoṣa, increase digestion (agni) and provide many essential nutrients to the body. Ghee enhances absorption of fat soluble vitamins and provides essential fatty acids which are not available in vegetarian diet. Both ghee and honey possess rasāyana[2b,11b] and balya properties. Ghee is said to have "sahasravīrya[6c]" and "sahasrakarma" meaning ghee is strong enough to alleviate many diseases and it also possesses innumerable pharmacodynamic activities.

Health parameters: - AR decreased walking time (5.51%), respiratory rate (1.74%) and skin wrinkling time (1.17%), whereas it increases long term memory (41.4%), short term memory (15.9%), breath holding time (11.9%) and hand grip power (5.45%). All the above parameters were improved. The improvement in walking time, hand grip power, foot pressure, short term memory, long term memory and breath-holding time and skin wrinkling time found to be highly significant ($p<0.001$), whereas the respiratory rate was significant ($p<0.01$). Most drugs in AR, especially guḍūcī, harītakī, āmalakī, śatāvarī, maṇḍūkaparṇi, ghee and honey are known to have anti-stress and adoptogenic properties and enhance cognitive functions such as memory and learning. Pulse rate (1.2%), systolic blood pressure (1.38%), diastolic blood pressure (1.36%), body weight (0.65%), body mass index (0.65%) and ponderal index (0.54%) were insignificant ($p>0.05$). Though the above parameters were increased slightly, they were within the physiological levels. The change in systolic B.P and skin wrinkling time showed significant ($p<0.01$) indicating AR is effective over placebo in improving those parameters.

Dos6Ya:- AR improved pitta and kaphakṣaya in a highly significant manner whereas vātakṣaya in a significant manner (Table 2). The result suggests that AR has better effect on kapha dosa followed by pittadoṣa. Analysing pharmacodynamic properties, AR is dominant in madhura, tikta and kaṣāya rasa which pacify pitta; madhura vipaka which pacifies vāta and pitta; uṣṇavīrya which pacifies kapha. The overall effect is tridoṣaśamaka. Ghee normalises vāta and pitta by its śitavīrya and snigdha properties[13], while honey reduces kapha and excess medas by its lekhana properties[2c].

Dhātu:- AR added maximum improvement in rasakṣaya. The improvement of first six successive dhātu was highly significant whereas that of śukrakṣaya was in a significant manner (Table 2). When dhātu absorb proper nutrition, they start to rejuvenate and gradually reverse the degenerative process that it was subjected to in premature ageing. AR by its

pharmacodynamic properties acts on doṣa, dhātu, srotas and agni to correct their anomalies by which signs and symptoms related to dhātukṣaya are subsided. AR improved rasa vṛddhi (38.09%), meda vṛddhi (17.98%) and māmsavṛddhi (13.88%) in a statistically significant manner ($p<0.01$).

AR contains lauha bhasma (27.50% w/w) which possesses raktajanana, vṛṣya and rasāyana properties. Lauha is said to act on rakta and majja dhātu (Singh R.H 1998).[14] AR also contains āmalakī which is the richest source of Emblicin - A & B[15] that has similar functions of ascorbic acid which again enhances iron absorption. Āmalakī is also said to act on raktadhātu.[14] This is the cause for AR to have significant effect on rakta and majja dhātu. AR showed a moderate improvement in 5.9% patients and a mild improvement in 45.09% patients.

Srotodusṭi: - AR improved rasavahasrotodusṭi in a highly significant manner statistically whereas the improvement of medovaha and asthivahasrotodusṭi was in a significant manner (Table 2). AR showed moderate and mild improvement on srotas in 5.88% patients and 13.72% patients respectively. AR is madhura in vipāka; uṣṇa in vīrya and tikta, kaṣāya and madura in rasa. Due to all these effects, AR cleans the srotas and subsequently enhances proper transformation of dhātu. Harītakī being one among the ingredients of AR, is valued as the best drug for srotaśśodhana.[6d]

TABLE 2
Effect on doṣavṛddhi, dhātukṣaya and śrotodusṭi of premature ageing patients

Description	N	Mean score		% of relief	S.D	S.E	't'	p
		BT	AT					
I. Doṣavṛdhi								
- Vāta	40	3.00	1.77	43.75	0.66	0.10	11.74	<0.001
- Pitta	18	2.00	1.06	53.7	0.24	0.056	17.00	<0.001
- Kapha	36	3.11	2.00	38.88	0.523	0.087	12.76	<0.001
II. Dhātukṣaya								
- Rasa	42	2.59	1.62	38.88	0.41	0.064	15.34	<0.001
- Rakta	39	2.08	1.31	35.89	0.67	0.11	7.19	<0.001
- Māmsa	18	2.39	1.83	24.07	0.51	0.12	4.61	<0.001
- Meda	15	1.87	1.33	33.88	0.52	0.13	4.00	<0.001
- Asthi	49	2.22	1.78	16.49	0.54	0.08	5.79	<0.001
- Majja	37	2.11	1.46	31.08	0.54	0.089	7.33	<0.001
- Śukra	10	1.80	1.20	31.66	0.69	0.22	2.71	<0.01
III. Srotodusṭi								
- Rasavaha	50	3.12	2.04	35.16	0.63	0.089	12.05	<0.001
- Raktavaha	11	1.18	1.00	9.09	0.40	0.122	1.49	>0.05
- Māmsavaha	3	1.33	1.33	0.00	0.00	0.00	0.00	>0.05
- Medavaha	12	1.83	1.33	33.33	0.52	0.151	3.32	<0.01
- Asthivaha	50	1.48	1.34	7.33	0.35	0.049	2.82	<0.01
- Majjavaha	3	1.67	1.33	11.11	0.56	0.33	1.00	>0.05
- Śukravaha	8	1.25	1.00	25	0.46	0.16	1.53	>0.05

Mental health

Abnormal mānasabhāva:- AR improved smṛti, prīti and dhairya to the maximum (Table 3). AR showed better results on prīti, viṣāda and cinta, whereas placebo showed a significant result on viṣāda and cinta. Harītakī, guḍūcī, āmalakī, śatāvarī, maṇḍūkaparṇī, madhu, and ghee are well known drugs having medhya properties. Honey is hailed as best drug to have kapha and pittaśāmaka properties; ghee for its vāta-pitta śāmaka and rasāyana properties; āmalakī[6d,12b] for its anti-ageing properties; and harītakī for its srotāśśodhaka properties.[6d] Most of the drugs are well known to have antioxidant,[12c] adaptogenic, immune modulatory and memory enhancing properties. Therefore in addition to its rasāyana effect AR has some effect on mānasabhāva. In this experimental study, both AR and combination of ghee and honey showed a marked adaptogenic effect in Charles Foster albino rats supporting the positive effect on abnormal mānasabhāva.

Hamilton Anxiety Rating Scale: - Maximum improvement was found in somatic-muscular (100%) followed by GIT symptoms, respiratory symptoms, etc. (Table 4). AR showed better effect on the parameters of HARS in total. In a clinical study on Āmalakāyasarasāyana, significant improvement was reported in medhā and anxiety scale[16]; guḍūcī is proved to have anti-stress and adaptogenic activity[17], maṇḍūkaparṇī is proved to have efficacy to prevent cognitive impairment, to improve anxiety and relieve mental fatigue[18] and śatāvarī is proven for its anti-stress activity.[17]

TABLE 3
Effect on abnormal mānasabhāva

Mānasa bhāva	Mean score		%	S.D	't'	p
	BT	AT				
Raja	1.20	1.00	10	0.45	1.00	>0.05
Śoka	1.00	0.75	0	0.50	1.00	>0.05
Cinta	1.17	0.91	25	0.45	2.79	<0.01
Dhairya	1.00	0.50	23.91	0.71	1.00	>0.05
Harṣa	1.67	1.00	50	0.58	2.00	>0.05
Prīti	1.00	0.00	44.44	0.00	(+inf)	<0.001
Mana	1.00	1.00	50	0.00	0.00	>0.05
Dhṛti	1.50	1.00	0	0.71	1.00	>0.05
Medha	1.25	1.00	25	0.50	1.00	>0.05
Smṛti	1.24	1.12	50	0.33	1.46	>0.05
Viṣāda	1.00	0.58	12.5	0.51	2.80	<0.01

Hamilton Depression Rating Scale:- AR showed improvements in somatic-GIT (83.33%), anxiety-psyche (50%), anxiety-somatic (50%), depressed mood (39.58%), insomnia (38%), work interest (25%), hypochondriasis (25%) and somatic-general (16.66%), whereas agitation, loss of weight and worthlessness are unchanged. Depressed mood, insomnia and somatic-GIT are improved in a highly significant manner statistically ($p<0.001$), whereas anxiety-somatic in a significant manner ($p<0.01$). Totally, AR showed moderate and mild improvement in 19.35% patients and 35.48% patients respectively.

