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Contents

An integrated Approach to Combat Cancer (neoplasm): in Perspective of Ayurveda

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Abstract

This fact is broadly validated that Ayurveda cures chronic diseases such as cancer, multiple sclerosis, asthma and hepatitis etc for which the modern i. e. allopathic system of medicine has no permanent cure. However there are less scientific studies were carried out to know the science behind the success of Ayurvedic treatment i.e. pharmacokinetics and pharmacodynamics of Ayurveda drugs. It is reported that death rate with cancer is on the rise, by 6% every year in a country even in United State of America where best medical care is available to treat cancer patients. This becomes a necessity that world scientific community should consider for a strategy for 'drug development programme' so that safe and cheap medicines could be made available for treatment of cancer and other chronic diseases. An integrated approach is needed to manage cancer using the growing body of knowledge gained through scientific developments. Thousands of herbal and traditional compounds are being screened worldwide to validate their use as anti-cancerous drugs. The science of Ayurveda is supposed to add a step on to the curative aspects of cancers that have resemblance.

Keywords

Cancer, Integrated approach, Ayurveda

Introduction

Charaka[1] and Sushruta[2] samhitas, two ancient Ayurvedic texts, describe cancer as inflammatory or non-inflammatory swelling and mention them as either Granthi (minor neoplasm) or Arbuda (major neoplasm). Ayurveda explains that a malignant abnormal growth, or Tridosaja neoplasm, is one in which all the three major bodily control systems, which should have mutual coordination for normal functioning of the body, are out of control. These control systems are defined by Ayurveda as: the nervous system (Vata), the venous system (Pitta), and the arterial system (Kapha). In this stage of cancer, abnormal growths of any part of the body by nature can be harmful, because the three major bodily systems have lost mutual coordination, and cannot prevent damage to tissues. The total breakdown of the coordination of these three bodily systems means a deadly morbid condition. A benign abnormal growth means that one or two of the three major bodily systems are out of control. In this condition, the abnormal growth in any part of the body cannot be very harmful (in its beginning stages), because there is still coordination among the systems, which to some extent controls damage. A cyst like bluish abnormal growth with neuralgic pain is the main symptom indicating the presence of a Vataja neoplasm. A reddish or yellowish vascular growth with inflammation and burning pain characterizes the Pittaja neoplasm. A stone like hard abnormal growth with a little pain and itching is descriptive of a Kaphaja neoplasm. The Sannipataja or Tridosaja neoplasm manifests all the characters of Vataja, Pittaja and Kaphaja neoplasm. In the same way, a neoplasm with the name Vata Pittaja, Vata-Kaphaja, or Pitta-Kaphaja will have a mixture of symptoms[2].

Ayurvedic classification of cancer (neoplasm) depends on various clinical symptoms in relation to Tridoshas.

Group I

Diseases that can be named as clear malignancy, which includes arbuda and

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granthi, e.g. mamsarbuda (melanoma) and raktarbuda (leukaemia), mukharbuda (oral cancer), etc.

Group II

Diseases that can be considered as cancer, such as incurable ulcers with e.g. tridosaja gulmas (abdominal tumours like carcinomas of the stomach and liver or lymphomas). Group III: Diseases with the possibility of malignancy, e.g. Visarpa (erysipelas), asadhya kamala (incurable jaundice) and nadi vrana (sinusitis) [3,4]. Maharshi Sushruta has proposed six stages in the pathogenesis of all diseases but his concept suits more to the pathology of the tumour than pathogenesis itself.

1. Sanchaya: early stages of localized neoplastic changes.
2. Prakopa: transformation of primary growths into metastatic tumours.
3. Prasara: metastasis.
4. Sthana samsraya: complete metastasis and secondary growth.
5. Vyakti: clinical signs and symptoms are expressed.
6. Bheda: the stage where differentiation of growth occurs on the basis of histopathology[5].

During the 7th century BC, Atreya and Dhanwantari used herbal medicines for treating the early stages of cancer and surgery in advanced cases. In the 8th century AD, Vagbhata, a Buddhist physician composed two texts: Astanga Hrdaya[6] and Astanga sangraha[7] where new methods for cancer treatment were introduced. Other Ayurvedic texts of internal medicine, viz., Chakradatta[8] composed by Chakrapani (10th century AD), the Sarangadhara Samhita[9] by Sarangadhara (14th century AD), the Bhavaprakasha Samhita[10] by Bhavamisra (15th century AD), the Satmya Darpan Samhita by Viswanath (16th century AD), the Bhaisajya Ratnavali by Binoda Lala Sen Gupta (18th Century AD), the Rasatarangini by Sadananda Sharma (19th century AD), etc. explain numerous remedies to treat internal and external neoplasms.

Validity of claims to treat cancer by Ayurveda

The therapeutic approach of Ayurveda has been divided in to four categories as Prakritisthapani chikitsa (health maintenance), Roganashani chikitsa (disease cure), asayana chikitsa (restoration of normal function) and aishthiki chikitsa (spiritual approach) [11].

In a study arsenic compounds are effective agents in the treatment of APL and their activity against other types of cancer requires further investigation. Treatment of newly diagnosed and relapsed patients with acute promyelocytic leukemia (APL) with arsenic trioxide (As_2O_3) has been found to result in complete remission (CR) rates of 85-93% when given by intravenous infusion for 2-3 h at a dose of 10 mg/day diluted in 5% glucose saline solution[12].

Extract of Tinospora cordifolia has been shown to inhibit the lipid peroxidation and superoxide and hydroxyl radicals in vitro. Concentration needed for 50% inhibition was 6 mg and 12.5 mg/ml, respectively. The extract was also found to reduce the toxic side effects of cyclophosphamide administration (25 mg/kg b.wt, 10 days) in mice hematological system by the free radical formation as seen from total white blood cell count, bone marrow cellularity and alpha-esterase positive cells[13]. Exposure of HeLa cells to 0, 5, 10, 25, 50 and 100 microg/ml of guduchi extracts (methanol, aqueous and methylene chloride) resulted in a dose-dependent but significant increase in cell killing, when compared to non-drug-treated controls[14]. The metal based formulations have been found to be effective in the successful treatment of leukaemia. In 1996, Ministry of Health and Family Welfare again reviewed my results and a pilot project entitled 'Effect of metal based formulation in the treatment of 30 patients of Acute Promyelocytic Leukemia (APML)' was sanctioned by CCRAS under the supervision of Cancer Research Committee headed by Dr Dinesh Chandra, Professor and Head, Department of Pharmacology, Maulana Azad Medical College, Delhi. The other members of the committee were Haematologist and Oncologist from AIIMS and experts from ICMR and CCRAS[15]. Although there is no certain treatment for cancer in ayurveda, it can help in restoring the normal functioning of organs and enable the body to fight disease to a certain extent. It does not have specific medicines to kill

cancer cells, but works more as a supplemental therapy towards overall management of the disease. Some ayurvedic physicians claim having achieved positive results in treatment with heerak bhasma (a medicine prepared from diamonds) [16]. Tamra bhasma purifies the blood. It has the qualities of Swarna Bhasma. Tamra Bhasma (Cupric oxide) is Useful in leprosy, asthma, bronchitis, cough, consumption, anaemia, piles, liver trouble etc [17]. Involving 400 cancer patients, the Ayurvedic formulation containing herbal drugs bhallatak (Semecarpus anacardium), rohitak (Amoora rohitaka), madhuyasti (Glycyrrhiza glabra), and tamra bhasma was evaluated alone or in combination with other treatment modalities, chemotherapy, and radiotherapy. The patients were monitored for 10 years found effective[18]. In 400 BC, Ayurvedic surgeon Sushruta described various cancers (arbud) and their surgical and holistic therapy in his textbook of surgery. In addition to surgical treatment, Ayurvedic physicians observed and documented the effects of various natural therapies, spiritual practices, yoga, meditation and herbal and mineral preparations on cancer. [19-21.] Various medicinal plants and Herbomineral preparations described in Ayurveda like Amla(Emblica officinalis), Giloy (Tinospora cordifolia), Kutki (Picrirhiza kurroa), Bahera(Terminalia chebula), Haldi(Curcuma longa), Khair(Acacia catechu), Nimb(Azadirachta indica), Bhuiamla (Phyllanthus urinaria), Sadampushpa(Lochnera rosea), pomegranate(Punica granatum Linn), Ashwagandha(Withania somnifera), Heerak Bhasma, Kanchanar Guggul etc. found effective in various types of cancer[22-63].

Discussion

CAM (Complementary and alternative medicine) is a growing field in health care and particularly among breast and other cancer patients. Knowledge of CAM by physicians, especially oncologists, is necessary. Oncologists should be willing to discuss the role of CAM with their patients and encourage patients to participate in well-organized research about CAM[64]. Herbo-metallic therapy, according to Ayurvedic texts which are thousands of years old, is based on the premise that human body tissues contain different metals in various degrees. Any imbalance in the content of these metals, caused by natural or self-inflicted methods such as substance abuse, disturbs the body and triggers ailments. The patients can be treated with metal-based drugs that replace the balance. Metal therapy rests on the belief that all ailments can be treated with metal-based drugs if they are diagnosed correctly and in time. All metals including gold, silver, mercury, arsenic, iron, and copper, lead, tin and zinc and their alloys and some wastes are used to make the drugs. Metals (ionized form which can be absorbed by the human body) have a very important role to play in the prevention and cure of cancer. Dr R M Anand, an assistant director at state-run Central Council for Research in Ayurveda and Siddha (CCRAS), told Reuters. He said metals are first purified in herbal decoctions, oxidized, subjected to heat and crushed several hundred times till they are converted into a non-metallic, non-toxic form that can be absorbed by the body. The drugs are either in the form of tablets or powders [65]. Traditional knowledge will serve as a powerful search engine and most importantly, will greatly facilitate intentional, focused and safe natural products research to rediscover the drug discovery process. Benefits in health care and improvement of quality of life.Natural harmaceuticals (Naturaceuticals), nutraceuticals and cosmeceuticals are of great importance as a reservoir of chemical diversity aimed at new drug discovery and are explored for antimicrobial, cardiovascular, immunosuppressive and anticancer drugs. US FDA has granted approvals to many biotechnology-based products, including Novartis: Gleevec – for treatment of CML; Genezyme: Carticel – cartilage regeneration; Immunex: Enbrel – for RA; Genentech: Herceptin – for Breast cancer; CDR Therap: Integrilin – for heart diseases; Organogenesis: Apligraft – a skin substitute. Over 300 drugs are in Phase III and over 200 are expected to be in the market by 2007[66-67]. An integrated approach is needed to manage cancer using the growing body of knowledge gained through scientific developments. Thousands of herbal and traditional compounds are being screened worldwide to validate their use as anti-cancerous drugs. The science of Ayurveda is supposed to add a step on to the curative aspects of cancers that have resemblance with clinical

entities of arbuda and granthi mentioned in Sushrutha samhita. Experimental and clinical studies conducted on single and compound ayurvedic preparations for their anticancer efficacy strongly emphasize ayurvedic therapy as a scientifically driven one and not simply unconventional[33].

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Evaluation of Medicinal plant-lore and Pharmacognosy of Cyperus kyllinga Endl. (Nirvisha): A Potential folk Medicine of India

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Abstract

Cyperus kyllinga Endl. syn. Kyllinga monocephala Rottb. is known as 'Nirbisi' in the different medicinal plant-lore of India. Its rhizome and roots are widely used as ethnomedicine among different tribal communities. Some scholars of Indian system of medicine reported that the plant may consider as 'Nirvisha' (antidote or anti poison) of old Sanskrit literature. The detailed studies on their macro and micro morphological characters, histo-chemical test, physico-chemical studies and fluorescence analysis are discussed here for the consideration and evaluation of the plant for proper utilization in Ayurveda system of medicine.

Key words

Pharmacognosy; Cyperus kyllinga; 'Nirvisha'; Cyperaceae; folk medicine

Introduction

Cyperus kyllinga Endl. (Cyperaceae) is an herb and used in different medicinal plant-lore of India. Dymock, et. al. (1890) considered this plant as 'Nirvisha' of old Sanskrit literature and described that the root is useful to relieve thirst in fevers, diabetes, prurites of the skin and promotes the action of liver. The medicinal properties and uses of this plant have been described by many others like Kirtikar & Basu (1935) mentioned its use as an antidote. The drug is given in tumours and icterus (Bodding, 1927; Jain & Tarafder, 1970; Asolkar, 1992)

The plant is considered as diuretic, stomachic, anthemintic and is given for fistula, pustules, tumours and stomach and intestinal complaints (Anonymous, 1959). The root decoction is refrigerant, demulcent and tonic. It is given in torper of the liver. It is alternative of mind and phelgam (Nadkarni, 1954; Khory and Katrak, 1984). Root is a refrigerant for fevers, poison and antidote (Jain, 1991). The rhizome of the plant is taken in tuberculosis, gland T.B. snakebite, uterus cancer and filarial (Hembrom, 1991)

Available literature (Iyenger, 1976; Mitra, 1985; Srivastava et. al, 1995) reveals that no pharmacognostical studies have been carried out on this plant hence, the present studies are undertaken.