Physical Exertion Test (PET):- AR reduced mean systolic B.P (5.39%) in a statistically significant manner ($p<0.01$), whereas decreased diastolic B.P (11.46%), pulse rate (14.7%), mean pressure (7.16%), and rate pressure (6.54%) in a highly significant manner ($p<0.001$); increased pulse pressure (5.87%) but insignificant ($p>0.05$). Physical exertion test was done to observe cardiovascular response after a definite physical exercise (walking), which is an indicator of myocardial oxygen consumption.[19] Left ventricular hypertrophy is common among the elderly people. Arteries become thick and narrow with advancing age. Most of the elderly people experience elevated systolic and diastolic blood

pressure. A study has reported that the systolic hypertension is a better predictor of mortality than diastolic blood pressure[20]. In AR treated group, all the parameters of PET except pulse pressure showed a significant change, meaning their differences of improvement are wider. This result suggests that AR has heart strengthening effect. Śatāvarī[6e] and guḍūcī[11c] are of balya; harītakī, punarnava and śatāvarī[6e] are hṛdya drugs (cardiotonic). Punarvana[12a] is a cardiotonic and āmalakī[12b] is cardio-protective, both strengthen the heart. Jīvantī and harītakī can reduce blood pressure. Maṇḍūkaparṇī and śveta[12d] have anabolic effect. Guḍūcī, āmalakī and śatāvarī have adaptogenic properties. Further, AR contains 27.5% w/w iron and it has increased hemoglobin (1.09%) significantly. These may be the reasons to show significant

TABLE 4
Effect on HARS, hematological parameters liver function tests

Parameters	Mean score		% of relief	S.D	S.E	't'	p
	BT	AT					
I. HARS							
- Anxious mood	1.00	0.92	8.33	0.29	0.083	1.00	>0.05
- Tension	1.25	0.80	32.5	0.51	0.11	3.94	<0.001
- Insomnia	1.16	0.72	38	0.50	0.10	4.34	<0.001
- Con. & memory	1.33	1.33	0.00	0.00	0.00	0.00	>0.05
- Depressed Mood	1.21	0.71	39.58	0.51	0.10	4.79	<0.001
- Res. Symptoms	1.67	0.67	100	0.00	0.00	(+inf)	<0.001
- GIT Symptoms	1.23	0.38	66.66	0.38	0.10	8.12	<0.001
- GUT Symptoms	1.67	0.67	76.92	1.00	0.57	1.73	>0.05
- Auto: Symptoms	1.50	1.00	55.55	0.58	0.29	1.73	>0.05
II. Hematological test							
- Total WBC	6839	7121	5.93↑	1373	192	1.47	>0.05
- Neutrophil	57.35	59.67	5.03↑	8.13	1.14	2.03	< 0.01
- Lymphocyte	35.49	34.22	2.28↓	7.20	1.01	1.26	>0.05
- Eosinophil	3.43	3.23	0.51↑	1.31	0.18	1.07	>0.05
- Monocyte	3.27	3.12	2.61↓	0.81	0.11	1.38	>0.05
- PCV	36.71	37.12	1.15↑	1.05	0.15	2.83	< 0.01
- RBC	4.51	4.57	1.36↑	0.28	0.039	1.36	> 0.05
- Hemoglobin	11.61	11.73	1.09↑	0.31	0.04	2.79	<0.01
- ESR	24.55	21.94	5.61↓	8.30	1.16	2.24	<0.01
III. Liver function tests							
- T. cholesterol	177.92	184.57	4.88↑	27.67	3.87	1.72	> 0.05
- Triglyceride	153.33	155.31	14.81↑	81.91	11.47	0.17	> 0.05
- HDL	41.18	41.86	3.78↑	8.16	1.14	0.60	> 0.05
- SGPT	31.157	21.941	8.6↑	65.14	9.122	1.01	> 0.05
- SGOT	34.59	27.41	3.5↑	55.83	7.82	0.92	> 0.05
- T. protein	7.03	7.27	3.45↑	0.48	0.067	3.46	< 0.001
- Albumin	3.92	4.04	3.22↑	0.27	0.038	3.15	< 0.001
- Globulin	3.12	3.23	3.83↑	0.30	0.043	2.67	< 0.001
- Al. phosphatase	55.59	58.76	10.76↑	16.78	2.35	1.35	> 0.05
- T. bilirubin	0.68	0.69	2.8↑	0.17	0.024	0.32	> 0.05

results on physical exertion test.

Hematological parameters: - AR increased PCV, hemoglobin and neutrophil in a statistically significant manner while it decreased ESR in a significant manner (Table 4). AR has effect on erythropoiesis; it contains Fe_2O_3 27.5% w/w (Lauhabhasma), which can increase hemoglobin in blood. Lauha is a rasāyana which acts on rakta and majja dhātus and āmalakī also acts on raktadhātu. Guḍūcī[6d] is one among the best raktaśodhaka drugs. Honey contains iron (0.42mg/100g or 3%) and vitamin C (0.5mg/100g or1%) and increase bone marrow functions[21].

Liver function test: - Although AR increased the parameters of liver function tests, they were within the physiological limit (Table 4). The results show that AR increases total cholesterol, total protein, albumin, globulin, alkaline phosphatase and serum bilirubin. But these values were within the normal range, whereas it decreases HDL, SGOT and SGPT which may be due to liver protective effect of AR. These results support by another study that an amalakī contained drug has reduced SGOP, SGPT and Alkaline phosphatase in experimental animals.[22]

On kidney function tests:- AR showed a decline in blood urea (7.3%) and an increase in uric acid (7.88%) level in a significant manner statistically ($p<0.01$). The increase in both serum creatinine and creatinine clearance is insignificant ($p>0.05$). Most rasāyana drugs have nephro-protective effect. AR contains punarnava a known herbal drug to have diuretic effect[12a,11d]. In a clinical study, it has observed that punarnava decreased albuminuria and a rise in serum protein in nephritic syndrome patients.[23]

Conclusion

Based on the improvement of all the chief complaints, associated symptoms and other grading system related to doṣa, dhātu, mala, srotas and mental health, Āmalakāyasarasāyana showed a moderate relief in 19.61% patients and a mild improvement in 64.70% patients, while placebo in 48.08% patients. The 15.69% patients were unchanged in AR group.

Premature ageing is an accelerated version of ageing, which create untimely symptoms of ageing and age related diseases depending upon other determining factors. The main objective of rasāyana is to improve nutritional state of body by which healthy youthfulness and longevity is expected. AR contains alkaloids, flavonoids, steroids, tannin, and phenolic compounds; it possesses antioxidant properties that can scavenge free radicals; a widely accepted cause of ageing. Almost all the ingredients in AR has antioxidants, free radical scavenging activity, adaptogenic activity, immune modulatory activity and enhance production of endogenous antioxidant enzymes. Keeping all these facts in view, it can be concluded that the observed result in subjective as well as objective parameters are due to anti-ageing and multi-dimensional effect of Āmalakāyasarasāyana and it is an effective medicine for age related diseases and premature ageing.

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PHARMACOLOGICAL STUDIES OF *BOERHAVIA DIFFUSA* L. - A REVIEW

Vidyadhish A. Kashikar[1], Pradeep S. Pawar[1] and Omprakash Upadhyaya[2]

Abstract: Punarnava (*Boerhavia diffusa*) is one of the important drugs prevalently using in many āyurvedic as well as in Unani medicines. Its efficacy in many disorders such as diabetes, stress, dyspepsia, abdominal pain, inflammation, jaundice, enlargement of spleen and congestive heart failure has already been testified. Ethnobotanical and pharmacological studies have revealed its various activities such as adaptogenic, analgesic, anti-inflammatory, anti fibrinolytic, antidiabetic, antifertility, etc. The present review enlightens some pharmacological studies conducted on this plant.

Introduction

Punarnava (*Boerhavia diffusa*) is an herbaceous member of the family Nyctaginaceae; it is called spread hogweed in English. The genus is named after Herman Boerhaave, a Dutch botanist, and the genus name is frequently misspelled as *'Boerhaavia'*. The plant distributes abundantly as a weed throughout India. It is a wild perennial herb which can be encountered in different terrestrial habitats, ranging from managed grasslands, wastelands, agro-ecosystems to large forest gaps. It is a creeping and spreading perennial herb, with a stout root-stock and many erect or spreading branches (Fig. I&II). Out of the 40 species of this genus, five are found in India viz. *B. diffusa*, *B. chinensis*, *B. erecta*, *B. rependa*, and *B. rubicund.*

The whole plant, preferably the root, is effectively used to cure several diseases including jaundice. The root and aerial parts of the plant are used in āyurveda for the treatment of inflammation.

Boerhavia species have been of keen interest in phytochemical and pharmacological research due to their excellent medicinal values. They are rich sources of alkaloids, steroids and flavones.

Phytochemistry

The plant contains a large number of compounds such as flavonoids, alkaloids, steroids, triterpenoids, lipids, lignins, carbohydrates, proteins, and glycoproteins. Punarnavine ($C_{17}H_{22}N_{2O}$). Boeravinone A.F, hypoxanthine 9-L-arabinofuranoside, ursolic acid, punarnavoside, liirodendrin, and a glycoprotein having a molecular weight of 16–20 kDa have isolated and studied in detail for their biological activity. The plant contains large quantities of potassium nitrate, besides punarnavine. The herb and roots are rich in

1. *Department of Maulik Siddhant & Samhita, National Institute of Ayurveda, Jaipur, Rajasthan*
2. *Vice Chancellor, Ravidas Ayurveda Vishwa Vidyalaya, Panjab*

proteins and fats. The herb contains 15 amino acids, including 6 essential amino acids, while the root contains 14 amino acids, including 7 essential amino acids. A new antifibrinolytic compound 'punarnavoside' is isolated from the roots of *B. diffusa*. Phytochemical screening of the roots from garden-grown in vivo plants of *B. diffusa* of different ages revealed that the maximum alkaloid content (2%) accumulated in the roots of 3-yearold mature plants. (Fig. III)

Pharmacological studies

Adaptogen activity

Adaptogens is useful during both adrenal hyper stress as well as adrenal hypo fatigue. By definition, an adaptogen implies the capability for bidirectional or normalising effects. *Boerhavia diffusa* has the ability to support both adrenal over and under activation. In stressful conditions it has demonstrated the ability to buffer the elevations of serum cortisol and prevent the suppression of the immune system that takes place with elevated cortisol. *Boerhavia diffusa* has also demonstrated the ability to improve cortisol levels with end stage adrenal exhaustion.[1]

Analgesic & anti-inflammatory activity

The analgesic property of aqueous extracts obtained from *B. diffusa* is mainly from the leaf juice. The aqueous extract obtained from the leaf juice is endowed with an apparently morphinomimetic central analgesic property.[2]

The acetone extracts of the root show significant anti-inflammatory activity against carageenan-induced oedema and formaldehyde-induced arthritis in albino rats[3]. A study on the water insoluble alcoholic extract of different parts i.e. root, stem, leaves and flowers of the plant for their anti-inflammatory activity against carageenan-induced oedema in rats and for diuretic activity revealed that the root and leaves are most active[4]

Anti-fibrinolytic activity

A study evaluating the effect of anti-inflammatory drugs like indomethacin, ibuprofen, naproxen and the root extract of *Boerhavia diffusa* on endometrial histology of IUD-fitted menstruating monkeys has testified its effect in reducing stromal edema, inflammation, and tortuosity of glands, and in increasing the degree of deposition of fibrin and platelets in the vessel lumen.[5]

Anti-diabetic activity

Chloroform extract of *B. diffusa* leaf produces dose dependent reduction in blood glucose in

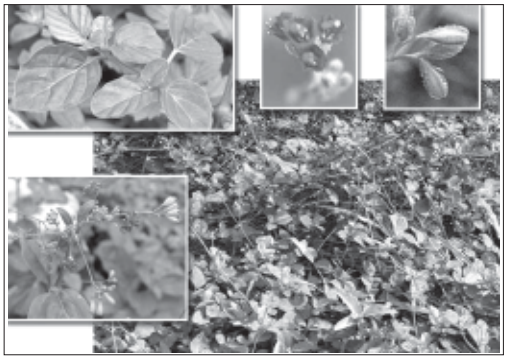

Fig. I - *Boerhavia diffusa*

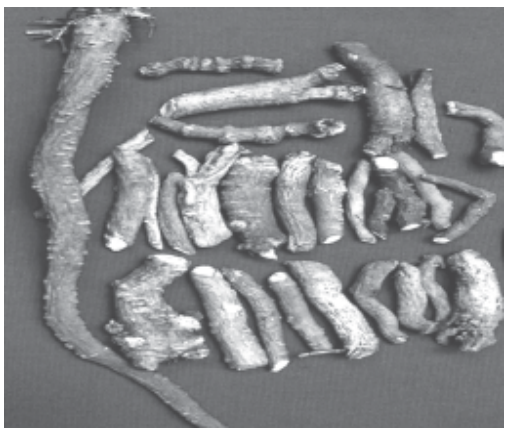

Fig. II - *Boerhavia diffusa* - root

streptozotocin-induced NIDDM rats comparable to that of glibenelamide. The results of the study has indicated a reduction in blood glucose produced by the extract, which may be through rejuvenation of pancreatic beta-cells or through extra pancreatic action.[6]

Anti-fertility

Oral administration of aqueous extract of *B. diffusa* leaves for sixty days to male Wistar rats decreases the sperm count, progressive sperm motility, sperm live-dead ratio and caused degeneration of the germinal epithelia of the testes.[7]

Anti-lymphoproliferative activity

Its ethanolic extract inhibits T cell mitogen phytohemagglutinin and concanavalin A-stimulated proliferation of human Peripheral Blood Mononuclear Cells (PBMC). It also inhibits purified protein derivative antigen-stimulated PBMC proliferation and human mixed lymphocyte culture. In addition, *B. diffusa* extract inhibits the growth of several cell lines of mouse and human origin, such as mouse macrophage cells (RAW 264.7) human macrophage cells (U937), human monocytic cells (THP-I), mouse fibroblast cells (L.929), human embryonic kidney cells (HEK293), mouse liver cells (BNLCL.2), African green monkey kidney cells (COS-I), mouse lymphoma cells (EL-4), human erythroleukemic cells (K562) and human T cells (Jurkat).[8]

Anti-metastatic activity

It has reported that prophylactic administration of the methanolic extract (0.5 mg dose^{-1}) inhibits the metastases formation by about 95% as compared to untreated control animals. There was 87% of inhibition in the lung metastases formation in syngeneic C57BL/6 mice, when the extract was administered simultaneously with tumour challenge.[9]

Anti-microbial activity

The methanol extract of *Boerhavia diffusa* leaves has significant *in vitro* antimicrobial activity. A study reports that in *Boerhavia diffusa*, maximum inhibition observed in *Staphylococcus aureus* followed by *Bacillus megaterium* and *Bacilus cereus*, respectively at 50 ìL concentration.[10]

The alcoholic extract of the root shows antimicrobial activity against *Staphylococcus*

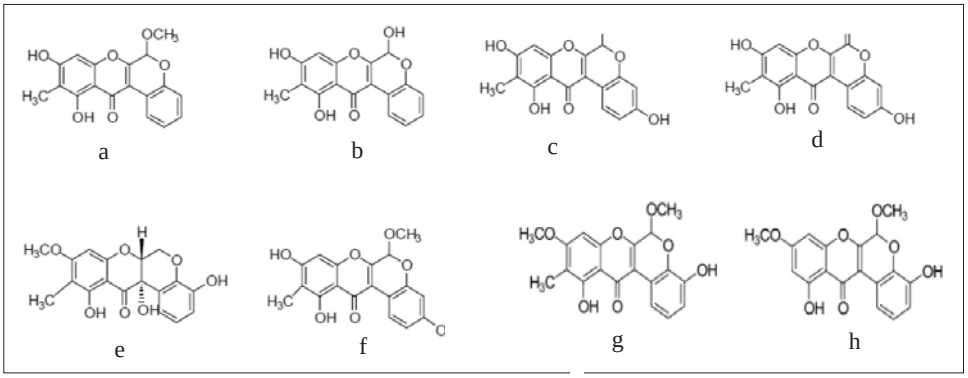

Fig. III Main rotenoids present in the root of *B. diffusa*
a Boeravinone A; **b** Boeravinone B; **c** Boeravinone C; **d** Boeravinone D; **e** Boeravinone E; **f** Boeravinone F; **g** Boeravinone G; **h** Boeravinone H;

aureus whereas aqueous extract is active against *Escherichia coli* and inactive against *Staphylococcus aureus*.[11] The phosphate buffer and ether extracts of shoot has antibiotic activity against *S. aureus* and is inactive against *E. coli*.[12] The seed exhibits antibacterial activity against *Bacillus subtilis, Pseudomonas cichorii* and *Salmonella typhimurium* but is inactive against *Escherichia coli*.[13]

Anti-oxidant activity

It has reported that the ethanol and methanol extracts, prepared and screened for *in-vitro* antioxidant activities using Ferric reducing power and Hydrogen peroxide scavenging methods and compared to standard antioxidant like ascorbic acid, show strong antioxidant activity in both the methods. Of these two extracts, ethanolic extract has better antioxidant activity compared to methanolic extract[14].

Anti-stress activity

Phytochemical constituents like flavonoids, alkaloids, glycosides and sterols have been reported to be present in the alcoholic root extracts of *Boerhavia diffusa*. The anti-stress activity of *Boerhavia diffusa* is mainly attributed to these constituents with established antioxidant activity.[15]

Chemopreventive action

In a study of cancer chemo preventive property of *B. diffusa* on 7,12-dimethyl Benz (a) anthracene (DMBA) induced skin papilloma-genesis in male swiss albino mice (6-7 weeks old), it has evaluated that the inhibition of tumorigenesis by the plant extract executed either by preventing the formation of active carcinogens from their precursors or by augmenting detoxification process, preventing promotional events in the mouse skin through free radical scavenging mechanism[16].

Diuretic action

The effect of extracts of red and white varieties of the plant on diuresis and renal enzymes has testified diuretic activity in toads. The red variety shows comparatively less activity. It inhibits the activity of kidney's succinic dihydrogenase and show stimulatory effect on in lower doses. The red variety produces less inhibition than that of white variety. It depresses kidney tissue slice respiration but has no effect on kidney phosphatase. It stimulates the activity of kidney d-amino acid oxidase. The activity is more in white variety.[17]

It has reported that the petroleum ether extract of the plant exhibits diuretic activity associated with increased sodium excretion in rats in a dose of 250 mg kg-1 orally, compared with polythiazide[18].

Growth inhibition of struvite crystals

An *in vitro* study carried out with the extract of *Boerhavia diffusa* using single diffusion gel growth technique has testified the effect of the herbal concentration in increasing the inhibition of crystals and the gel media as well as the dissolution of crystals at the gel-liquid interface. The de-fragmentation of some grown crystals has also reported. [19]

Hepatoprotective activity

The hydro alcoholic extract of the roots of *B. diffusa* (HEBD) exhibits significant protective action of liver evident by a reduction in elevated levels of serum lysosomal enzymes namely serum Glutamate Pyruvate Transaminase (SGPT), Serum Glutamate Oxaloacetate Transaminase (SGOT), Alkaline Phosphate (ALP) in both CCl_4 and rifampicin-isonizid induced hepatotoxicity, hence it has a dose dependent hepatoprotective activity[20].

It has been reported that the alcoholic extract of

the whole plant given orally exhibits hepatoprotective activity against experimentally induced carbon tetrachloride hepatotoxicity in rats and mice and that the extract produces an increase in normal bile flow in rats suggesting a strong choleretic activity. The extract does not show any signs of toxicity up to an oral dose of 2 g kg-1 in mice. [21]

A study conducted on the effect of 50% ethanolic extract of the roots of *B. diffusa* on Country Made Liquor (CML) induced hepatotoxicity in albino rats has revealed the drug (100 mg/100g body weight/day) protects the rats from hepatotoxic action of CML as evidenced by changes in serum alanine Aminotransferase (ALT), Triglycerides (TG), Cholesterol and total lipid levels in both serum and tissues. Histopathological studies show marked reduction in fat deposits in animals receiving *B. diffusa* extract along with CML.[22]

A study based on the effects of seasons, thickness of the root and the form of dose (either aqueous or powder) of the root on its hepatoprotective action in thioacetamide-induced liver toxicity in rats has reported that the aqueous extract (2 mL kg^{-1}) of roots of diameter 1-3 cm, collected in the month of May, exhibited marked protection of majority of serum parameters viz. SGOT, SGPT, SACP and SALP but not GLDH and bilirubin. The study also showed that administration of aqueous form of drug (2 mL kg^{-1}) had more hepatoprotective activity than the powder form probably due to the better absorption of the liquid form through the intestinal tract. [23]

Immuno suppressive activity

An *in vitro* study on *B. diffusa* hexane, chloroform and ethanol extracts and two pure compounds Bd-I (eupalitin-3-O-h-D-galactopyranoside) and Bd-II (eupalitin) evaluating the effect on T cell mitogen (phytohemagglutinin; PHA) stimulated proliferation of human Peripheral Blood Mononoclear Cell (PBMC), mixed lymphocyte culture, Lipopolysaccharide (LPS) stimulated nitric oxide production by RAW 264.7, PHA and LPS induced IL-2 and TNF-á production, in human PBMCs, superoxide production in neutrophils, human Natural Killer (NK) cell cytotoxicity and nuclear translocation of nuclear factor-k B and AP-1 in PHA stimulated PBMCS, reports the selective immunosuppressive activity of *B. diffusa* leaf. [24]

Immunomodulatory effect

The alkaloidal fraction from the roots of *Boerhavia diffusa* significantly inhibits SRBC-induced delayed hypersensitivity reactions in mice; it exhibits *in vivo* immunostimulatory activity without an *in vitro* effect. [25]

Insecticidal activity

The hexane and acetone extracts of twigs of the plant show insecticidal activity against *Culex p. fatigans* and *Musca domestica* nebulo. [26]

Radioprotective activity

A study on the effect of the plant in radiation-induced haemopoietic injury in albino mice, pretreatment (in the dose of 260 g kg-1 bw orally for 21 days) to mice exposed to total body irradiation (6 Gy) for 3 min has showed significant increase in Hb and total RBC count and after irradiation, there was no fall in RBC count and Hb unlike in controls. This indicates that the plant had selective effect on the erythroid compartment. [27]

Conclusion

Boerhavia diffusa is one of the important drugs prevalently using in āyurvedic system of medicine. Numerous studies have been

conducted on different parts of this plant and have testified their various activities like adaptogenic, analgesic, anti-inflammatory, anti-fibrinolytic, anti-diabetic, anti-fertility, etc., which corroborate its multidimensional efficacy to cure and prevent various ailments. This review underscores the qualities and various indications of punarnava described in the classical āyurvedic texts.