Materials and Methods

The crude drug materials were collected from the natural sources of Santhal Pargana region of Jharkhand. The voucher specimen has been lodged.

For the study of micromorphological characters, free hand sections were used and staining techniques were followed as given by Johansen (1940). The representative diagrams were drawn with the help of Camera lucida. The Micro-chemical tests for histological zones were performed according to the methods given by Kay (1938), Johansen (1940), Trease & Evans (1972) and Wallis (1967), physico-chemical constant values of the powdered drug and extractive values for petroleum ether, Benzene, Chloroform, Methanol and Water were determined according to the method given by Peach & Tracy (1955). Preliminary and qualitative analysis for phytochemical investigations (Peach & Tracy, 1955; Harborne, 1973), Thin layer chromatography for knowing the relation to front (Rf) value. (Stahl, 1969), ash value (I.P. 1966), determination of inorganic constituents (Vogel, 1953) and Fluorescence studies (Chase and Pratt, 1949, Kokoski et al. 1958) were made.

Botanical Description

Glabrous and erect plant, stem slender up to 25-30 cm. tall, oftem 1-3 and upto 7 in linear succession, compressed, triquetrous, 1.1-1.6mm thick erect from a slender creeping rhizome.

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Leaves several, liner, acuminate, shorter than to as long as the stem, 1.5-3.4 mm broad, Inflorescence capitate, usually 3 but sometimes 4 bracts foliaceous, 5-18 cm long, subglobose spike, solitary, 5-9 mm broad, greenish white in flowers, brownish in fruit, obliquely lanceolate elliptic or ovate – elliptic, numerous spikelets, congested, 2.5-3.0x1mm, 1-2 flowered. Glumes Keeled, serrulated, mucronulate, 3-nerved on each side of the prominently winged, acuminate, 5-7 nerved, in upper half and keel lunately crested, Stamens – 3, anthers 0.5-0.9 mm long, entire crest or crestly ovate, styles bifid, Nut suborbicular or obovoid – oblong or obovate, much compressed, yellowish-brown or blackish brown.

Cyperus kyllinga Endl. Cat. Hort. Acad. Vindob. 1:94:1842; Kuekenth, loc. Cit. 606; kern in FI. Males Ioc cit 659. 1974; Srivastava, F.G. 339. 1976 Kyllinga monocephala Rottb. Descr. & Icon. 13, t. 4, fig. 4.1773; FBI 7:588; 1872-97; FUGP2: 397, 1903-1929. BBO 4: 907, 1925.

Distribution

Throughout India from sea level to 2100m. in field. Growing as weed in garden near moist solid canal, ponds, river, forest margins, wastelands wide spreads (Haines, 1925) in united provinces to Bengal.

Vernacular Names

Hindi	-	Nirbishi
Bengali	-	Nirbishi, Swetgothubi
Malyalam	-	Mottenga, Pimottenga
Marathi	-	Mustu
Telgu	-	Anuang

Macroscopic Characters

Rhizome-Aromatic, 1.1-2.6mm thick, 1-8 cm long, creeping, smooth, reddish brown in colour, brown imbricating scales, semisolid, bearing tufted root, shining in fresh condition.

Root- Reddish-brown or brownish-black in dry condition, up to 2-3 cm long, 0.5mm thick near the base of rhizome.

Microscopical Characters

Rhizome

The histological study of rhizome reveals that it is 2.0-2.5mm thick in diameter. The outline of T.S. (Fig. 1) is almost round encircled by single layer epidermis. Beneath the epidermis a broad cortex is present. It is usually made up of 10-12 layers of parenchymatous cells. At the inner side of cortex often a sinuous zone of cells (Fig.2) with thickened walls of U-shaped endermoid layer are present. Below the above layer a thin and small layer of cells or sheath are seen which is compacted with outer vascular bundle. The stele or apparent of vascular bundles lies within the cylinder bounded by the endodermoid layer. In this region many vascular bundles are seen. It tends to be at the centre of the rhizome. There is two layers of vascular bundles are present. In close with endodermoid and sheath layer there are 10-12 vascular bundles and towards the centre 6-8 vascular bundles are seen, vascular bundles is apparently amphivasal. In the centre pith cells are thick walled.

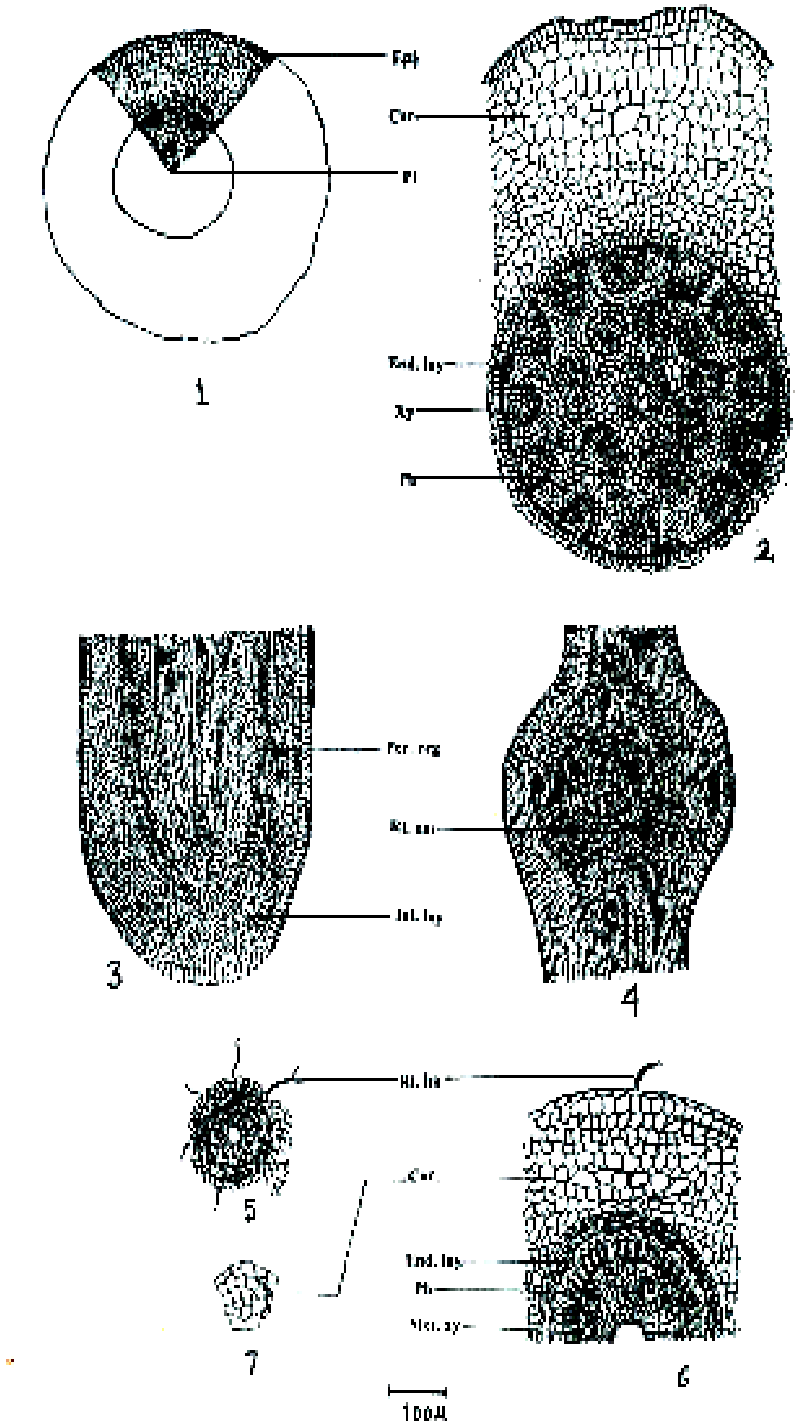
The L.S. (Fig. 3) of rhizome reveals that the apex is hemispherical. It shows an apical meristem. It is covered by two layered thickening. Below this layer there is an initial layer of meristem which is 2-3 layered cells. In the centre there are 8-10 layers of cells which are arranged in regular files. In the L.S. of a part of rhizome (Fig. 4) shows that in the centre there is a root emarginated. In the middle about 22.5 μ diameter of a root section are present where the cortex and endodermal layer are seen. In the central ground tissue there is 1 large metaxylem, 10-12 xylem vessels are obvious. Histological, the root structure are recognized with the layer of promeristem, 6-7 layers of peripheral zone and 4-5 layer of central zone.

Root

The diameter of root is almost 0.7-1.2mm. Transverse section (Fig. 5) shows that root hairs are represented by out growth from epidermal cell or thin walled epidermis. Below the epidermis the layer of polygonal cells are present. It is often cortex of parenchymatous zone. In the cortex air cavities are present which may due to break down of cortex cell usually from middle region. The air cavities may be schizo-lysigenous. It is oval shaped. The layer of endodermis is composed of tall rectangular cells (Fig. 6) with uniformly thickened walls. It is thick walled in older roots. The cells are radially elongated and it is like U-shaped. Below

the endodermis a dark pericyclic region is present. The central ground tissue of parenchymatous. There is 1 conspicuous central and large metaxylem which is composed of tracheal element and stand out from neighboring cells with large diameter. There is 10-12 small xylem elements are present. Phloem is small in between the xylem.

Powder: Fragments (Fig. 7) of cortex cell are observed in powder. It is 0.31 mm x 0.12 mm. in size.



Legends to figures

Fig.1 – T.S. of rhizome, Fig. 2 – T.S. of rhizome (apart cellular), Fig. 3 – L.S. of rhizome, Fig. 4- L.S. of rhizome (A view reveals a root emarginated in the centre), Fig. 5- T.S. of root, Fig. 6 – T.S. of root (A part cellular), Fig. 7 – Powder particles.

Abbreviations

Cor – cortex, End. lay- endodermal layer, Epi – epidermis, Ini. lay- initial layer, Met. xy – metaxylem, Peri. reg – peripheral region, Ph - phloem, Pi- pith, Rt. em – root emarginated, Rt. ha – root hair.

Mircometry

Table – 1: Measurement of different cells in microns (μ)

	Cells	Measurement in Micron (μ) (Length x Width)
Rhizome	Epidermis	9-11-13.5x11.5-14-18
	Cortex	13-32.5-49.4x18.2-34.6-45.1
	Endodermoid layer	6.9-14.2-18.4x9.1-13.6-18.5
	Xylem	6.7-7.5-9x4.5-8-9.5
	Phloem	9-11.5-13.5x4.5-6-7.5
	Pith	40-45x35-40
Root	Epidermis	9-12.6-13.5x4.5-5.2-6.75
	Cortex	18-24.6-27x9-15.4-22.5
	Endodermis	13.5-34.5-36x9-11.5-13.5
	Metaxylem	42.7x40.5
	Xylem	15.7-16.5-18x13.5-14.5-17
	Phloem	9-10.5-11.2x4.5-7.5-9

Microchemical test

Table – 2 Showing Microchemical test of histological zone by chemical reagent.

Reagent	**Test for**	**Histological zone**			
		Nature of colour change	**Rhizome**	**Nature of colour change**	**Root**
Iodine solution	Starch	Blue	Cortex endodermoid layer	Light blue	Ground tissue
Phloroglucinol + Conc. HCI + Alcohol	Lignin	Light violet	Cortex Sheath	Pink	Polygonal cell
Sudan III Solution	Oil globule	Light red	Cortex	Light red	Polygonal cell
Aqueous ferric chloride solution	Tannin	Blue	Endodermoid layer, pith		
Liberman – Burchard reagent	Terpene	Pink	Cortex	Pink	Cortex
Dragandorff's reagent	Alkaloid	Light orange	Endodermoid layer		

Physico – chemical study

Organoleptic test

Odour	-	Mild aromatic
Colour	-	Dark Brown
Taste	-	Astringent
Touch	-	Rough

Physical constant values

Ash values

Table – 3; Physical constant of powder drug.

	Percentage (%)
Total ash	16.72
Acid insoluble ash	9.5

Extractive values

Table – 4: Extractive values of different solvents, percentage of extractability and colour of extract.

Solvent used	Percentage of Extractibility	Colour of extract
Petroleum ether	3.8%	Brownish-yellow
Benzene	1.2%	Brownish-yellow
Chloroform	4.9%	Yellowish-brown
Methanol	7.2%	Yellowish-brown
Water	18.4%	Brown

Fluorescence analysis:

Table – 5: Fluorescence characters of the powder drug under Ultra Violet (UV) light.

Powder & reagent	Colour in ordinary light	Colour in UV Light
Powder as such	Reddish brown	Deep Brown
Powder + Nitrocellulose	Light black	Black
Powder + NaOH in Methanol	Blackish brown	Black
Powder + NaOH in Methanol + Nitrocellulose	Brown	Deep brown
Powder + 1N NaOH in water	Brownish yellow	Brown
Powder + 1N NaOH in water + Nirtocellulose	Light gray	Grey black
Powder + HCI	Light brown	Deep brown
Powder + HCI+Nitrocellulose	Brown	Purple
Powder + HNO_3 (1:1)	Orange brown	Orange red
Powder + H_2SO_4 (1:1)	Light brown	Reddish brown

Analysis of Inorganic constituents:

Table – 6: Inorganic constituents and their presence

Inorganic constituents	Result
Calcium	+
Iron	++
Potassium	+
Sodium	+
Corbonate	+
Sulphate	++

Preliminary phytochemical investigations:

Table – 7: Preliminary qualitative analysis of phytochemical constituents.

Extracts	Alkaloid	Steroid	Reducing Sugar	Glycoside	Phenolics	Amino acid
Petroleum ether	-	+	-	-	-	-
Benzene	-	+	-	-	-	-
Chloroform	-	+	-	-	+	-
Methanol	+	-	-	+	+	-
Water	-	-	-	+	+	+

Relation to Front value:

Table – 8: Relation to front (Rf) value of different extract of solvent.

Solvent	Rf value
Petroleum ether	0.12, 0.27, 0.41, 0.63
Benzene	0.13, 0.30, 0.57, 0.85
Chloroform	0.18, 0.33, 0.51, 0.78
Methanol	0.10, 0.32, 0.58, 0.75, 0.93

Discussion

Cyperus kylinga Endl. is used as 'Nirbisi' by different tribal communities in medicinal plant-lore of India. The same vernacular names for this plant were reported by Bodding (1927), Jain (1991) and Hembrom (1991). Dymock et. al. (1890) in his 'Pharmacographica Indica' mentioned that this plant may be 'Nirvisha' of old Sanskrit literature. It is also described by Nadkarni (1954) and Dutta (1922). The properties and uses of 'Nirvisha' have been described in Raj Nighantu (Piplaydi Varg., 218) as an anti kaph, anti vata, antidote and wound healer in the following sloka:

Nirvisha katuka soushna kaphvatstradoshnuta I
Anek vishdoshghani vran saropini ch sa II (Raj Nighantu, PV/218)

However at present the plant Delphinium denudatum is regarded as 'Nirvisha'. The aims and objectives of the studies of the above works are to highlight the plant as 'Nirvisha' to use in Ayurveda. Morphologically the crude drug or rhizome of Cyperus kyllinga Endl. can be identified by reddish brown colour and 1.1 – 2.6 mm. thickness. Microscopically inner sincuous zone of cells like endodermis endodermoid U-shaped layer and two layers of vascular bundles are present. The root is characterized by 1 conspicuous central and large metaxylem which is composed of tracheoid element as apparent in T.S. The maximum extractive value is 18.4% in water. The study may be

useful to enrich the Ayurvedic Pharmacopoea.

Acknowledgement

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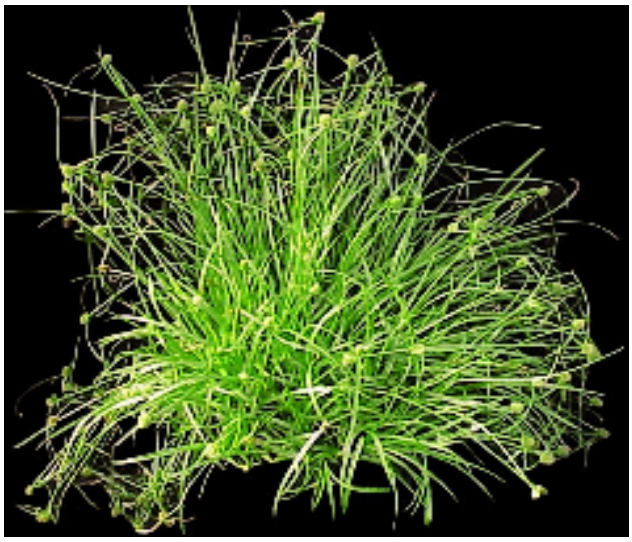

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Demographic Studies of Fart-e-Tadassum-Fid-Dam (Hyper-lipidaemia)

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Key words

Fart-e-Tadassum-fid-Dam, Hyperlipidaemia, Hypercholesterolaemia, Hyper-triglyceridaemia, Demographic studies

Abstract

Fart-e-Tadassum-fid-Dam (Hyper-lipidaemia) is not a single condition, but encompasses a wide range of disorders characterized by excess of fatty (lipid) substances in the blood due to metabolic derangement. The lipids include total serum cholesterol (TC), serum triglycerides (TG) and Lipoprotein (molecules of fat and cholesterol linked to protein). According to Harrison, raised fasting serum cholesterol and triglyceride levels from 4.5 mmol/dl (250 mg/dl) and according to Devidson's, raised levels of plasma cholesterol and triglyceride from 20 mmol/l is termed as Hyper-lipidaemia [1-2]

The increased level of one or more of these lipids i.e. Total cholesterol (TC), low density lipoprotein (LDL); serum cholesterol or triglyceride (TG) or both TC and TG and low level of high density lipoprotein (HDL) predispose cardiovascular ailment while raised serum level of HDL is inversely related and protect the heart against cardiovascular diseases.

The treatment of Hyper-lipidaemic state is to reduce the risk of atherosclerosis and cardiovascular disease through lowering blood lipid levels. It may be achieve by adopting certain measures: (i) by reducing the total fat intake, (ii) by eating a diet high in fruits and vegetables; (iii) by keeping alcohol consumption to no more than 1-2 standard drinks a day; (iv) by doing exercise 3 times a week for at 30 minutes at a time; (v) by stopping smoking and by managing stresses. Drug treatments applied, if diet, exercise and weight reduction have not adequately reduce the blood lipid levels. Commonly used lipid lowering agents in Allopathy are bile sequestrant resins (cholestyramine, colestipol), lovastatin, simvastatin, gemfibrozil and nicotinic acid. Unani system of Medicine also provides some herbo-animo-minerals that are in use as blood lipid level lowering/weight reducing agents since ancient times like Luk-e-Maghsool, Zeera Kirmani (Carum carvi), Karafs (Apium graveolens), Sandros, Limoon, Honey, Sirkah (Vinegar), Sikanjbeen (Venegar+ Honey), Dawaul Luk, and Safoof Mohazzil etc. The present deals with Age, Sex, Marital status, Religion, Occupation, Socio-economic status, Dietary habit, Exercise, Family history, Addiction, Temperament, and Obesity as demographic parameters.

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Introduction

Fart-e-Tadassum-fid-Dam (Hyper-lipidaemia) is not a single condition, but encompasses a wide range of disorders characterized by excess of fatty (lipid) substances in the blood due to metabolic derangement. The lipids include total serum cholesterol (TC), serum triglycerides(TG) and Lipoprotein (molecules of fat and cholesterol linked to protein).These lipoprotein are of five types: 1-Very Low Density Lipoprotein (VLDL), 2-Low Density Lipoprotein (LDL), 3-Intermediate Density Lipoprotein (IDL), 4-High Density Lipoprotein (HDL), 5-Chylomicrons (consist of triglyceride, cholesterol and protein)[1]. Scientifically raised level of chylomicrone and VLDL above the normal is known as Hyper-lipidaemia, raised level of serum triglyceride and serum cholesterol are known as Hyper-triglyceridaemia and Hyper-

cholesterolaemia respectively while the condition in which serum triglyceride and LDL level increases simultaneously above the normal level is called Combined Hyper-lipipdaemia. According to Harrison, raised fasting serum cholesterol and triglyceride levels from 4.5 mmol/dl (250 mg/dl) and according to Devidson's, raised levels of plasma cholesterol and triglyceride from 20 mmol/l is termed as Hyper-lipidaemia.[2]

The increased level of one or more of these lipids i.e. Total cholesterol (TC), low density lipoprotein (LDL); serum cholesterol or triglyceride (TG) or both TC and TG and low level of high density lipoprotein (HDL) predispose cardiovascular ailment while raised serum level of HDL is inversely related and protect the heart against cardiovascular diseases.

It is not a simple matter to define, what is a high, normal or low serum lipid level? because lipid levels in an individual vary from day to day and also varies with age, sex, ethnicity and country (e.g. average cholesterol levels in Japan are vary low compared with levels in the U.K i.e. two-third of people have a serum cholesterol level greater than 5.2 mmol/l. For men aged between 45 and 75 years, the median serum cholesterol is 6.2 mmol/l. For women aged 45-55 years, it is 6.1 mmol/l, and it is 6.8 mmol/l for women aged over 55 years [Durrington, 1995] but in respect of Indians, the normal level is regarded as 150-200 mg/dl due to their low socio-economic and nutritional status.

Clinically, it is of two types: Acquired hyper-lipidaemia and Familial hyper-lipidaemia. First is usually asymptomatic while second have a strong family history of early myocardial infarction, elevated and therapy resistant level of LDL in either or both parents, chest pain (angina) and may have xanthomas (Fleshed colored lesion caused by cholesterol deposit) or xanthelesmas (Cholesterol deposits on the eyelids) and obesity.[1,3-4]

The treatment of Hyper-lipidaemic state is to reduce the risk of atherosclerosis and cardiovascular disease through lowering blood lipid levels. It may be achieved by adopting certain measures: (i) by reducing the total fat intake to no more than 30% of total calories. 10% of saturated fats and no more than 300mg%(7.7 mmol) of dietary cholesterol a day; (ii) by eating a diet high in fruits and vegetables; (iii) by keeping alcohol consumption to no more than 1-2 standard drinks a day; (iv) by doing exercise 3 times a week for at 30 minutes at a time; (v) by stopping smoking and by managing stresses.[1-2]

Drug treatments applied, if diet, exercise and weight reduction have not adequately reduce the blood lipid levels. The type of drug used will depend on the type of lipoprotein elevated in the serum. Commonly used lipid lowering agents are bile sequestrant resins (cholestyramine, colestipol), lovastatin, simvastatin, gemfibrozil and nicotinic acid. Apart from the above, Unani system of Medicine also provides some herbo-animo-minerals that are in use as blood lipid level lowering/weight reducing agents since ancient times like Kawameekh, Luk-e-Maghsool, Zeera Kirmani (Carum carvi), Karafs (Apium graveolens), Sandros, Limoon, Zubdatul baher, Junteeyana Roomi, Sirkah (Vinegar), Sikanjbeen (Venegar+ Honey), Abkama, Dawaul Luk, and Safoof Mohazzil.[5-11]

Materials and Methods

The study was conducted on patients of Fart-e-Tadassum-fid-Dam (Hyper-lipidaeima) on demographic pattern in the Department of Moalejat, Ajmal Khan Tibbiya College, Aligarh Muslim University, Aligarh. Obese , Hypertensives, Atherosclerotics, patients having history of angina pectoris, palpitation, arthritis, dyspnoea, arcus cornea, xanhoma, xanthelesma and subjects having lipid level over 200mg/dl were selected for the study. Patients below 20 years of age, mentally ill, prisoners and suffering from other acute/chronic illness were excluded from the study. Parameters selected for the study were Age, Sex, Marital status, Religion, Occupation, Socio-economic status, Dietary habit, Exercise, Family history, Addiction, Temperament, and Obesity.[12-16]

Observations, Results and Discussion

Present study deals with 85 cases with reference to age. Among them 17 (20%) cases were in the age group of 21-30 years, 53 (62.35%) cases were in the age group of 31-40 years, 11 (12.95%) were in the age group of 41-

50 years and 4 (4.70%) cases were in the age group of 51-60 years [Table-1 & Fig-1]. As per the study, the highest incidence of Hyper-lipidaemia was observed in 31-40 years of age and lowest incidence of the disorder was found in 51-60 years of age. Because of non availability of data for prevalence of age in Hyper-lipidaemic patients, these observations are meaningful and it is suggested that a large size study shall be more meaningful.

According to sex, study sample size was 85 in which 27 (31.76%) patients were male and 58 (68.23%) patients were female [Table-1& Fig-2]. This study revealed that female is more prone to Hyper-lipidaemia as compared to their counterpart and it is because of female body constitution which contains more fat in the body than males. This observation correlates with the Harrison's statements.[1]

In context to marital status, the study sample size was 85, out of which 82 (96.47%) recorded cases were married and 3 (3.53%) cases were registered unmarried at A. K. Tibbiya College Hospital [Table-1 & Fig-3]. This data denote that married persons have high prevalence of the disorder probably because of luxury, gaiety life as compared to their counterparts on one hand and less number of unmarried patient attendance in the hospital on the other.[1]

According to religion, the study sample size was 85, out of it 67 (78.82%) cases belonged to Muslim community and 18 (21.18%) cases belonged to Hindu community [Table-1 & Fig-4]. Study revealed that Muslim community was found to be more affected and probably it was because of high intake of animal flesh which is a high risk factor to predispose Hyper-lipidaemia as mentioned by almost all medical men.[17-19]

In relation to occupation, the study sample size was 85, out of it 6 (7.08%) patients were students, 57 (67.00%) patients were house wives, 20 (23.54%) patients were employees and 2 (2.38%) patient was a daily worker [Table-1 & Fig-5]. This study also revealed that highest percentage of incidence was found in house wives and least in daily worker which suggests that sedentary workers or females have the tendency to develop Hyper-lipidaemia as compared to hard workers or males.[17-19]

In context to socio-economic status, the study sample size was 85, out of it 14 (14.11%) cases belonged to upper class status, 50 (58.89%) cases belonged to middle class status and 23 (27.00%) cases belonged to low socio-economic class of people [Table-1 & Fig-6]. This study does not corresponds with the statement of Ali bin Rabban Tabri (noted physician of his time) that Farhat (cheerfulness), Rahat & sarvat (comfort & delightfulness) and Ghina (dance, music and alcoholism) predisposes Saman-e-mufrat (obesity) or Ghilzat or Lazoojat wa Dasoomat-e-Dam[25] (Hyper-lipidaemia) which is the common feature of upper class people instead of middle/lower class. One cause of this finding may be attributed to high incidence of hyper-lipidaemia in middle class people because of their neglected attitude to words dietary habits specially balance diet.