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STANDARDISATION OF KAIŚORAGUGGULU WITH SPECIAL REFERENCE TO ITS DISINTEGRATION

Neetu Singh[1], Sujeet Singh[2] and Anand Chaudhary[1]

Abstract: Guggulu is an exudate (niryāsa) obtained from the plant guggulu (*Commiphora wightii*). Preparations having the exudates as the main ingredient are known as guggulu. Owing to hardness of the drugs that containing guggulu, a study was designed to learn the effect of use of kuttanak processed (1000 time pounding) guggulu, use of disintegrating agent and combined effect of both in Kaiśoraguggulu tablet. It was observed that disintegrating agent play significant role in reducing the disintegration time of Kaiśoraguggulu compared to kuttanak processed guggulu and sodhita guggulu.

Introduction

Āyurvedic pharmaceutics deals with quality production of drugs which consists of primary formulations (pañcavidha kaṣāyakalpana) and secondary formulations (vaṭi, avaleha, sneha, sandhāna, etc.). Guggulukalpana is described under the heading of vaṭi kalpana in āyurvedic classics. Guggulu is an oleo gum resin of plant *Commiphora wightii*.[1] Guggulu is stated to be a healing agent both as single drug and in combination. Preparations having the exudates as main effective ingredient are known as guggulu.[2] It is used mainly for treatment of obesity and rheumatoid arthritis.

Vaṭi is a type of solid dosage form and considered as secondary kalpana, an outcome of kalkakalpana (paste). Śārṅgadhara has described this kalpana individually in a separate chapter due to its importance. Easy administration, better palatability as well as accuracy of dose make it a unique formulation.

Vaṭikalpana in modern pharmaceutics can be correlated with tablets. In addition to the active ingredient, tablets contain number of inert materials. The later are known as additives or excepients. These include diluents, adsorbent, binders, disintegrating agent, organoleptic additives, sweetening agent, colouring agent, lubricants, etc. These may vary from formulation to formulation according to the desirable property in a tablet.

Kaiśoraguggulu is a compound preparation consisting of guggulu as the main drug and triphalā (*Terminalia chebula, Phyllanthus emblica* and *Terminalia bellirica*), amṛta (*Tinospora cordifolia*), trayūṣaṇa (*Zingiber*

1. *Deptt. of Rasasastra, Faculty of Ayu., Inst. of Medical Sciences, Banaras Hindu University, Varanasi, 221005,*
2. *Emami India Limited, Baddhi , Himachal Pradesh*

officinale, *Piper nigrum* and *Piper longum*), viḍaṅga (*Embelia ribes*), danti (*Baliospermum montanum*) and tṛvṛt (*Merremia turpethum*) as accessory drugs. One shortcoming of the guggulu-containing formulation is its hardness and if not broken before internal administration it may pass through the GIT as such. So, it is a matter of concern to reduce the disintegration time of guggulu preparation. In ancient time, scholars were aware of this problem and suggested process of kuttanak (1000 time pounding). In the present work the effect of various pharmaceutical procedures like preparation of Kaiśoraguggulu following the method described by ācārya Śārṅgadhara, preparation by applying kuttanak (1000 time pounding) of guggulu, addition of disintegrating agent, combined effect of both kuttanak and disintegrating agent, are studied on the various analytical parameters of finally prepared Kaiśoragugguluvaṭi. These samples were further compared with three market samples.

A disintegrating agent is a substance added to tablet to facilitate its breakup materials serving as disintegrating have been classified chemically as starches, clays, cellulose, gums and cross linked polymers. The oldest and still most popular disintegrents are corn starch and potato starch. Starches have great affinity to the water and swells when moistened. Generally 5% starch is suggested, but if more rapid disintegration time is required, it may be increased to 10-15%.

Material and methods

Preparation of triphalā kvātha and śodhana (purification) of guggulu were done according to the method of AFI. The impure guggulu dissolved in triphalā kvātha was filtered by clean cotton cloth. The filtered liquid heated in madhyamāgni (medium fire) to get a semisolid mass and different samples of Kaiśoraguggulu tablet were prepared with the purified guggulu. The samples were prepared in four batches (each batch contained 3 samples viz. A, B & C) as follows:

- Batch-1: As referred to in Śārṅgadhara-samhita, Madhyamakhaṇḍa, 7/70-75[3]
- Batch-2: As per kuttanak process (1000 times pounding) of guggulu
- Batch-3: By adding disintegrating agent (starch and MCCP) to purified guggulu
- Batch 4: By adding disintegrating agent to purified and pounded guggulu.

Compressed tablets of all the samples were prepared in the tablet machine (16 rotary). The analytical parameters applied to study the properties of different samples of Kaiśoraguggulu tablet include weight variation test, hardness test, friability test, total ash and disintegration time. The samples were further compared with three market samples. The details of methods employed are as follows:[4]

Weight variation test

Twenty tablets were weighed randomly and the percentage of weight deviation noted as given in Indian Pharmacopoeia[5] and British Pharmacopoeia[6] (Table 1).

Hardness test

The hardness of tablet depends upon weight of the material used, space between upper and lower punches at the time of compression and

TABLE 1
Percentage weight deviation of tablet

Average weight	% of deviation
1. 80mg or less	10
2. 80mg - 250mg	7.5
3. 250mg or more	5

pressure applied during compression. The hardness also depends on the nature and quantity of excipients used during formulation.

A number of hardness testers are used for determining the tablet hardness but Monsanto and Pfizer hardness testers are commonly used. The tablet to be tested is held between a fixed and a moving jaw and reading of the indicator adjusted to zero. The force applied to the edge of the tablet is gradually increased by moving the screw knob forward until the tablet breaks. The reading is noted from scale which indicates the pressure required in kg or lb to break the tablet. Hardness of 4 kg is considered suitable for handling the tablets. Hardness of 6 kg or more will produce tablets of highly compact nature.

Friability test

Friability test is performed to evaluate the ability of the tablets to withstand abrasion in packing, handling and transporting. The instrument used is known as 'Friability Test Apparatus' or 'Friabilator'. It consists of a plastic chamber which is divided into two parts and revolves at a speed of 25 r.p.m. A number of tablets are weighed and placed in the tumbling chamber which is rotated for four minutes or for 100 revolutions. During each revolution, tablets fall from a distance of six inches to undergo shock. After 100 revolutions, the tablets are again weighed and loss in weight indicates the friability. The acceptable limits of weight loss should not be more than 0.8 percent.

Total ash

Accurately weighed 2-3 gm of sample was taken in a tarred silica dish and incinerated at a temperature not exceeding 450^0C until free from carbon. Then the sample was kept for self cooling and weighed and percentage of total ash was calculated with reference to air-dried sample.

Disintegration test

The disintegration test is performed to find out the time at which the tablet disintegrates. This test is very important and necessary because dissolution rate depends upon the time of disintegration which ultimately affects the rate of absorption of drugs. Generally the disintegration time for uncoated tablets is 30 minutes and for coated tablets one hour.

Observation and result

In the weight variation test, it was noted that all the three samples in four batches passed the I.P. Limit. The results of hardness test, friability test, etc. are presented in Table 2. The result of analytical parameters (discussed above) applied to the three market samples of Kaiśoraguggulu is shown in Table 3.

Discussion

Many contemporary researches have established several pharmacological actions of guggulu such as anti hyperlipidemic[7] (which has correlation with its medohara[8] property mentioned āyurvedic classics). Kaiśoraguggulu is one of the popular guggulu preparations

TABLE 3
Results of parameters applied to market samples

Parameters applied	Samples		
	M 1	M 2	M 3
Weight variation test	P*	P*	P*
Hardness test (kg/cm$^{2)}$	5.3	6.4	6.5
Friability test (% w/w)	0.02	0.05	0.03
Total ash (% w/w)	24.61	10.61	15.61
Disintegration time (minutes)	61	95	60

*Passed I.P. Limit

TABLE 2
Different tests of Kaisoraguggulu tablet

Description	Samples		
	A	B	C
1. Hardness test (Kg/cm^2)			
Batch- 1	3.3	4.15	3.85
Batch- 2	4.6	4.31	4.5
Batch- 3	4.6	4.5	3.3
Batch- 4	3.5	3.4	3.5
2. Friability test (% w/w)			
Batch- 1	0.17	0.18	0.17
Batch- 2	0.16	0.5	0.18
Batch- 3	0.28	0.27	0.39
Batch- 4	0.32	0.37	0.25
3. Total ash content (% w/w)			
Batch- 1	7.51	7.59	7.55
Batch- 2	5.4	5.03	4.3
Batch- 3	4.0	4.5	4.1
Batch- 4	2.34	4.63	4.03
4. Disintegration time (minutes)			
Batch- 1	75	76	75
Batch- 2	70	70	72
Batch- 3	53	52	52
Batch- 4	54	55	54

recognised as effective in leprosy, gout, tumour, diabetes and other such conditions.