According to physical activities, the study sample size was 85, out of it 62 (72.94%) patients have sedentary life style, 18 (21.17%) patients have moderate life style and 5 (5.88%) patients hard work [Table-1 & Fig-7]. The observed data seems to be directly proportional to the observations of Ali bin Rabban Tabri.[20]

Similarly out of 85 cases, 16 (18.82%) were vegetarian and rest of 69 (81.18%) cases were non-vegetarian [Table-1 & Fig-8]. These observations also confirm the findings of Ali bin Rabban Tabri and Harrison's that sedentary life and intake of saturated fatty diet leads to hyper-lipidaemia as the subjects body is unable to utilize it properly under these circumstances.[1,20]

In respect to personal habit and presence of family history of hyper-lipidaemia, out of 85 cases 32 (37.64%) cases were smoker and have positive family history while 53 (62.36%) cases were non-smoker and had no positive family history of hyper-lipidaemia respectively [Table-2 & Fig-9-10]. Even though smoking and positive family history are the risk factors for hyper-lipidaemia but present study revealed higher percentage of non-smokers and cases did not have positive history of hyper-lipidaemia, it is probably because of increase percentage of female cases i.e. (68.23%) and they were less cooperative for exploring family history in the study.

Regarding the use of oral contraceptives, out of 58 women, 35 (60.35%) had positive history

of use of oral contraceptives while 23 (39.65%) had negative history for the same [Table-2 & Fig-11]. Harrison had described that those females who use oral contraceptives are more prone to develop Hyper-lipidaemia/obesity. Our findings were also found to be in accordance with the same.

According to temperament, out of 85 cases, 70 (82.35%) cases were of Balghami (phlegmatic temperament), 11 (12.95%) cases were of Safravi (bilious temperament) and 4(4.70%) case was of Damvi (sanguineous temperament) [Table-2 & Fig-12]. Similarly, in another demographic event i.e. obese ness, 62 (72.94%) cases were obese and 23 (27.06%) cases were of normal built [Table-2 & Fig-13]. These observations showed that highest incidence was of Balghami temperament and obese cases and these findings are in accordance with the experiences of Ismail jurjani and Azam khan.[6,21]

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Table-1

Showing distribution of Age, Sex, Marital status, Religion, Occupation, Socio-economic status Physical Activities and Dietary habit distribution

	Number	Percentage		Number	Percentage
1. Age - n=85					
21-30 years	17	20.00	31-40 years	53	62.35
41-50 years	11	12.95	51-60 years	04	04.70
2. Sex - n=85					
Male	27	31.76	Female	58	68.23
3. Marital status - n=85					
Married	82	96.47	Unmarried	03	03.53
4. Religion - n=85					
Muslims	67	78.82	Hindus	18	21.18
5. Occupation - n=85					
Students	06	07.08	House wives	57	67.00
Employees	20	23.54	Daily workers	02	02.38
6 Socio-economic status - n=85					
Upper class	12	14.11	Middle class	50	58.89
Lower class	23	27.00	-	-	-
7. Physical Activities - n=85					
Sedentary worker	62	72.95	Moderate worker	18	21.17
Hard worker	05	05.88	-	-	-
8. Dietary habit - n=85					
Non-vegetarian	69	81.18	Vegetarian	16	18.82

Table-2

Showing distribution of Family history of hyper-lipidaemia, Addiction, Temperament and Obesity

	Number	Percentage		Number	Percentage
9. Family history of hyper-lipidaemia - n=85					
History Positive	32	37.64	History Negative	53	62.36
10. Addiction - n=85					
Smoker	32	37.64	Non smoker	53	62.36
11. H/o Oral contraceptive use - n=58					
History Positive	35	60.35	History negative	23	39.65
12. Temperament - n=85					
Phlegmatic	70	82.35	Bilious	11	12.95
Sanguinous	04	04.70	Melancholic	-	-
13. Obesity - n=85					
Obese	62	72.94	Normal built	23	27.06

Fig- 1

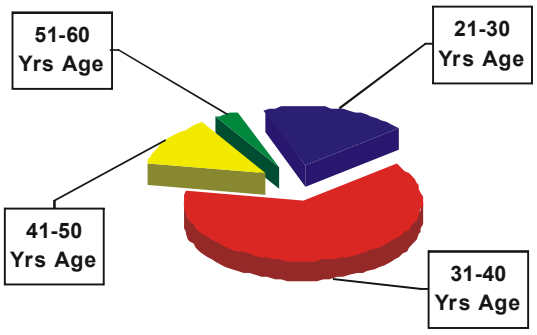


Fig- 2

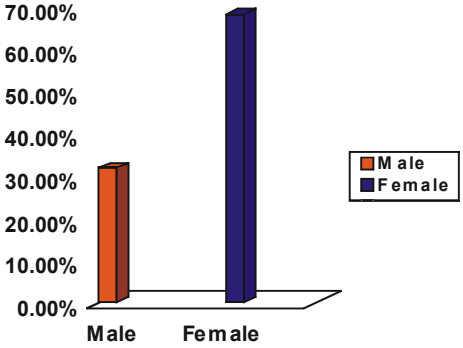
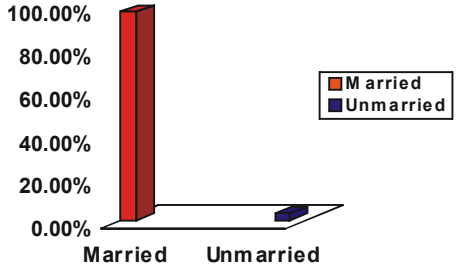


Fig- 3



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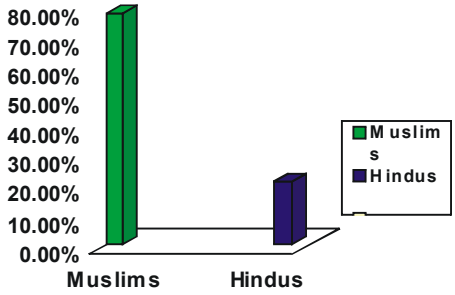


Fig- 5

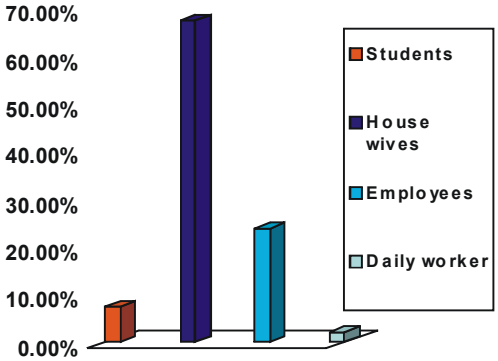


Fig- 6

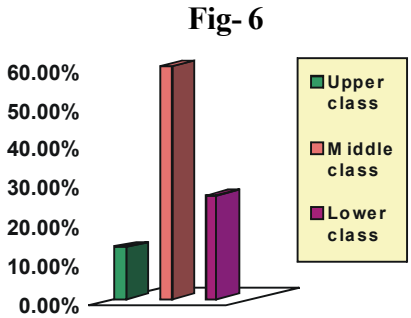


Fig- 7

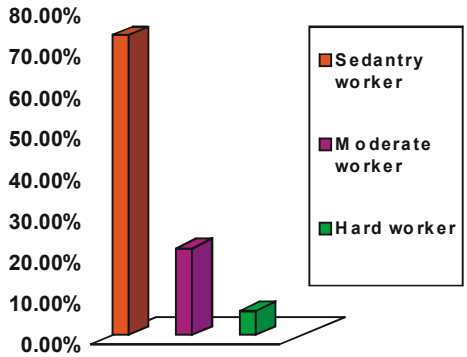


Fig- 8

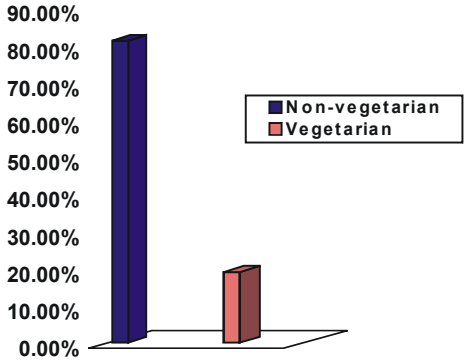


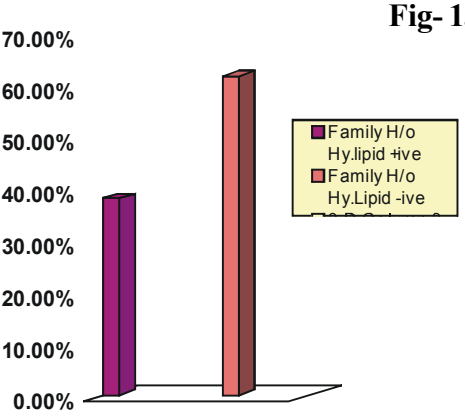
Fig- 9

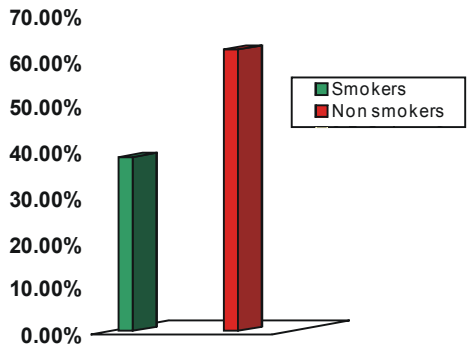
Fig- 10

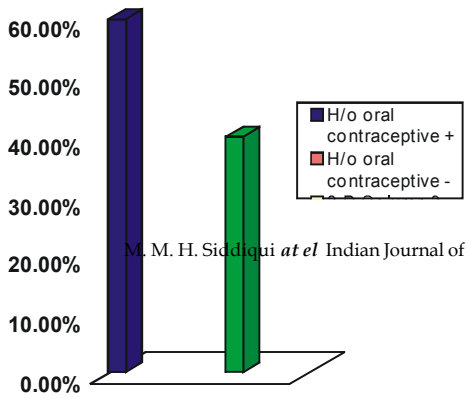
Fig- 11

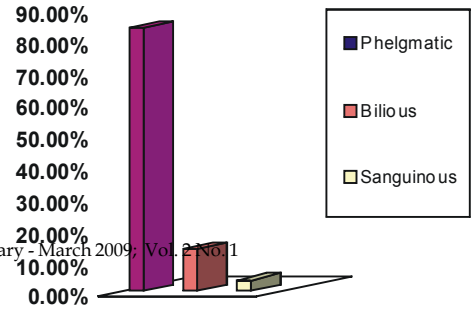
Fig- 12

Fig- 13









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Scientific Study of Curative Effects of Yogasana

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Yoga is the science of right living and, as such is intended to be incorporated in daily life. It works on all aspects of the person; the physical, vital, mental, emotional, psychic and spiritual .The science of Yoga begins to work on the outermost aspect of the personality, the physical body, which for most people is a practical and familiar starting point. When imbalance is experienced at this level, the organs muscles and nerves no longer function in harmony, rather they act in opposition to each other. For instance, the endocrine system might become irregular and efficiency of the nervous system decrease to such an extent that a disease will manifest. Yoga aims at bringing the different bodily functions into perfect co-ordination so that they work for the good of the whole body.

From the physical body, Yoga moves on to the mental and emotional levels. Many people suffer phobias and neuroses as a result of the stresses and interactions of everyday living. Yoga can not provide a cure for life but it does present a proven method for coping with it. In the last half of this century, Hatha yoga has become the most well known and widely practiced of the systems. However, the concept of what constitutes Yoga is broadening as more people take it up, and this knowledge is spreading, In the ancient texts, Hathayoga consists of the Satkarmas, cleansing practies, only. Today, however, Hathayoga commonly embraces the practics of Asana Pranayama, mudra, & Bandha as Well.

Today, as we prepare to enter the 22nd century, a spiritual heritage is being reclaimed of which yoga is very much a past, physical and mental therapy is one of Yoga's most important achievements. What makes it so powerful and effective is the fact that it works on the wholistic principals of harmony and unification. Yoga has succeeded as an alternative form of therapy in diseases such as asthama, diabeties, blood pressure, arthritis, digestive disorders and other ailments of a chronic and constitutional nature where modern science has not research into the effects of Yogic practices on HIV is currently under way with promising results. According to medical scientists, Yogatherapy is successful because of the balance created in to nervous and endocrines systems which directly influence all the other systems and organs of the bodies.

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The mind and body are not separate entities although there is a tendency to think and act as though they are. The gross form of the mind is the body and the subtle from of the body is the mind. The practice of Âsana integrates and harmonizes the two. Both the body and the mind harbor tensions or knots. Every mental knot has a corresponding physical muscular knot and vice versa.

The aim of *Âsana* is to release these knots. Âsanas release mental tensions by dealing with them on the physical levels acting somato-psychically, through the body to the mind. For example emotional tensions and suppression can tighten up and block the smooth functioning of the lungs, diaphragm and breathing process, contributing to a very depilating illness in the form of Asthama. Muscular knots can occur anywhere in the body tightness of neck as cervical sponylities the face as neuralgia, etc. As well chosen set of Asanas, combined with Pranayama, Satkarma, Meditation and Yoga nidra, is most effective in eliminating these knots, tackling them from both the mental and physical levels. The result is the release of dormant energy; The body becomes full of vitality and strength, the mind becomes light, creative, joyful and balanced.

Regular practice of *Asana* maintains the physical body in an optimum condition and

promotes health even in an unhealthy body. Through Asana practice, the dormant energy potential is released and experienced as increased confidence in all areas of life. Yoga practies promoting the general health of specific areas of the body and the preventation of common ailments.These practices should not be taken as a prescription for theraphy. Anyone who, is suffering from a disease or ailment must seek the guidance of a competent and knowledgeable Yoga therapist or medical doctor with whom they can discuss their symptomatology.But yogasana are equally benifical for keeping our body in sound health and free from disease.Yogasa have the capacity to cure many types of ailments.But on the whole they have more preventative than curative value.

Treatment of Abdominal disease

Pawanamutâsânâ, Trikonâsânââ, suputâvâjrâsana, ustrâsana, sasânikasana, matsyasana, yogamudrâsana, drutahalâsana, Ardhamatsyendrasana, halasana,& any backward or forward bending Asana etc.

Hansana, Mayûrasâna, Tolângulâsana, Brahmacaryâsana, Merudandâsanas, Nirâlamba, pashcimottânsânas, Agnisârakriyâ, Nauli, kunjali etc.

Bhastrika, kapalabhati, unniyanobandha, sankhapraksalana ete.

These above mentioned *Yogasanas* are useful for abdominal diseases

Treatment of Hyper acidity

Vajrasana for at least 10 minutes after every meal.

Nadishodhana, Bhramari, Agnisarakriya, kunjala etc. Other relaxation and cultivation of mental tranquility through Yoganidra and meditation.

These above described *Yogasanas* are useful for curing the Hyperacidity disesse.

Yogasanas are much useful for curing disease and patient should take light vegetarian meals also.

Treatment of Alzheimer Disease

Pawanamuktasana, Nadishodhana, Ujjayi, Bhramari, Neti, Trataka,

Yoganiddra, Ajapajapa, Antaramauna, etc.

These are above stated *yogasamas* are useful for removing the Alzhamers disease

Treatment of Angina pectoris

Pawana-muktasana, Hasta-utthanasana, Makarasana, Akarna-dhanursana and Savasan, Ujjayi, Nadishodhana, Bhramari, Yoga-mudra etc.

These above described *yogasansa* are much useful for curing disease and patients should take light vegetarian meals also.

Treatment of Arthritis

Pawanamuktasana, Nadshiodhana,deep abdominal breathing, Bhramari, Kapalabhati, Neti,Laghusankhapraksalana, kunjala,

yoganidra, Meditation etc.

These above mentioned *Yogasanas* are very useful for curing disease and patient should take light vegetables. Meals and avoid sour & artificial food also.

Treatment of Asthma

Ustrasana, Suryanamaskara, sarvangasana,

shashankasana, Marjariasana, sputa- Vajrasana, Matsyasana, Hastauttanasama, Dwikonasana, Padahastasana, Baddhapadmasana, Utthitatolasana, backward bending *Asanas, Savasana* with breath awareness, *Nadishodhana, kapala-bhati, Bhastrika*, deep abdominal breathing at all times, *vastraduauti, kunjal, jalaneti, sankhapraksalana, yoganidra, Ajapajapa, Antarmauna* and other meditation and relaxation techniques to remove the sourse of nervousness etc.

Avoid mucus producing food such as milk and milk products, rice and non-vegetarian foods. Eat fruit and vegetables in season and cooked, rather than raw vegetables (Salada)especially in winter.

Treatment of Adrenal glands

Suryanamaskara, Ustrasana, Dhanurasana, Salabhasana, Trikonasana, Shashankasana, Marjariasana, Cakrasana, Halasana, Pascimott-anasana, Padahastasana, Ardha- matsendrasana, Purnamatsenadrasana, Muyurasana, Hansasana, Bhashrika,pasini- mudra, uddiyanabandha, Agnisara-kriya, nauli, Merudandasana, Niralambapashaimottanasan and also stressfree regular life style etc.

Treatment of Adenoids

Simhasana, Suryanamaskara, Pranayama, Ujjayi with khecarimudra, Neti, Kunjalala etc.

These above mentioned *yogasana* are useful for curing diseases.Patient should avoid non vegetarian food, milk products and sour food.

Treatment of Anger

Shashankasan, pashcimottanasana,Yogamudrasana, Garbha-sana, Kurmasana,

Nadishodhana, Bhamari, Sitali, Akasi, yoga,

Pranamudra, maha mundra,Mahabheda mudra, yonimudra, Pasinimudras, Mulabandha, mahabandha and all types of meditation and relaxation practices etc.

These above described yogasana are useful for curing disease

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Antibacterial Activity of Jwarahara Dashemani an Experimental Evaluation

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Abstract

Antibacterial activity of Syrup and Tablet form of the Jwarahara Dashemani of Charaka was tested against both Gram-positive and Gram negative organisms by using bioassay method with concentrations of 1000, 500 and 250 mcg/ml. Both the formulation i.e. JHD Syrup and JHD Tablet showed antibacterial activity against Pseudomonas aeruginosa and Staphylococcus aureus. But minimal activity showed against Escherichia coli and Streptococcus pyogenes. The above results were supported by phytochemical analysis. Both formulations exhibited concentration dependent activity.

Keywords

Antibacterial, JHD Syrup, JHD Tablet, JHD: Jwarahara Dashemani

Introducation

It is common folk knowledge that pyrexia is an extremely common symptom in approx all diseases of our society. Pyrexia or fever gets manifested as a symptom due to impact of infection, tissue damage, inflammation, graft rejection, malignancy or other diseased states. It is the body's natural defense mechanism to create an environment where infectious organism or damaged tissue cannot survive[1].

The contemporary system of medicine has ample of potent antipyrexial remedies but they also have a high risk of developing side effects. Amid of all these, it is the high time to search remedies from the traditional treasure houses, which may be proven as safe and effective anti-infectious, and antipyretic agents. Jwarahara Dashemani one of the combination explained by Acharya Charaka at Sutrasthana 4th chapter[2] has been selected for the present work and its antibacterial activity has been evaluated in two different forms.

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The root of Hemidesmus indicus (Sariva) belongs to family Asclepiadaceae and ethanolic extracts posses antibacterial activity[3,4]. The Candy sugar (Sharkara) prepared from sugar cane (Saccharum spp.) which is one type of carbohydrate. The root of Cissampelos pareira (Patha) belongs to family Menispermaceae used in urinary infections, intestinal worms, etc[5]. The root of Rubia cordifolia (Manjistha) belongs to family Rubiaceae and it is credited with tonic, antiseptic, and deobstruent properties[6]. The fruit of Vitis vinifera (Draksha) belongs to family Vitaceae said to be an antioxidant, antibacterial etc. activity[6]. The fruit of Salvadora persica (Pilu) belongs to family Salvadoraceae, are carminative & diuretic and given in enlargement of spleen, rheumatism and tumors[7]. The fruit of Grewia asiatica (Parooshaka) belongs to family Tiliaceae, is astringent and stomachic. It is reported that when unripe, Phalsa fruit alleviates inflammation and is administered in respiratory, cardiac, and blood disorders, as well as in fever reduction[8]. The fruit of Terminalia chebula (Haritaki) belongs to family Combretaceae and is reported that a crude extract of it have potent and broad spectrum antibacterial activity against human pathogenic Gram positive and Gram negative bacteria[9]. The fruit of Emblica officinalis (Amalaki) belongs to family Euphorbiaceae and showed that, aqueous and ethanol extracts of P. emblica have been found to be both antifungal and antimicrobial in vitro, without any indication of cellular toxicity[10]. Medical studies conducted on Amla fruit suggest that it has antiviral properties[11] and also functions as an antibacterial and anti-fungal agent[12]. The fruit of Terminalia bellirica (Bibhitaki) belongs to family Combretaceae having four lignans (termilignan, thannilignan, hydroxy-3',4'-(methylenedioxy) flavan, and anolignan B) possessed demonstrable antifungal

activity in vitro[13].

Materials and Methods

Plant material

The ingredients of Jwarahara Dashemani were collected during the month of July 2007 from the Gujarat Ayurved University Pharmacy, Jamnagar, Gujarat and authenticated by pharmacognosy department of IPGT & RA, Gujarat Ayurved University, Jamnagar.

Preparation of formulation

JHD Syrup

Individual drug was powdered (passed through mesh no.8) using a grinding mill. The powder of each (125 g) material (total 1125 g) was suspended in 18000 ml of water for 12 h at room temperature, and then heat was given (between 70-85°C) till 2200 ml liquid remains. The filtrate was collected and sugar candy powder (1450 g) was added and again heated (range between 70-85°C) it till the volume becomes 2200 ml, filtered and stored at room temperature in amber colored glass bottle.

JHD Tablet

Individual drug was powdered (passed through mesh no.8) using a grinding mill. The powder of each (125 g) material (total 1125 g) was suspended in 18000 ml of water for 12 h at room temperature, and heat was given (between 70-85°C) till 2200 ml liquid remained and filtered. The filtrate was collected and again heated (range between 70-85°C) it to evaporate the watery part. When material gets concentrate collected and placed in oven at 45°C for drying. After complete drying, sugar candy powder was added and converted in to granules and compressed in to tablets of 500 mg, stored in stopper glass bottle for further compliance.

Bacteria

Gram-negative bacteria such as Escherichia coli (MTCC-442), Pseudomonas aeruginosa (MTCC-441); Gram-positive Staphylococcus aureus (MTCC-96), Streptococcus pyogenes (MTCC-443) were chosen based on their clinical and pharmacological importance[14]. The bacterial strains obtained from Institute of Microbial Technology, Chandigarh and sub cultured on selective medium at 37°C for 24 h incubation.

Antibacterial activity

Study was carried out using the modified bioassay method:

Susceptibility of bacteria to both formulation and standard antibiotics

Susceptibility of bacterial strains to both formulations i.e. JHD Syrup and JHD Tablet, and standard antibiotics was determined by modified bioassay methods of Berova et al. (1994)[15] and Chen et al. (1996)[16]. The reconstitute JHD Syrup and Tablet were diluted to give 1000 mcg / ml, 500 mcg / ml, 250 mcg / ml concentration in buffer solution. Muller Hinton sterile agar plates were seeded with indicator bacterial strains (10^8cfu) and allowed to stay at 37°C for 3 h. Using a sterile cork borer, wells were made on the seeded plates and these were filled with JHD Syrup and JHD Tablet of various dilutions with standard drug concentrations, and to the second set of seeded plates antibiotic impregnated discs were added. The two sets of plates were incubated at 37°C for 18 h and the zone of inhibition measured by zone reader scale.

Phytochemical screening

Alkaloids[17]: A portion of the methanolic extract was taken in a watch glass and was evaporated; to the residue few drops of dilute Hydrochloric acid and few drops of Mayer's reagent (potassium mercuric iodide solution) were added. The creamy or white precipitate indicates the presence of Alkaloids.

Tannins[18]: To a portion of aqueous solution of sample, a few drops of very dilute solution of ferric chloride was added, Greenish to bluish black color was formed, which indicates presence of tannin.

Flavonoids[18]: Small quantity of methanolic extract was treated with sulphuric acid (20 %). Appearance of yellow coloration indicates the presence of flavanoids.

Saponins[19]: The extract was diluted with distilled water and made up to 20 ml. The suspension was shaken vigorously for 15 min. 2 cm layer of foam indicates the presence of saponins.

Triterpenes and sterols[18]: 1 ml of the extract

was evaporated to dryness. 1 ml of chloroform and 1 ml of acetic anhydride were added to the residue followed by gentle addition of few drops of conc. Sulphuric acid from the side. Formation of purple colored ring at the junction of two layers indicates the presence of triterpenes and sterols.

The present investigation of preliminary phytochemical studies, JHD Syrup and JHD Tablet revealed the presence of saponins, flavonoids, triterpenoids, sterols and tannins.