The hardness of a tablet depends upon the pressure applied during the compression as well as excepients used during the preparation of tablet. Hardness play an important role in disintegration of tablet. All the four batches showed little variation in the hardness; may be that all the excepients used in four batches were similar except disintegrating agent. Friability test is performed to evaluate the ability of the tablets to withstand abrasion in packing, handling and transporting. The result of friability test indicates friability increases on addition of disintegrating agent.

The disintegration time found notably varied in all the four batches. The disintegration time was maximum in Batch I (tablet prepared according to Śārṅgadharasamhita) and reduced in the Batch II (guggulu processed with kutannak process); whereas in the Batch III, addition of disintegrating agent significantly reduced the disintegration time of 70 to 52 minutes on an average. This shows a very encouraging role of disintegrating agent in guggulu-containing preparation. There was insignificant difference in the batch IV where both kutannak processed guggulu and disintegrating agent were used. It can be inferred from that kutannak process does not play a major role in reducing the disintegration time of guggulu preparation and addition of disintegrating agent is necessary for better bioavailability of the drug.

The three market samples bought from the three different companies were also examined for the above parameters and it was observed that disintegration time of Sample M2 was 95 min and that of M1 and M3 was 61 and 60 minutes respectively. It seems that in sample M1 and M3 disintegrating agent have been added whereas in the sample M2 no disintegrating agent was added.

Conclusion

On the basis of observations of this research work, it is suggested that addition of disintegrating agent to the dosage form containing guggulu as major ingredient is appreciable.

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KĀSA WITH SPECIAL REFERENCE TO MAHĀVYĀDHIS - A REVIEW

Manivannan S[1] *et al**

Abstract: Āyurveda categorises certain group of disorders under the heading of mahāvyādhis or asādhyarogas in different contexts. Kāsa (cough), a common symptom in regular clinical practice, has mentioned as one of the symptoms of yakṣma (phthisis) - one of the mahāvyādhis. In this context, an attempt is made to review kāsa as one of the symptom of yakṣma (phthisis) along with correlation of its various symptoms in different conditions.

Introduction

Bṛhattrayi describes a certain group of disorders under the name of mahāvyādhis or aṣṭamahāgadam. The diseases mentioned by the different scholars under mahāvyādhis may vary depending upon their importance to respective diseases. Carakasamhita describes vātavyādhi, apasmāra, kuṣṭha, śopha, udara, gulma, madhumeha and rājayakṣma as mahāvyādhis (Indriyasthānam).[1] It says that patients afflicted with the above diseases and lost natural stamina or emaciated should not be treated.

In contrast to the above order, Suśruta has stated arśas, bhaghandra, aśmari and mūḍhgarbha in places of apasmāra, śopha, gulma, and rājayakṣma[2]. Vāgbhaṭa follows Caraka's order. The term 'mahā' denotes complexity of treatment associated with a lot of complications. The treatment protocol starts from selection of the patient and it has advised to reject the patient based upon the symptoms (ariṣṭalakṣṇas).

The root word 'kās' implies 'to move' or 'to afflict'. The vitiated udānavāyu, which is expelled through the mouth, is termed as kāsa (cough). Kāsa is mentioned under the ekādaśa (eleven) symptoms of rājayakṣma.[3] It is also enumerated under the Nidānārthakararogas.[5] Nidānārthakararogas can be explained as diseases or symptoms which lead to another disease like in case of jvara leads to raktapitta, jvara and raktapitta leads to rājayakṣma, common cold leads to kāsa, kāsa leads to rājayakṣma, etc.[4] Rājayakṣma is named as it is considered as the king of diseases and also from a mythological origin that Lord Chandra suffered with the above disease.

Mahāvyādhis

Suśruta has included vātavyādhi (paralysis of

*Aravamudhan, T.N.[1], Thirunarayanan, R.[2], Koti Rukmini Bai[3] and Gopinath, V.[3]
1. *Raja's College, Tiruvaiyaru, Tamil Nadu;* 2. *St. Joseph College, Trichy, Tamilnadu, India;* 3. *CARISM, SASTRA University. Thanjavur, Tamilnadu.*

diseases effecting the nervous system in general), prameha (morbid diseases of urinary system), kuṣṭha (skin diseases including leprosy), arśas (piles) bhagandara (fistula-in-ano), aśmari (calculus in the bladder), mūḍha-garbha (false presentation and its eight kinds) under mahāgadam (incurable diseases). While screening the clinical presentation and signs and symptoms of these diseases, their prognosis and treatment can be seen associated with the complications. The nomenclature of aṣṭamahāgadam differs depending upon the importance given to their respective branches viz. Kāyacikista and Śalya by Caraka and Suśruta respectively. The title Aṣṭamahāgadam can be seen justifiable while observing the clinical manifestations and their complications associated with treatment.

Nidāna (causative factor)

Factors which were enumerated as causes of dyspnoea and hiccup are to be understood as causes of cough[6]. Assault by smoke and dust, excessive physical exercise, consumption of dry foods, particle of food moving in wrong paths (into the trachea) and suppression of sneezing are the general causes.

Samprāpti (pathogenesis)

Vāyu that gets obstructed in the lower region moves upwards and affects the channels of circulation in the upper part of the body and takes over the function of udānavāyu (i.e. the function of the respiration) and gets lodged in the throat and the chest. This vāyu enters and fills up all the channels (cavities) of the head to cause bending and stretching of the body, jaws, sides of the neck (sterno mastoid muscle) and the eyes; and having caused contraction and stiffness of the eyes, back, chest, and sides of the chest, it (vāyu) induces coughing (kāsanat), which may be dry or with phlegm, because of which it is called kāsa.[7]

Classification

Kasa is described of five types viz. vātaja, pittaja, kaphaja, kṣata, (injury to lungs) and kṣaya (loss or decrease of tissues).[8]

Pūrvarūpa (prodromal symptoms)

Irritation of throat, hindrance in swallowing, coating of throat and palate, slight disorder in voice, loss of taste and weakness of digestive fire are the pūrvarūpa of kāsa.[9]

Rūpa (clinical features)

Vātajakāsa: - Pain in the region of the heart, temples, head, abdomen and flanks; emaciation of the face; decrease of strength, voice and valour; and dry cough (depending on the quantity of kapha accumulated inside) accompanied with broken voice are the feature of vātajakāsa.[10]

Pittajakāsa:- Burning sensation in the chest, fever, dryness of the mouth, bitter taste in the mouth, thirst, vomiting of yellow and pungent materials and cough accompanied with burning-sensation in the throat are the features of pittajakāsa.[11]

Kaphajakāsa:- Mouth coated with kapha and expulsion of kapha from the mouth, headache, body full of kapha, aversion to food, feeling of heaviness of the body, debility, cough followed by expulsion of thick kapha are features of kaphajakāsa.[12]

Kṣatajakāsa:- Severe chest (lung) injury due to excessive physical activities such as heavy weight lifting, prolonged walking, studying (in loud pitch) and other assaults cause a person to cough constantly bringing out sputum mixed with blood.[13]

Kṣayajakāsa:- Cough associated with pain in the body, fever, burning sensation, delusion, decrease of respiration, emaciation, debilitation, muscular weakness; and cough with expulsion of sputum mixed with blood and pus; breaking pain in the joints, fever, asthma, thirst, and loss of voice are the symptoms which make the kṣataja type of the diseases and the patient moans like a pigeon.[14]

Treatment

Depending upon the doṣa dominance, particular treatment is planned as per śāstra.[15] Immediate attention and treatment has to be given for kṣatajakāsa as it may lead to complications if not treated early.

A famous verse of Yogaratnākara explains the efficacy of vāśa (*Adathoda vasica*) in kāsa[16]. Lavaṅgādi vaṭi is another important drug indicated in kāsa. Agastyaharītaki, Bhṛṅgarājāsava, Tālīsādi cūrṇam, Sitopalādi cūrṇam, Sītāmśurasa, Kaṇṭakārighṛta, Rāsnādi ghṛta, etc. are common formulations prescribed in the management of kāsa.

Discussion

Cough is one of the most important respiratory symptoms. It occurs due to irritation of the mucus membrane anywhere in the respiratory tract. It indicates infection of air ways or lung parenchyma (pneumonia, bronchitis and viral infections), inflammation (asthma) or irritation (tumors), enlarged lymph nodes, inhaled foreign body or toxic fever of the mucosa. Cough exhibits a long inspiratory whoop known as whooping-cough. It loses its explosive character with recurrent laryngeal nerve paralysis and is referred to as bovine cough, which can be correlated with complications of vātavyādhis.

The clinical presentations of mahāvyādhis are associated with so many complications that are difficult to treat and take long time to get relief. When one of the systems of the body gets infected, it automatically brings down the immune mechanism of the body which can be correlated with nidanarthakara roga described by Charaka.

Cough is presented as one of the symptoms of kaphajagulma, which can be interpreted with so many conditions from soft tissue tumours to malignant ones located in the abdomen, in which cough is one of the clinical symptoms. Sometimes, if the patient has suffered from some prolonged illness in which cough was a prominent feature, then cough may persists even long after the cure of the ailment. Psychogenic cough may be a form of obsessional neurosis and can co-ordinate to some extent with kasa associated with unmāda.

Conclusion

Kāsa is a common problem in the general clinical practice and may lead to dreadful diseases like tuberculosis. Human body has its own defense mechanism to protect itself from various foreign substances. Kāsa is a reflux mechanism of the body to defend any foreign matter when tries to enter into the respiratory tract hence the physician has to consider various aspects while diagnosing the clinical condition. A chronic cough, which is not responding to the normal course of treatment, makes the physician to think about the causes especially associated with lung pathology.

The pathogenesis of kāsa due to vitiation of the udānavāta can be correlated with the reflex mechanism of the body said above. Worm infestation also is a prime factor to be considered especially in children who are suffering with

chronic cough. A recurring chronic gastro esophageal reflex is a main cause of chronic cough.