Results

Antibacterial activity of JHD Syrup and JHD Tablet was tested using the broth dilution method. Both the formulations showed greater inhibition against Pseudomonas aeruginosa and Staphylococcus aureus than other species of bacteria. However, the JHD Syrup and JHD Tablet showed minimal antibacterial activity against Escherichia coli and Streptococcus pyogenes bacteria. The results of the antibacterial activity of the compounds tested against selected organisms are presented in Table 1.

Table 1. The effect of JHD Syrup and JHD Tablet against pathogenic bacteria:

Test Sample	Concentration mcg/ml	Size of inhibition zone (mm)			
		Ec	*Pa*	*Sa*	*Sp*
JHD Syrup	1000	10	30	21	13
	500	09	25	21	11
	250	09	24	20	10
Gentamycin	100	22	22	20	22
JHD Tablet	1000	10	29	22	12
	500	08	28	21	10
	250	07	27	20	09
Gentamycin	100	22	22	20	22

Bacteria: *Ec - Escherichia coli, Pa - Pseudomonas aeruginosa, Sa - Staphylococcus aureus, Sp - Streptococcus pyogenes*

Table 2. The Phytochemical screening of JHD Syrup and JHD Tablet:

Sr. No.	Components	JHD Syrup	JHD Tablet
1	Tannin	Present	Present
2	Terpenoid/Sterols	Present	Present
3	Alkaloid	Absent	Absent
4	Saponin	Present	Present
5	Flavonoid	Present	Present
6	Phenols	Absent	Absent

Discussion

The present work clearly indicates the JHD Syrup & Tablet in the highest concentrations of 1000 mcg/ml, effectively control the growth of specific bacteria. Both the formulations were less effective against Escherichia coli. As the combination is known to be colon friendly nature, it may prove a great boon to the antibacterial community.

The ingredients of JHD Syrup & Tablet were reported to contain flavonoids, tannins, terpenoids and saponins. The JHD Syrup & Tablet contains flavonoids, tannins, terpenoids and saponins by qualitative results were confirmed (table 2).

The secondary metabolites of various chemical types present in the plant species are known to possess antimicrobial activities. Flavonoids are found to be effective antimicrobial substances against a wide range of microorganisms, probably due to their ability to complex with extracellular and soluble proteins and to complex with bacterial cell wall; more lipophilic flavonoids may also disrupt microbial membrane[20]. Phenolics and polyphenol compounds present in the plants are known to be toxic to microorganisms[21]. The tannin components are responsible in inactivates microbial adhesions, enzymes and cell envelope transport proteins[22]. Many plant genetic resources have been analyzed for their active constituents possessing antibacterial activities. For example, broad spectrum antibacterial activity of leaf extract of Bolusanthus speciosus is due to flavonoids[23]. Landolphia owrrience is known to possess glycosides, flavonoids, tannins, saponins, which either individually or in combination, exert antibacterial activity[24]. The antibacterial activity exhibited by JHD Syrup and JHD Tablet may be attributed to the various active constituents present in it, which exhibit antibacterial activity either due to their individual or combined action. The present findings provide a scientific base for some of the medicinal claims of JHD Syrup and JHD Tablet. The above mentioned compounds, which are present in the JHD Syrup and JHD Tablet, may influence activity in an effective manner and may also have multiple actions against bacteria. Elucidation of these processes is necessary to define the exact mechanisms of active principles present in JHD Syrup and JHD Tablet.

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Achyranthus aspera L. in Tribal Medicine

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Abstract

Latjîrâ (A. aspera Linn.) is considered as an important drug among the Tharu tribe residing in the vicinity of Dudhwa National Park, District Kheri (U.P.). The plant is famous in the tribal community by the name of *CHHATTÎSÂ* (curing 36 ailments) and is used widely in the local health traditions to treat various ailments by the tribe. It is also known as *Vajrâdantî* for its ability to cure dental problems and its *Dataun* (tooth brush) is very popular in the community. Main uses of the plant by the ethnic group, their classical references from the Classics of Ayurveda and pharmacological activities based on scientific screening are comparatively analyzed here.

Introduction

The sub-Himâlayan Terâi region of Uttar Pradesh is inhabited by two important Scheduled tribes, namely, the *Thârus* and *Bhoxâs*. The Thârus are found in northern districts of this area, viz., *Gondâ, Bahrâich*, Gorakhpur, *Nainitâl* and *Lakhimpur* Kheri. In district Kheri, the tribal people reside in villages situated in the vicinity of Dudhwa National Park and they have immense opportunities towards the interaction with plants occurring in their surrounding vegetation. There are 41 *Thâru* villages in Kheri district (Map 4), occupying an area of 8,194 hectares in the vicinity of Dudhwa National Park. According to the latest census, the *Thârus* have a population of about 26,000.

Map 1 Map 2 Map 3

In-spite of great change in the cultural, social and economic status, even today the Thârus depend upon the outside world for only such articles as salt, kerosene and cloth. They make use of many plant species to meet with their day-to-day needs. They have a self managed system of medicine and make use of various plant species in the health care system.

Tribal Medicine Men, the "*Bharrâ*" have got a very respectful position in the society. He is expected to look after the health of the community and in return the community is responsible for his bread and butter. The 'Bharrâ' collects herbal drugs and uses fresh for the treatment of the common ailments. Some seasonal vegetable drugs are collected and stored by them. Some drugs are imported from the adjoining territory of Nepal. Traditional knowledge is transferred from generation to

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generation by oral folk.

Methodology

A survey on the folklore was conducted between the Dec. 2006 to Jan. 2007 to study the utilization pattern of herbal drugs by the Tribal people in local health traditions, their comparative study with the indications and utilization patterns in one of the worlds oldest codified system of medicine "the Ayurveda" and a search for scientific ground for therapeutic uses in tribal medicine from pharmacological screenings. During the study, a total of 90 plant drugs used by the tribal people were collected and studied. One of them is being discussed here.

Author with Tribal Medicine Man at Dignia Crossing during a Visit to the Dudhwa National Park

Achyranthus aspera L.

Thârû (Tribal) Name: *Chirchirâ, Latjîrâ, Chhattîsâ (NRrhlk).*

HINDI - *LATJÎRÂ.;*

SANSKRIT - *APÂMÂRGA, MAYÛRAKA, PRATYAKPUSHPÂ (CS., SS., AH.); KHAR - MANJARÎ (SS.); SHIKHARÎ (CS., AH); GAURDANDA APÂMÂRGA (AH.SA.1.39).*

Natural Order – Amaranthaceae

PROPERTIES AS PER AYURVEDA:

Classified as *Errhine* (CS.Su.1.83; 4.27; 25); Krimighna, Adjuvant in emetic therapy (CS); Arkadi group of drugs (SS); Stomachic, Digestive, alleviates cardiac troubles (*Hridrujâhara*), tympanitis, indicated in Piles, Abdominal colic, *Apachî* (Cervical lymphadenitis) (BP.Ni.; K.Ni.); Emetic, Blood coagulant, checks *raktâtisâr* (malena) (S.Ni.); Relieves Ringworm, Pruritis, is astringent and *Sransana* (digestive laxative) (D.Ni.; R.Ni.; K.Ni.); bitter, sharp, alleviates dysuria, constipation, skin diseases, earache other colic (Pr.Ni).

Pharmacological Activities

Anabolic activity (Chang & But 1986), Hypoglycaemic (Akhtar & Iqubal 1991), Aqueous and alcoholic extract stimulates gravid & non-gravid uterus in mice (Satyavati 1976), post coital antifertility (Vasudeva & Sharma 2006); anti-implantation activity (Tatke & Gabhe); anti-carcinogenic (Chakraborty et al, 2002), anti-inflammatory (Vetrichelvan, Jagdeeshan 2003), anti-androgenic (Sandhya Kumary et al. 2002); Seeds exhibited hypotensive, spasmogenic and para-sympathomimetic action (Bever 1883); cardiac depressant, vasodilating, respiratory analeptic, diuretic, purgative, slightly antipyretic (Neogi et al. 1970); diuretic action attributed to its high potassium contents (Kapoor & Singh 1966); Aqueous extract of leaves elevates thyroid hormone levels & decreases hepatic lipid peroxidation in male rats (Tahilani & Kar 1966); whole plant extract in-vitro neutralizes Bothrops atrox venum (Nunez et al. 2000).

Therapeutic Evaluation

Clinically, administration of decoction of whole plant to patients of leprosy showed encouraging results in lepra reaction as well as quiescent stage of lepromatous leprosy along with improvement in general health. When administered with specific antileprosy drug, DDS (Diaminodiphenyl sulphone), chances of reaction due to drug became less and rate of improvement was faster (Ojha et al. 1966).

Toxicity: No adverse side effects at dosages (of powdered whole plant) up to 8 gm/kg orally in rabbits (7 days acute toxicity test) (Akhtar & Iqubal 1991).

Discussion

Medicinal uses of the drug by the tribe are similar to various indications described in Ayurvedic classics except few differences. As in tribal medicine, root is tied to the waist and placed on head to induce obstructed labour where as Bangasena institutes insertion of the

root into the vagina and Gadnigrah states the application of leaf paste on the navel, pelvis and vagina. In Tribal Medicine in Rajasthan, Powder of whole plant with warm water is taken in pneumonia (Katewa et al. 2004).

Some therapeutic uses of A. aspera L. by the tribe and not mentioned in Ayurvedic Classics are in habitual abortions, hydrocoel, dental pain, pneumonia in young children. These indications need further evaluation.

It is evident from the observations that most of the uses of the drug in traditional system of the Tharu tribe are classically supported by the Ayurvedic literary references and experimentally proved by the pharmacological screenings. This proves the scientific approach of the tribal people and establishes the tribal system of medicine on scientific grounds.

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Abbreviations

AH – Astanga Hridaya; AS – Astanga Hridaya; BP.Ni. – Bhav Prakash Nighantu; BS – Banga Sena; CD. – Chakra Dutta; Ci. – Chikitsa Sthan.; CS.- Charak Samhita; D.Ni. – Dhanvantari Nighantu; GN – Gada Nigraha; ITDP – Integrated Tribal Development Project.; K.Ni – Kaiyadeva Nighantu.; Ka – Kalpa Sthan; MP.Ni – Madan Pal Nighantu; Pr.Ni – Priya Nighantu; R.Ni. – Raj Nighantu; RRS – Ras Ratna Samucchaya; Sg.S. – Sharangadhra Samhita; S.Ni. – Sodhal Nighantu; SS. – Susrut Samhita; U – Uttar Sthan

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COMPARATIVE UTILIZATION PATTERN OF THE DRUG IN TRIBAL SYSTEM & AYURVEDA:

S.No.	Conditions treated	Ethnomedicinal Uses by the Tharu Tribe	Classical Evidences (Ayurveda)
1.	**Hepatosplenomegaly (*Barbat Rog*)** –	Whole plant/root pounded with water is given.	• Alkali of *Apāmārga* used to treat Splenomegaly (SS.Ci.14.13). • Māshādya Gutikā in Yakrit Plihā Chikitsā (CD.38.15). • Roots of *apāmārga* and *samī* (*Prosopis cineraria L. Druce*), 10 gm pounded and administered with buttermilk alleviates jaundice, oedema and anaemia. (RRS.19.109)
2.	**Dental Pain**	Stem is used as tooth brush.	No Classical Reference
3.	**Pneumonia in Children**	• Leaves are crushed with hand and applied to the chest in pneumonia in children followed by dry fomentation (*Pottali Sek*) with cow dung. • Stem / root cut into small pieces and tied to neck helps in recovery from pneumonia.	No Classical Reference
4.	**Hydrocele**	Root tied to the waist relieves Hydrocele.	No Classical Reference
5.	**Obstructed Labour -**	Root is tied to the waist/placed on head.	• *A. aspera* root along with *Cissampelos pareira L., Gloriosa superba L.*, and *Adhatoda zeylanica Medik.* or any one of them pounded in water, applied below navel and in vagina induces easy labour. (CD.63.12, GN. Mudha Garbha Ci.21, 26). • Root of *A. aspera* introduced and kept in the vagina induces labour easily. (BS.Striroga.233). • Paste of A. aspera root applied on navel, pelvis, and vulva induces labour easily. (GN.6.4.23).
6.	**Habitual abortion -**	Root is tied to the neck.	*Apamarga* used for *Pumsvana Samskar* (Treatment to ensure the birth of a male child). (CS.Sa.8.19)
7.	**Poisoning**	• Root paste is applied in scorpion bite. • Root pounded with water is given in Snake bite / dog bite.	• Snake bite. (SS.Ka.6.12). • In Insect poisoning Agad made from *Apāmārga (A. aspera), Tagar (Valeriana wallichii DC*), and *Kuth (Saussurea lappa C.B. Clarke)*. (SS.Ka. 8.54). • Dog bite – juice of leaves applied on the wound (AS.U.46.64). • Paste of *Apāmārga* applied locally in *Kapilā Lūtā* (Black spider) poisoning (SS.Ka.8.106).
8.	**Pain Abdomen**	Root pounded with water, mixed with sugar is given in pain abdomen.	• Oil cooked with the alkali of *Apāmārga* to alleviate abdominal disorders. It also alleviates constriction in cardiac region caused by *Vāta* due to abdominal disorders (CS.Ci.13.171). • *Apāmārga* root taken with rice water increases digestive power and destroys piles (SS.Ci.6.13). (Sg.S.2.5.19). • *Parināma Shūla* (Duodenal Ulcers) *Chikitsa*. (CD.27.45). • Root of *apāmarga* taken with water destroys *visūchikā* (Cholera). (BP.Ci.6.110).
9.	**Abscess, Wounds & Piles:**	**Abscess -** Leaf paste with a small quantity of salt is applied to the abscess for suppression as well as suppuration.	• Wound labeling drug (SS.Su.36.31); treatment of sinuses (SS.Ci.17.18, 25). • *Angāraka Taila* in *Vrana Chikitsā*. (CD.44.89). • Local application of *Apamarga* paste causes rupture of the abscess. (BP.Ci.47.51).
10.	**Fever**	• Part of stem / root is tied to neck . • Paste of root / leaves is given in fever 2-3 times a day.	• Root of *A. aspera* tied to the waist relieves *Vishama Jwara*. (Periodic fever) (CD.1.227,228 ;GN.2.1.554,607;BP.Ci.1.769). • *Apāmarga* root should be taken empty stomach early in the morning to cure periodic fever. (GN.2.1.639).
11.	**Part Used**	Leaves, root, whole plant.	Seeds, Leaves, root, whole plant, alkali.
12.	**Doses**	For internal administration 5-10 gm fresh leaves/ root/ whole plant.	Juice – 10 to 20 ml.; Alkali – ½ to 2 gms.

Quality Control in Ayurved and Its Interpretation

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Abstract

Quality, the denominator of any object for its acceptance is the prime issue in present scenario. It is also applicable for the drugs of different origin mentioned in Ayurveda. Ayurvedic science has developed in a cultural milieu and through a methodology that is based on a subjective approach to standardization. After scrutinizing the classics, it can be said that the ancient seers were well familiar with the concepts of quality control of the drugs, which helps in maintaining positive health and eradicating diseases, while the contemporary system learnt about the significance, in recent times only. WHO too starts to think about implementation of quality control aspects for herbal drugs in recent past. This paper reflects some light on the important subjective quality control parameters mentioned in classics along with some advanced analytical and phytochemical investigations for the quality control, along with suitable examples based on recent studies. Attempt has also been made to compile the scattered references pertaining to quality control from the ancient classics along with justification at few instances. The whole paper tries to reflect a need of collaborative approach between ayurvedic and modern sciences for better understanding and to create relevant quality standards.

Key words

Ayurvedic medicines, commercialization, quality control, raw material, finished products.

Introduction

Success of any healthcare system depends on the availability, authenticity and safety levels of suitable drugs. In nut shell, one can say that all healthcare services will get paralyzed without having safe / potent drugs. Considering the significance of this view, authenticity, purity and quality of the medicinal substances have been emphasized through ages. A verse of Charaka speaks clearly about this, mentioning "An improperly treated drug would kill an individual like a thunderbolt"[1].

The word 'Quality' denotes the "degree of excellence"[2] or says "degree to which a set of inherent characteristic fulfills requirements"[3]. It is an important factor dealt for any of the substance present in this universe. In relation to dosage forms this term denotes towards potency, purity, stability & efficacy etc. The quality of any dosage form should not only be tested at the final stage; but the measures should be adopted right from the stage of procurement of raw materials through processing until it reaches to the consumer[4].

The Ayurvedic system of medicine, introduced as early as the dawn of human civilization, embraces with in its folds the drugs of plant, mineral and animal origin used as single as well as in compound formulations[5]. During the initial days of pharmaceutical development, the sector was limited to the physician's kitchen and ancient physicians used to collect the raw materials after proper identification and authentication of genuine quality on the basis of various ayurvedic parameters like Prakriti (nature), Guna (pharmacognostic characteristic/quality), Prabhava (specific pharmacological activity) as well as place, season and method of collection etc. Most of these are even also followed nowadays; the only difference is the method of evaluation which was primarily subjective during ancient period while objective today. All these makes clear that, the ancient physicians were well versed in identifying single drugs, their preservation; pharmaceutical processing along with their

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therapeutic dose and logical uses etc[6]. The basic qualities of a raw drug, required for medicinal purpose, are also described in Charaka Sutra Sthana in a Sanskrit quotation, which indicates towards suitability of the drug at pharmacognostical, pharmaceutical and pharmacological parameters. It include abundant availability, good therapeutic value, capable of being compounded in to various dosage forms through different pharmaceutical processings and should be in excellent condition i.e. without any infestation, contamination, adulteration, presence of foreign material etc., with required Rasa (taste), Guna (character / quality) and Virya (potency) etc[7].

The term "Sampat" of the verse indicates the quality standards of the drug, which is the most essential aspect during selection and procurement of raw material and will cover the following aspects:

1) Organo-leptic evaluation

2) Physico-chemical evaluation

3) Microbial contamination, pesticide residues and estimation of heavy metal contents etc.

Several classical references are available regarding the precautionary measures taken right from the procurement of raw materials; where as Siddhi Lakshanas (finished product characteristics) are given for in process quality control.

Quality control in Ayurveda

Ayurvedic formulations have also their quality parameters as described in various classics in scattered manner. These can be arranged in following three headings for better understanding.

A. Raw drug quality control

B. In process quality control

C. Finished product quality control

A. Raw drug quality control (Collection / Harvesting / Processing of Medicinal plants):

Procurement of genuine raw materials is one of the indispensable steps during preparation of a quality product. Any shortcomings during collection of raw material, like grown in contaminated soil, collected in immature/ infested condition or during improper season etc, have direct effect on the potency of the raw materials and ultimately on the finished products. Various points mentioned by Acharya Charaka with reference in this area needs to be examined before administering any of the drug[6]. Some of the important points which should be keenly checked for the procurement of raw materials as described in classics are dealt here under.

Description of place (Habitat)

Before forwarding towards the collection of any herb, it is needed to analyze the quality of the soil and environment of the place of collection, as the therapeutic attributes of the drugs depends upon them. The quality of soil or place for the procurement of herbs (Table 1), places from where drugs should not be collected (Table 2) etc. points are exclusively focused in ancient classics[8,9,10]. On the other hand Acharya Sushruta has described that the predominance of specific Panchabhautika property (phytoconstituents) possess by the drug also depend on the qualities of area from where it was collected[11]. Acharya Sharangadhara also quotes that the herbs belonging to Himalayan region are having Saumya properties, which produces anabolic changes where as those belongs to Vindhya region are having Agneya properties which depicts catabolic activities[12].

Description about place, given in ayurvedic texts indicates towards the habitat, nature and colour of soil indicating towards the mineral contents of the soil which is directly related with the therapeutic actions of the drug. Contamination of soil with heavy metals, pollutants, industrial byproducts etc. ultimately affects the plant and leading to defects in quality. Controversy over the plants under the list GRAS is a recent example, which is an outcome due to negligence of soil quality and habitat. Thus soil examination becomes one of the necessary steps during procurement of herbs.

Acceptable qualities of raw materials[13,14,15]

Besides examining the place of collection, Acharyas have also provided detailed descriptions regarding the acceptable qualities of the drugs for therapeutic purpose (Table 3). The mentioned subjective parameters reflect towards the acceptable physico-chemical &

phytochemical information regarding the drugs.

Time of collection

The drugs become accomplished to generate maximum therapeutic effects if their potency is augmented by Desha - Sampat (collected from appropriate habitat) and Kala - Sampat (collected at appropriate time)[8]. Almost all the drugs are mentioned to be collected in the early morning[16]. Acharya Charaka and Vagbhatta have almost same opinion about the specificity of season for the collection of different parts of a plant (Table 4)[13,17]. While Acharya Sushruta opines that the drug having Saumya Guna (anabolic characters) should be collected during Saumya Ritu (winter or spring season) while the drug having Agneya Guna (catabolic characters) should be collected during Agneya Ritu (summer or rainy season)[18]. As per Acharya Sharangdhar, for all the purpose drugs should be collected during Sharada ritu (late rainy season) while for vamana and virechana karma, drugs should be collected at the end of spring season[19]. Latter classics followed the same concepts with a slight modification in Raja Nighantu[20].

The synonyms or features of raw drugs cited in ayurvedic texts are suggestive for their proper identification. Drugs, deteriorated by environmental, mechanical or biological factors, should not be adopted for medicinal purpose. Seasonal specifications are also mentioned for the collection of various parts of a plant. Scientific studies prove the variation in the alkaloid percentage of Vasa collected in different months of a year (Table 5)[21]. The alkaloid contents in the leaves of Vasa are at peak in the month of August, September and October, similarly variation in total solid content of Vasa swarasa was also reported (Table 6)[22].

Utilization of genuine parts of a drug

Part used of a drug for the preparation of a formulation plays an important role about its efficacy. A study on Shirisharishta also shows that utilization of different parts of the drug, directly affects the therapeutic properties of the finished products. In the study, Shirisharishta was prepared by utilizing three different parts i.e. bark, sapwood and heartwood of Shirisha (Albizia lebbeck Benth.). HPLC study shows that the main chemical constituent of the drug i.e. epigllocatechin gallate is found in maximum concentration in the bark than that of heartwood, but contrary to it, the concentration of the same is found higher in heartwood based formulation than that of bark[23]. This may be the reason why twak (bark) of Shirisha is commonly mentioned for the preparation of Churna kalpana[24] or Ghrita[25] etc. while for the preparation of Asava-arishta, sara (heartwood) is indicated as Asava-yoni[26]. Here the Asava-yoni term is given on the basis of the best used part, suitable for the preparation of Asava-Arishta etc type of ayurvedic fermented dosage forms.

Storage of raw material[27]

As most of the raw materials are not available throughout the year in abundance and are seasonal crops. Also some of the drugs can be procured only from a region specific e.g. Hingu, Ela, Dhataki, Nagkeshar etc Therefore these drugs should be collected from their available source and favorable season. For the purpose of their availability through out year, these should be stored appropriately after proper processing to avoid their deterioration. The factors like temperature, moisture, dust, insects etc. are the responsible for deterioration of a raw drug.

In classical texts, these are mentioned to be stored after proper harvesting in appropriate containers; well covered with a lid and hung on a swing. The store room should be resistant to wind or storm however having appropriate ventilation. Adequate storage of the raw materials or finished products is the matter of immense attention. Specific types of containers are required for the storage depending upon their specific physico-chemical properties, so that these can be protected by various factors like environmental, mechanical or biological hazards. Daily flower-offerings and sacrificial rituals are also indicated in the store room, which indicates that daily entry of personnel is must, so one can observe the condition of the stored material. The rituals may be used for the avoiding the invasion of contaminating micro-organisms in the room.

In process quality control

Ayurvedic pharmaceutics comprise of a variety of formulations which are selected according to the nature of the disease, condition of the patients and also the qualities and

availability of the drugs[28]. Several formulations have their own rules of preparations and their quality control measures thoroughly dealt in various classical texts. Some important measures for the preparation of ayurvedic formulations are discussed here.

Kwatha kalpana

Particle size of raw drug, amount of water taken and its reduction by heating, quantum of heat required etc. are the major factors during its preparation. Aacharya Charaka has described that raw drug should be cut into small pieces (Khandschhedaitva), continuous stirring is needed (Satatamavaghatayan). Although a lot of variations are found related to quantity of water taken and the extent up to which its volume should be reduced, one general principle mentioned by Charaka is supposed to be most suitable characteristic i.e. "Gata-rasatvam" stage, which means the Rasa (taste) of the raw materials should be transferred to the decoction[29]. The quantum of heat required for preparation should be termed as mild (mridu)[30].

Lesser the size of raw material better will be the extraction, the concept was also considered during Kwatha preparation i.e. the particle should be up to finer stage. This is also supported by "mass transfer theory" that maximum surface area is needed for better extraction. It must be emphassised that the greatest degree of size reduction is not necessarily to be preferred. Thus it has been shown experimentally that, if dry extracts are made from drugs such as belladonna or stramonium, it is possible to obtain a greater total extractive when a finer grade of powder are used, but that the extract from a moderately coarse powder contains a higher proportion of alkaloid. Mild heat or / along with reduced pressure is also recommended for the extraction process. As per study it is observed that application of more than 60°C temperature for longer time may leads to destruction of alkaloids present in the drug by hydrolysis[31].

Churna kalpana

In the classical references for Churna preparation, herbs should be dried in shade, pounded well with an instrument made up of stone and to be filtered through a clean cloth. The drug should be reduced to such a level as the particles seen in the sun rays comes through the window in a dark room[32,33]. The recommended size of Churna also, indicated for its better absorption or easy extraction of its phytocnstituents during metabolism as per the "mass transfer theory".

Avaleha Kalpana

Avaleha siddhi lakshana[34,35,36] ensure, not only different stages of pharmaceutical procedure but also quality of the final product. Overall it may be simplified into following two stages- Asannapakva Avastha & Supakva Avastha.