References:

1. *Chrakasamhita*, Indriyasthana, 9/8
2. *Susrutasamhita*, Sutrasthana, 33/3
3. *Charakasamhita*, Nidanasthana, 6/14
4. Ibid 8/16
5. Ibid 8/19
6. *Chrakasamhita*, Chikitsasthanam, 18/12; Su. Uttara. 52/2-4
7. Ibid 18/6-8;
8. Ibid 18/ 4; Ibid 52/5
9. Ibid 18/5; Ibid 52/6
10. Ibid18/12; Ibid 52/7
11. Ibid18/14; Ibid 52/8
12. Ibid 18/7; Ibid 52/9
13. Ibid 18/21-23; Ibid 52/10
14. Ibid 18/24; Ibid 52/11-14
15. Ibid 18/32-34
16. वाशायां विद्यमानायामाशायां जीवितस्य च।
रक्तपित्ती क्षयी कासी किमर्थमवसीदति।। (योगरत्नाकर)

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MEDICINAL PROPERTIES OF GOMŪTRA (COW'S URINE) AND ITS APPLICATION IN ĀYURVEDA

Paresh A. Katariya, Santosh N. Belavadi and P. Sivaramvudu*

Abstract: References to gomūtra can be traced from the Vedic period. Its medicinal properties have been empirically testified by āyurvedic scholars from the very early period. Bhāvaprakāśa mentions that gomūtra is the best among the aṣṭamūtras. It has a different chemical composition. It has a good germicidal power and is indicated in germ-generated diseases. It is one of the main ingredients in many āyurvedic formulations.

Introduction

In āyurveda, gomūtra is considered as a medicine as single or in compound. Its references can be seen dated back to the Vedic period. Bṛhattrayi, laghutrayi and most of the Nighaṇṭus describe the medicinal values of gomūtra. Bhāvamiśra mentions that wherever mūtra (urine) is mentioned without naming a particular animal, then gomūtra has to be used. Gomūtra is also regarded as a spiritual dravya and its importance and physical/psychological effects are mentioned in the texts like Skandapurāṇa, Viṣṇupurāṇa and Mahābhārata. Gojala, goambu, godrava, surabhījala and gonisyanda are its synonyms.

Properties

Gomūtra is madhura, kaṭu, tikta and kaṣāya in rasa; tīkṣṇa, uṣṇa and laghu in guṇa; uṣṇa in vīrya; and kaṭu in vipāka. Its anu-rasa is lavaṇa and kapha-vātahara is its doṣaghnata. Lekhana, laghu, pācaka, agnidīpaka, bhedaka, medhya and pittakāraka are its karma.

Chemical constituents

1. Urea: - Maintain blood reaction constantly. It increases the exertion in fever, diabetes and excessive adrenocortical activity.
2. Uric acid: - Acts as diuretic. It increases in gout, leukemia, pneumonia
3. Hippuric acid: - Acts as a detoxification agent. Detoxification power of liver is assessed on the basis of presence of hippuric acid is in the urine.
4. Ammonia: - Formation of urea and ammonia salts. It decreases in severe nephritis and increase in cystitis.
5. Neutral sulphur: - Acts as a detoxicating agent. It takes part in tissue oxidation and helps in blood clotting. It increases in metabolic disorders.
6. Urochrome: - It is a sulphur containing yellow pigment, being the chief colouring

* *D.G.M. Ayurvedic Medical College, Gadag - 582 103*

matter in urine. It increases in all conditions where tissue damage occurs.

7. Urobilin: - This is a urine pigment. Its increase indicates functional deficiency of liver.
8. Inorganic salts: - Malnourishment due to lack of salt causes death than food. Iodine is essential in thyroid hormone synthesis.
9. Creatine and Creatinine: - Creatinine is the product of the breakdown of creatine. An increased level of creatine causes metabolic disorders. It increases in pregnancy and decreases in hypothyroidism.
10. Amino acids: - Synthesis of cell protoplasm and melanin. It is useful for repairing the wear and tear. It is required for the hormones of thyroid, adrenal medulla and insulin.

The factors affecting the urine composition are: i.) recent fluid intake, ii.) general health, iii.) blood pressure, iv.) emotional states and v) diet. All these factors may affect the urine composition; hence it is said that the time preferable for collection of gomātra is early morning. It has to be purified by distillation procedures to make it free from harmful matters.

Important qualities

Gomūtra has amazing germicidal power to kill varieties of germs; hence it is indicated in germ-generated diseases. There are some micronutrients in our body, which give us life-strength. These micronutrients are flushed out through urine. Therefore, gradually ageing steps in our body. Gomūtra has all elements which compensate the deficiency of nutrients in our body, which are required for a healthy life. Thus cow's urine stops ageing process, so it is called as elixir.

TABLE 1

Some formulations (śamanayoga) where gomūtra is the prime ingrident

Formulation	Indication	Reference
1. Pañcagavya ghṛta	Kāmala, apasmāra and jvara	CH (Chi. 10)
2. Mahāpañcagavyaghṛta	Apasmāra, unmāda, śotha, gulma, arśa, pāṇḍu, kāmala, udara and halīmaka	CH (Chi. 10)
3. Sidhārthakaghṛta	Unmāda, apasmāra and jvara	CH (Chi. 9)
4. Citrakaghṛta	Udara	
5. Nāgadanyādi ghṛta	Sarpaviṣa, kīṭaviṣa and garaviṣa	CH (Chi. 23)
6. Gomūtraharītaki	Pāṇḍu and kāmala.	CH (Chi. 16)
7. Dārvīghṛta	Pāṇḍu and kāmala.	CH (Chi. 16)
8. Krimighnādi varti (suppository)	Udāvarta	CH (Chi. 26)
9. Punarnavāmaṇḍūra	Pāṇḍu, kuṣṭha and kāmala.	CH (Chi.16)
10. Maṇḍūravaṭaka	Pāṇḍu, plīha, grahaṇi and arśa	CH (Chi. 16)
11. Hiṅgvādyaghṛta	Unmāda.	AH (U. 5)
12. Sañjīvanīvaṭi	Arocaka, sarpadamṣṭra, viṣūcika and sannipātaja jvara	SS (M. 7)
13. Caṇḍabhairavarasa	Apasmāra.	BR (25)
14. Rohītakādi yoga	Kāmala, gulma, prameha, arśa, udara and krimi	CH (Chi 13)
15. Nārācaghṛta	Udara, āmavāta, plīha, gulma, bhagandhara, gṛdhrasi	BR (40)

CH - Carakasamhita (Cikitsāsthānam); AH - Aṣṭāṅgahṛdayam (Uttarasthānam); SS - Śārṅgadharasamhita (Madhyamakhaṇḍa); BR - Bhaiṣajyaratnāvali

TABLE 2

Some procedures (śodhanayoga) where gomūtra is the prime ingrident

Procedure	Medicine	Indication	Reference
1. Abhyaṅga	1. Gomūtra+madira+ kṣāra medicated ghṛta	Kaphaja vātarakta	CH. Chi. 29/146
	2. Gomūtra+ghṛta+dugdha	Yakṣagraha	AH. U. 5/35
	3. Katabhyādi oil	Apasmāra	CH. Chi. 10/33
2. Parisecana	1. Gomūtra+ksārodaka+jala+trikaṭu kalka medicated oil	Vātarakta	CH. Chi. 29/147
	2. Gomūtra+kulatha+śuṇṭhi kvātha	Kaphaja śotha	CH. Chi. 12/70
	3. Gomūtra alone	Udara roga	CH. Chi. 13/110
	4. Uṣaṇa gomūtra alone	Granthi visarpa	CH. Chi. 21/122
	5. Gomūtra bath	Apasmāra	CH. Chi. 10/32-39
3. Ubatana	1. Tuḷasi+kuṣṭha+harītaki+ jaṭamānsi+Corapuṣpi+gomūtra	Apasmāra	CH. Chi.10/39
	2. Gomūtra and bhasma of cow hair	Apasmāra	CH. Chi. 10/40
4. Svedana	1. Sukhoṣṇa gomūtra	Arśa	CH. Chi. 14/47
	2. Daśamūla and gomūtra		CH. Su. 14/33
5. Virecana	1. Gomūtra medicated milk	Pittodara kaphanubandha	CH. Chi. 13/70
	2. Gomūtra and tīkṣṇa kṣāra	Jalodara	CH. Chi. 13/93-94
	3. Gomūtra and godugdha	Pāṇḍu and kāmala	CH. Chi. 16/56
	4. Gomūtra and harītaki cūrṇa	Stanya doṣa	CH. Chi. 30/255
	5. Gomūtra, triphala, trikaṭu	Kapha and kaphapradhāna doṣa	SS. U 4/18-19 BP. Pu.
	6. Gomūtra as virecana dravya	Virecana sādhya vyādhi	CH. Su. 1/96
6. Nirūhabasti	1. Eraṇḍamulādi nirāha basti	Kapha vātaja vikāra	CH. Si. 3/38
	2. Catuhprasūtaka nirūha basti	Malavibandha, ānāha	CH. Si. 8/12
	3 Pakvāśaya śodhaka niruha basti	Pakvāśayaśodhana	CH. Si. 10/27
	4. Punarnavā nirūha basti	Sadātura rogi	CH. Si. 11/32
	5. Vaitaraṇa basti	Āmavāta	CD. Niruha/30
	6. Gomūtra basti	Kaphajaroga, pāṇḍu, viṣūcika, śukrodāvarta, vātodāvarta, vibandha, ādhman	A.K. 4/34-36
7. Uttarabasti	1. Kaṭurasa kvātha+ gomūtra	Kaphaja yonīroga	CH. Chi. 30/85
8. Nasya	1. Laśunādya ghṛta	Āgantuja unmāda, apasmāra, viṣamajvara	CH. Chi. 9/49-51
	2. Bhārṅgyādi taila	Kaphaja pratiśaya	CH. Chi. 26/154
	3. Kapila gomūtra	Apasmāra	CH. Chi. 10/47
	4. Śigru, karañja, trikaṭu, gomūtra	Krimija śiro roga	CH. Chi. 26/186
9. Lepa	1. Devadārvādi lepa	Udara roga	CH. Chi. 13/108
	2. Sarṣapa and gomūtra	Ūrustambha	CH. Chi. 23/53
10. Kavaḷagraha	1. Gomūtra	Mukhapāka	CH. Chi. 26/204
11. Picu	1. Guḍūcyādi tailam	Vātaja yonīroga	CH Chi. 30/60

CH. Chi./Su./Si. - Carakasamhita, Cikitsāsthānam/Sūtrasthānam/Siddisthānam; AH.U - Aṣṭāṅgahṛdayam, Uttarasthānam); SS - Śārṅgadharasamhita,Uttarasthānam; BP.Pu. - Bhāvaprakāśam, Pūrvakhaṇḍam; CD - Cakradattam; A.K. -

It contains many minerals especially copper, gold and salts and thus compensates mineral deficiency in body. Presence of gold salts protects body against diseases. Electric currents (electro waves), which are present in the environment, keep our body healthy. These waves in the form of extremely small currents enter our body through the copper present in our body. Gomūtra is the natural source of copper and its intake helps one to maintain the copper presence in the body.

Gomūtra in āyurveda

References to the medicinal formulations, where gomūtra is the chief ingredient, are abundant in our āyurvedic classics. It is indicated as prakṣepakadravya also. There are important yogas in which gomūtra is used; this can be classified into: i) sāmanayoga and ii) śodhana-yoga (Table 1&2). Crakasamhita mentions gomūtra as anupāna (adjuvant) in various formulations and diseases. For example, i) Paṭolamūlādi cūrṇa along with gomūtra is indicated in udararoga (Cikitsāsthānam 13/123), ii) Hapuṣādi cūrṇa along with gomūtra in śveta-kuṣṭha, pāṇḍu and kāmala (Cikitsāsthānam 13/134) and iii) Maṇḍūrabhasma along with gomūtra in pāṇḍu (Cikitsāsthānam 16/72).

Conclusion

All the above explanations corroborate the medicinal value of gomūtra. It is an economically affordable and easily available dravya to everyone hence its benefits have to be explored widely.

References:

1. *Carakasamhita*
2. *Susrutasamhita*
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6. *Sarngadharasamhita*
7. *Yogaratnakara*
8. *Rajanighantu*, *Kaiyyadevanighantu*, *Dhanvantarinighantu*.
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EXCERPTS FROM CIKITSĀMAÑJARI - LXV

P. Unnikrishnan*

Abstract: The chapter Mukharogacikitsa (treatment of face and mouth) continues. The causative factors of diseases of dantamūla (roots of teeth), jihva (tongue) and their various remedies including Gomūtraharītakī, Arimedastaila, etc. are discussed in this issue.

Diseases of dantamūla

The diseases of dantamūla (roots of teeth) are classified to thirteen viz. 1) śītada, 2) upakuśa, 3) dantapuppuṭa, 4) dantavidradhi, 5) suṣira, 6) mahāsuṣira, 7) adhimāmsaka, 8) vidarbha, 9) vātika pūyanāḍi, 10) paittika pūyanāḍi, 11) śḷaiṣmika pūyanāḍi, 12) raktaja pūyanādi and 13) sannipātika pūyanāḍi.

Śītada: - Deranged śḷeṣma and rakta cause degeneration of gums, resulting in bleeding (without any apparent cause) and foul smelling. Gums become soft, black and exudates secrete. This condition is called śitada.

Upakuśa: - Inflammation caused by deranged pitta and rakta, where gums become reddish and protruding with burning sensation and bleeding is called upakuśa. Itching and congestion is present in the absence of bleeding; teeth become loose; mild pain and foul smell are also present.

Dantapuppuṭa: - Here two or three teeth are affected. In this condition, hard and coffee-coloured edema, vitiated kapha and rakta are seen. Edema develops fast, producing characteristic features of inflammation.

Dantavidradhi: - In this disease, all doṣas and blood jointly damage the gums causing the inner and outer surface of gums. Gums may split and bleed. Formation of pus, pain and burning are also present.

Suṣira: - Here, rakta and pitta damage tooth sockets; pain, inflammation, exudation and formation of gap between gum and tooth are also present.

Mahāsuṣira: - In this, all symptoms of suṣira are present. Fever and pus is seen from the sockets; teeth may become detached.

Adhimāmsa:- A nail like projection at the root of tooth with inflammation and pain on the jaws and ear is termed as adhimāmsa. This is caused by vitiated śḷeṣma.

Vidarbha: - In this, when the gums are rubbed, severe pain is felt; teeth are movable in the sockets and may be caused secondary to injury.

Pūyanāḍi:- Even curable diseases of the gum doṣas, if left untreated or ignored, may cause

**"Sivam" Vaidyaratnam Road, Nayadippara, Kottakkal-676 503*

small pus-secreting sinuses. Frequent flow of pus invades skin, gums and even bones and result in cracking and severe pain. This condition is known as tubular abscess (pūyanāḍi) and is named variedly depending on the doṣa vitiated.

Śītada is treated by bloodletting[; after bloodletting, the gums are rubbed or frayed with the powder of the following mixed with honey:

Musta	*Cyperus rotundus*
Arjunatvak	*Terminalia cuneata* - bark
Triphala	*Terminalia chebula*
	Phyllanthus emblica
	Terminalia bellirica
Phalinī	*Callicarpa macrophylla*
Tārkṣya	Copper vitriol
Nāgara	*Zingiber officinale*

A kaṣāya prepared from the above used for filling the mouth is also effective. Abscess of the gum is relieved by gargling sesame oil medicated with milk, dry ginger and sesame seeds.

Sesame oil medicated with the expressed juices of jāti (*Jasminum grandiflorum*) mañjal (*Curcuma longa*), erikkizhaṅgu (*Zingiber officinale*), tozhukai (*Mimosa pudica*), carmantara (*Acacia sinuata*) and nimbaja (leaves of *Azadirachta indica*) as liquid component, and fine powders of the following as solid component, on gargling, relieves pain of the mouth and toothache. It also makes the teeth strong as diamond.

Koṭṭam	*Saussurea costus*
Amarcavaḷḷi	*Cayratia carnosa*
Trikaṭu	*Zingiber officinale*
	Piper longum
	Piper nigurm
Phalatraya	*Terminalia chebula*
	Phyllanthus emblica
	Terminalia bellirica
Ela	*Elettaria cardamomum*

Sesame oil medicated with the juice of karunocci (*Vitex negundo*) as liquid component and fine powders of kaṭutraya (*Zingiber officinale, Piper longum* and *Piper nigurm*) as solid component, on gargling, relieves tooth-ache.

Boil one hundred pala* of crushed bark of fresh arimeda (*Acacia leucophloea*) in one droṇa (12.288 ltr) of water and reduce to one fourth; add half āḍhaka (1.536 kg) of sesame oil and fine powders of the following into it and simmer the mixture to prepare a medicated oil. This oil, on gargling in the morning and evening, relieves movable or loosened teeth, foul smell of the mouth and tubular abscess of the gums. Abscesses (vidradhi), splitting of teeth (dantabheda) and suṣira are also relieved by this. This oil is said to be prescribed by the sage Videhapati.

Yaṣṭīmadhuka	*Glycyrrhiza glabra*
Mañjiṣṭha	*Rubia cordifolia*
Lodhra	*Symplocos cochin-chinensis*
Ela	*Elettaria cardamomum*
Musta	*Cyperus rotundus*
Gairika	Red ochre
Lākṣa	*Laccifer lacca*
Arimeda	*Acacia leucophloea*
Khadira	*Acacia catechu*
Vaca	*Acorus calamus*
Pattaṅga	*Caesalpinia sappan*
Katphala	*Myrica nagi*
Nāgara	*Zingiber officinale*
Nāgakusuma	*Mesua ferrea*
Dhātaki	*Woodfordia fruticosa*
Candanadvaya	*Santalum album*
	Pterocarpus santalinus
Śāriba	*Hemidesmus indicus*

*1 pala = 48g

Padmaka	*Prunus cerasoides*
Uśīra	*Vetiveria zizanioides*
Rajanīdvaya	*Curcuma longa*
	Berberis aristata
Joṅgaka	*Aquilaria malaccensis*
Lavaṅga	*Syzygium aromaticum*
Jāti	*Myristica fragrans* (nut meg)
Kaṭuka	*Picrorhiza kurrooa*
Takkolaphala	*Piper cubeba*

Gomūtraharītaki is prescribed for gargling for the relief of toothache, numbness and ulcers of the mouth.

Gomūtraharītaki

Mix one nāzhi (192 ml) of common salt in one nāzhi of cow's urine; permit to sediment and take the decanted solution. Put five or eight finely chopped kaṭukka (*Terminalia chebula*) in it and reduce the mixture in fire; when it becomes powder form, add iḷḷalakkari (kitchen soot) and trikaṭu powder, dry in sunlight and preserve in an earthen pot kept in kitchen smoke. A small quantity of this powder, on rubbing on the gums relieves inflammatory and degenerative lesions of the gums.

Sesame seed powder preparation detailed earlier is also indicated. Prepare a mixture with old kurumuḷaku (*Piper nigrum*) and varaṭṭumañjal powder (*Curcuma longa*) - one uri (96 ml) each - mixed with expressed leaf juice of kūvaḷam (*Aegle marmelos*) and cow's milk - two nāzhi (384 ml) each and reduce the mixture in fire to powder form. Tie this powder in a cloth bundle and put it in sesame oil. Squeeze the bundle to get oil and apply on the head. This relieves disease of the head caused by kapha. Triphalādi oil or Asanavilvādi oil also can be applied on the head depending upon the stage of the disease.

In tubular abscesses, cauterisation after extracting the tooth is advised. Uneven and multidirectional tubular abscess is to be filled with the powder of jaggery or macaṇa. A kaṣāya prepared from the following is prescribed for gaṇḍūṣa (gargling).

Jati	*Myristica fragrans* (nut meg)
Madana	*Catunaregum spinosa*
Khadira	*Acacia catechu*
Svādukaṇṭaka	*Flacourtia jangomas*
Kṣīrīvṛkṣa	The four Fig trees

Sesame oil medicated from the above can be used as nasal medication (nasya). Fumigation with the powder of above drug, bloodletting and nasal medication also can be done. Treatments indicated for tubular abscess are also effective.

Tuber of nilappana (*Curculigo orchioides*) and sesame seeds made to a paste on application on the cheek (adjacent to the lesion) relieves gum edema. Application of Triphalādi or Asanavilvādi medicated oil on the head and gargling twice daily with honey are advocated. Arimedastaila or Jātīmañjaḷādi taila (described earlier) can also be used for gargling.

Arimedastaila

Boil 100 pala of crushed fresh bark of arimeda (*Acacia leucophloea*) and barks of nyagrodha (*Ficus benghalensis*), udumbara (*Ficus racemosa*), aśvatha (*Ficus religiosa*) and pḷakṣa (*Ficus microcarpa*) - each 25 palas - in four droṇa (49.152 ltr) of water and reduce to one fourth; add one āḍhaka (3.073 kg) of sesame oil as lipid component and fine powders of the following - each one karṣa (12 gm)- as solid component.

01. Yaṣṭi	*Glycyrrhiza glabra*
02. Trijāta	*Elettaria cardamomum*
	Cinnamomum verum
	Cinnamomum tamala

03.	Mañjiṣṭha	*Rubia cordifolia*
04.	Gāyatrī	*Acacia catechu*
05.	Lodhra	*Symplocos cochin-chinensis*
06.	Katphala	*Myrica nagi*
07.	Kṣīrīvṛkṣa	The four Fig trees
08.	Arimedatvak	*Acacia leucophloea* - bark
09.	Musta	*Cyperus rotundus*
10.	Agaru	*Aquilaria malaccensis*
11.	Himadvaya	*Santalum album*
		Pterocarpus santalinus
12.	Karpūra	*Cinnamomum camphora*
13.	Jāti	*Myristica fragrans*
14.	Takkola	*Piper cubeba*
15.	Māmsī	*Nardostachys grandiflora*
16.	Dhātaki	*Woodfordia fruticosa*
17.	Gairika	Red ochre
18.	Mṛṇāḷa	*Nelumbo nucifera*
19.	Misi	*Anethum graveolens*
20.	Vaidehī	*Piper longum*
21.	Padmakesara	*Nelumbo nucifera*
22.	Kuṅkuma	*Crocus sativus*
23.	Lākṣa	*Laccifer lacca*
24.	Samaṅga	*Mimosa pudica*
25.	Bṛhati	*Solanum violaceum*
26.	Vilvamadhya	*Aegle marmelos* (fruit pulp)
27.	Suradruma	*Cedrus deodara*
28.	Śaileya	*Parmelia perlata*
29.	Saraḷa	*Pinus roxburghii*
30.	Spṛkka	*Schizachyrum exile*
31.	Palāśa	*Butea monosperma*
32.	Rajanīdvaya	*Curcuma longa*
		Berberis aristata
33.	Priyaṅgu	*Callicarpa macrophylla*
34.	Tejanī	*Zanthoxylum rhetsa*
35.	Pārtha	*Terminalia cuneata*
36.	Madayantī	*Lawsonia inermis*
37.	Phalatraya	*Terminalia chebula*
		Phyllanthus emblica
		Terminalia bellirica
38.	Kāleya	*Santalum album* (sub.)
39.	Puṣkarajata	*Inula racemosa*
40.	Vyāghrī	*Solanum virginianum*
41.	Madana	*Catunaregum spinosa*

When the above medicated oil is in wax state (cikkaṇa), filter the sediment and consume; it can be used for nasya, vasti and abhyaṅga to relieve the diseases of the face; it heals the ulcers of the mouth.

Medicated sesame oil with the expressed juice from the leaves of nirguṇḍi (*Vitex negundo*) as liquid component and fine powders of the following as solid component, relieves diseases of the mouth, including ulcers.

Nālpāl	The four Fig trees
Kārveppu	*Murraya koenigii*
Lanta	*Ziziphus jujuba*
Paṭavala	*Trichosanthes cucumerina*
Amṛtu	*Tinospora cordifolia*
Ñjāval	*Syzygium cumini*
Pāccoṫṫi	*Symplocos cochin-chinensis*
Dūrva	*Cynodon dactylon*
Muttaṅga	*Cyperus rotundus*
Tātirippu	*Woodfordia fruticosa*
Kaṅa	*Piper longum*
Vṛṣa	*Justicia beddomei*
Karavīra	*Nerium oleander*
Paraccuṇṭa	*Mimosa pudica*
Koṭṭam	*Saussurea costus*
Jāti	*Myristica fragrans*
Brahmadru	*Cedrus deodara*
Dārvi	*Berberis aristata*
Rajani	*Curcuma longa*
Phalavatī	*Callicarpa macrophylla*
Vājīgandha	*Withania somnifera*

Alternatively, the liquid component in the above preparation can be changed to the juice of leaves of karunocci (*Vitex negundo*) and piccaka (*Jasminum grandiflorum*). A kaṣāya prepared with the components 1 to 4 and kariveppu

(*Murraya koenigii*) is also effective. Fine powder of the items 5 to 24 can be used as solid component. Gargling with the above oil relieves diseases of the mouth.

Jihvarogacikitsa

The diseases of the tongue (jihvaroga) are classified into six viz. 1) vātikajihvakaṇṭaka, 2) paittikajihvakaṇṭaka, 3) śḷaṣmikajihvakaṇṭaka, 4) jihvālasa, 5) adhijihva and 6) upajihva.

Rough surface of tongue, like the leaf of śāka (*Tectona grandis*) with cracking and numbness is termed as vātadūṣita. Reddish tongue with red taste buds spread in association with local burning sensation denotes vitiation by pitta. Thick inflexible and dense tongue surface presenting thorns as on the surface of śānmālī (*Bombax ceiba* - bark surface with pointed thorn-like projections) is seen in vitiation by kapha.

Jihvālasa is a thickened condition of the tongue, caused by deranged kapha and pitta where the lower surface is edematous, upper surface smooth like that of the fish, fowl smelling and inflexible. In advanced stages, it may damage the muscular tissue also.

A projection on the lower surface of tongue resembling red chilly is known as adhijihva, caused by deranged kapha, pitta and rakta. Here, rough surface, pain, numbness, salivation, itching, difficulty in speech and deglutition are seen.

Projection similar to the above on the upper surface of tongue is known as upajihva. Jihvākaṇṭaka is a condition where surface of tongue presents thorn-like elevations as in oṣṭhakopa (disease of the lip), caused by vitiated vāta.

Diseases of the tongue caused by vitiated pitta are to be treated by fraying and bloodletting. Thereafter, rubbing (pratisāraṇa), filling of mouth (gaṇḍūṣa) and nasal medication (nasya) are to be done with drugs that have sweet taste (madhura rasa).

When kapha is deranged, the above treatment is done with drugs such as tryūṣaṇa (*Zingiber officinale, Piper longum* and *Piper nigurm*), sarṣapa (*Brassica juncea*), etc. that are having pungent (tīkṣṇa) property.

Jihvālasa of recent onset also is to be treated on the above lines and no surgical instrument should touch the tongue. Adhijihvika should be elevated and pulled with hook (baḷiśa). It should be excised with curved knife (maṇḍalāgra) and the residual region is to be rubbed with drugs that have pungent property (tīkṣṇa) and hot potency (uṣṇa). Upajihva is to be frayed and rubbed with yavakṣāra (*Hordeum vulgare*).

Jihvākaṇṭaka is relieved by filling the mouth with a kaṣāya prepared from the following:

Triphala	*Terminalia chebula*
	Phyllanthus emblica
	Terminalia bellirica
Khadirasāra	*Acacia catechu*
Arimeda	*Acacia leucophloea*
Punarnava	*Boerhavia diffusa*

Water, boiled and medicated with the following, on filling the mouth relieves diseases of the tongue.

Arimedadvayam	*Acacia leucophloea*
	Acacia nilotica ssp. *indica*
Dārvī	*Berberis aristata*
Yavāni	*Trachyspermum ammi*

Medicated sesame oil prepared from the kaṣāya of the following as liquid component, and fine

powder of drugs detailed in the sweet group (madhuragaṇa) as solid component, can also be used for filling the mouth, gargling and nasya.

Musta	*Cyperus rotundus*
Arjunatvak	*Terminalia cuneata*
Triphala	*Terminalia chebula*
	Phyllanthus emblica
	Terminalia bellirica
Phalinī	*Callicarpa macrophylla*
Tārkṣya	Copper vitriol
Nāgara	*Zingiber officinale*

A kaṣāya prepared from the following, mixed with cow's urine, used for gargling relieves jihvā-kaṇṭaka.

Punarnava	*Boerhavia diffusa*
Abhaya	*Terminalia chebula*
Śuṇṭhī	*Zingiber officinale*
Marica	*Piper nigrum*

Kaṣāya prepared from the drugs detailed below, used for gargling also relieves diseases of the tongue.

Karañjadvayam	*Pongamia pinnata*
	Holoptelea integrifolia
Nirguṇḍī	*Vitex negundo*
Surasī	*Ocimum sanctum*
Devadāru	*Cedrus deodara*
Tripippali	*Piper longum*
	Scindapsus officinalis
	Piper longum (wild var)
Musta	*Cyperus rotundus*
Ela	*Elettaria cardamomum*

Nirguṇḍyadi tailam (explained elsewhere) can be used for filling the mouth (gaṇḍūṣa). Sesame oil medicated with moru (sour buttermilk) as liquid component, and the paste prepared from īzhaccempu (*Alocasia macrorrhiza*) as solid component, on application on the head relieves diseases of the tongue. Triphalādi and Asanavilvādi medicated oils are also usful depending upon the stage. Application of Kāḷakacūrṇa (Aṣṭāṅgahṛdayam, Mukharoga-pratiṣedham) on the tongue is effective. Gomūtraharītaki is also good. Arimedastailam can be used for gargling. Bud-like growths of the tongue is relieved by application of a paste made by ashes of hair (of head) mixed with mañjal (*Curcuma longa*) and honey; the paste is to be prepared in a white bronze vessel and pounded by a copper spatula.

A paste prepared by ash of hair of human head, bees wax and honey in an earthen vessel using a copper metal spatula, on application, relieves upajihvika and other bud-like abnormal growths on the tongue gradually fade off as if evil individuals become friends.

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