Asannapakva Avastha Lakshna

These features indicate towards the concentration of sweet substances (jaggery/ sugar) in liquid material, which directly influences the final form of the medicament. In short, these mark the stage to stop heating and add Prakshepa Dravya (adjuvants) (Table 7).

Supakva Avastha Lakshana

These signs indicate organoleptic characters (Table 8) of the final form of "Leha" after addition of Prakshep Dravya (adjuvants), Sneha (fat/oil) and Madhu (honey) etc. Ayurvedic parameters denotes towards attainment of a specific physical form of the finished product for quality maintenance.

Signs given in Table 7 & 8 are indicative of extent of sugar percentage as well as the achievement of the final characteristics of finished product and both of these are important factors regarding quality maintenance of Avaleha kalpana. As more as paka (heating) of sugar solution proceeds; the water content decreases accordingly.

Sneha Kalpana

Method of Sneha Kalpana preparation is dealt by various Acharyas[37,38,39]. The presence of moisture content in the Sneha (oil) and Kalka (paste) condition of the drug are the indicative of Sneha Paka stages[40,41,42,43] (Table 9). Sneha Siddhi awastha[37,42,44,45] i.e. completion stage can be decided by examining the presence of specific characters in the Sneha and Kalka Dravya as given below-

For Sneha:Shabdasya Uparame Prapte. .....Gandha-Varna-Rasadinam Samyato

The appearance of desired smell, colour and

taste of added drug in the oil along with subsidence of the bubbling sound from the oils, are the deciding parameters for the completion of Sneha Paka. An indicative measure is also described for the examination of completion test during Ghrita / Taila kalpana preparation as Phenasya Uparame (subsidence of frothing) and Pheno Atimatram (augmentation of frothing) respectively[44].

For Kalka: Nanguli grahika Kalke, na snehe agnau shabdata

The stage when Kalka seems as to be non sticky and can be easily molded into Varti (spindle) form by rolling it between fingers and no cracking sound appear on fire etc are the indicatives of extent of moisture content in the Kalka, which are reduced after attainment of the Siddhi awastha[46].

Besides these, some classical text of 18th century are also put emphasis on the Murchhana of the oils for the removal of Ama dosha and for augmentation of the medicinal properties of the medicinal Taila/Ghrita. Here, Ama dosha may be considered as unwanted component among the raw oils/ghrita; like intermediate chemical constituents, dissolved gasses, adulterants, plant toxins and/or moisture present in raw oils or developed due to long time storage. Murchchhana process may be introduced during theses period for the removal of these unwanted materials i.e. Ama dosha. The process may also helps in maintaining the necessary ratio of unsaturated and saturated fats suitable for human physiology[47].

Pharmaceutically three stages of Sneha paka, are mentioned in Ayurvedic classic on the basis of therapeutic point of view viz. Mridu paka (mild cooked), Madhyam paka (sufficient/ medium cooked) and Kharapaka (excessive cooked). The Mridupaka is indicative of moisture presence in the Kalka (paste) of herbal drugs used for preparation and is diagnosed physically by touch and molding into spindle shape (Varti); it seems to be sticky in nature. In the Madhyam paka, no moisture presence remained in Kalka and can be easily molded into spindle shape, but in Kharapaka, inflexibility appeared in the Kalka. Sneha Siddhi Lakshana like "Shabdasya uparame prapte" suggests reduction of water i.e. extent of moisture content. When water remains present in the oil it produces the hissing sound and this sound disappears gradually after reduction of water. "Gandhavarna rasadinam sampatau" suggest that desired active constituents are transferred into the oleaginous media. 'Phenashanti' and 'Viphena parichapalagata', specifically for Ghrita suggest that there is no production of any gases resultant into absence of frothing[37,42,44,45].

Sandhan Kalpana- Sandhan Kalpana is one of the most advanced and complex classical ayurvedic formulations. Ancient scholars mentioned several precautionary measures based on their experience for maintaining genuine quality of a fermented product like specific Asava yoni (part used) of drugs, type of Sandhan patra (fermentation vessel), nature and concentration of nutrient medium / sweetening agent, Prakshepa dravya (adjuvants), place and duration of fermentation along with seasonal effects etc. These all may be intended for acquiring specific product components which would be beneficial for curing the diseases for which the Asava are recommended. As per the modern fermentation technologist, a variety of primary and secondary metabolites are produced due to the activity of specific micro-organisms during fermentation process. A specific micro-organism is required for obtaining specific intermediate / end product. Nowadays modern pharmacies adopts some developed artificial fermentation techniques for the production of specific antibiotics, antiseptics etc by using some specific micro-organisms. But these all measures are limited to single micro-organism and/or for the production of a single compound while the ayurvedic fermentation technique is seems to be based on multy-organism activity for the production of a group of intermediate / end products some what like wild fermentation. Therefore the standardization of these ayurvedic dosage form is seems to be a tedious job without prior knowledge of the each and every components and steps of the ayurvedic fermentation technique.

Asava yoni (official parts of drugs used for fermentation)

Total nine Asava yonis are mentioned by

Acharya Charaka including 84 Asava dravyas (drugs used for fermentation) as the official part of the drug for Sandhan (fermentation). As per example it is already discussed that Shirisharishta prepared by heartwood of Shirisha shows better result on all the grounds i.e. pharmaceutical, analytical, pharmacological as well as on clinical study than that of the bark or sapwood based formulations. It clearly indicates towards the significance of Asava yoni mentioned in Charaka Samhita. In the same reference Dhataki (Woodfordia fruticosa Kurz) is also found described in Phushpa yoni (flower group) that's why in later texts its flower is commonly used for preparing various types of Asava-arishtas[26].

Sandhan patra (fermentation vessel): Specific vessel is mentioned to be used for the production of specific product like Madhvasava, Kumaryasava, Saraswatarishta etc[48,49,50,]. Some of the traditional vessels mentioned in the classics are enlisted as – earthen, wooden and metallic vessels etc. Nowadays food grade plastic & steel vessels are commonly used for the fermentation instead of these. These all are the result of time to time modification adopted for further ease in the process and enhancement in the quality. One of the study carried out by Hiramath S.G. et al conclude that porcelain, steel and plastic containers are better alternatives to earthen containers[51].

Patra Sansakar (preparation and sterilization of vessels) is also indicated in sequential manner as Prakshalan (washing), Dhoopan (fumigation) and Lepana (coating/oleation)[52]. These traditional processes are needed to prevent contamination and facilitate the fermentation in the earthen pots. Lepana may be adopted for closing the minute pores of the earthen pots along with providing a nutritive media to desirable microorganisms.

Madhura Dravya (Nutrient medium / sweetening agents): Acharyas have also utilized sweetening agents mentioned in Ikshu or Madhu varga as a nutritive media for fermenting microorganism. As per modern view maximum limit of sugar concentration required to facilitate fermentation is 15-40%, while in ayurvedic fermented products concentration of sweetening agent (jaggery) is observed to be up to 150%[53] and still a successful fermentation is observed. The mere purpose of such types of variations regarding variety of sweetening agents as well as the amount is not only for providing nutritive media but also to facilitate specific microorganism to work out.

Temperature factor for addition of sweetening agents: Temperature of the medium before addition of sweetening agent is also a matter of great concern for facilitating fermentation. In classical literatures the term Susheetam / sheeta are mentioned denoting the temperature of medium i.e. the herbal decoction should be properly cooled up to room temperature[54,55] before addition of sweetening agents. It is a general fact that at higher temperature the sugar leads to hydrolysis which is useless to the organisms, which was also considered by ancient Acharyas.

Prakshepa dravya (adjutants): A variety of adjuvants are found described during preparation of Asava-arishta. Most of these are aromatic in nature. These not only provide essential nitrogenous source to the media for regulating the fermentation reaction but also have medicinal importance to augment the effect of main drug besides contributing pleasant colour, taste and aroma to the Asava-arishta.

Place and duration of fermentation: Regarding place Acharya Charaka has mentioned that it should be kept in Dhanya / Yava rashi (between the rice/barly husk)[56,57] whereas other references are also found regarding place of fermentation as Bhugharbha (under ground)[55], Vaihayasda (open sky)[58] too. Duration of fermentation also varies on the basis of type/ concentration of sweetening substances used or place and season of preparation. The duration taken for fermentation in cold atmosphere is double than that in warm atmosphere[59,60]. As per modern studies the most favorable atmospheric temperature for fermentation is in between 30-36^{o}C.

Determination of fermentation: As no clear references are found regarding the completion signs of the sandhan kalpana in classics except the term used as 'Jatarasam'[61]. Few characteristic signs developed by imminent scholars as tradition for the determination of onset and completion of fermentation (Table 10) but these

are not mentioned in classical texts. The bubbles coming out from the bottom are indicative of fermentation process. Alcoholic aroma indicates presence of alcohol (C_2H_5OH) in the preparation.

Finished product

The quality of finished product is determined by appearance of desirable characters like smell, colour and taste etc (Istagandha varna rasotpatti). Besides these a quality medicine should be more therapeutically more potent even in low dose, easily eliminate most of the doshas (disease causing factors), easily digestible, palatable and should pacify the disease without producing any side effect when administered in therapeutic dose[62]. The appearance of desired color, taste, smell and consistency suggest that the properties of raw material has now come in the product and this can also be confirmed by the technologies like TLC, HPTLC, HPLC, GC, NMR etc. Various studies are carried out nowadays considering these advance technologies for the quality control and standardization of the ayurvedic products like Vasa Swarasa, Vasa Avaleha (Table 11, 12), Vasa Ghrita[22,63], Guduchi Ghrita or Taila[64] and Shirisharishta[23] etc.

Discussion

The quality of a product or service refers to the perception of the degree to which the product or service meets the customer's expectations. It has no specific meaning unless related to a specific function and/or object. Quality is a perceptual, conditional and somewhat subjective attribute[3]. Ancient physicians were well vigilant about quality assurance of the drugs at raw, in process and finished level. It is also evident by a quote in Charaka Samhita, a physician should have proper knowledge about identification and nomenclature of herbs / folklore medicine also, besides their formulation techniques, dose schedule and therapeutic uses etc[62]. In this way, the Ayurvedic sciences or Shastras as they are called possess qualitative standards that are derived by a subjective but impersonal approach to standardization. While there is a contemporary value in applying modern science and technology tools for creating objective and verifiable standards for traditional knowledge products and concepts, currently the approach to creating standards is one-sided. This is because it does not adequately consult the available qualitative Traditional health sciences (THS) standards and parameters. Ayurveda has its own sophisticated internal quality standards. They include standards for identity, collection procedures, processing technology, finished products, drug design and therapeutic applications. The criteria for collecting plants, for instance, may include the best time, season and stage of growth when the plant is most therapeutically active. It may include the best habitats for gathering the plants, in order to peak their medicinal potency. Standards also exist for safety and efficacy of 'pharma ceutical', 'nutraceutical' and 'cosmeceutical' products. It is in this context of growing acceptance of Ayurvedic products and therapies that questions regarding their efficacy and quality standards have become a matter of serious concern to policy-makers, consumers and to the regulatory authorities in both the producing and importing countries. Today, government regulators do not take the epistemological differences, between traditional and western biomedicine, into account while setting standards to monitor quality in respect of consistency, safety and efficacy of ayurvedic products and services. Centuries of clinical evidence and practical methods for quality assurance that are available in the THS are thus overlooked. This unmindful neglect can be rectified by carefully translating the detailed and sophisticated traditional knowledge on identity, collection, processing and therapeutic applications into appropriate modern parameters, instead of setting standards ab initio. Modern tools of physics, chemistry and biology are indeed capable of objectifying the traditional standards that already exist. Microscopy is useful to the herbal sector in authenticating plant drugs. Also geology and marine sciences may be helpful in the availability of standard metal, minerals and marine raw materials. Advance analytical tools like HPTLC, HPLC, and Spectroscopy etc are also prove to be efficient for 'fingerprinting' of herbal products. The flame photometers and atomic absorption spectrophotometer, electron spectroscopy for chemical analysis and electron microscopy are useful for studying traditional

ayurvedic medicines that contains metals or minerals etc. Although these correlations are not so easy job but in long way it may be helpful to establish an inter-cultural approach for quality standard.

A programme to develop modern inter-cultural standards for quality, safety and efficacy of traditional Indian systems of medicine is not only important for Indians, but also for global consumers. However, the project to develop such standards needs an appreciation of the epistemology of Ayurveda[65].

Conclusion

Thus it is the need to build a bridge between traditional ayurvedic and modern scientific quality standards at various levels. Databases is needed to create on ayurvedic approach of identity of raw materials, collection methodology, specific processing of the materials, their specific combination in any formulation, finished products, dosage form and their uses etc. Scientific relevance of these concepts and approaches is also needed to be reestablished using modern scientific tools of chemistry, physics, biology and geography etc. It is also needed to identify the important physical, chemical and biological differences that are reflected when the traditional methods are followed, and demonstrate their relevance in establishing the quality, safety and efficacy of the products

Tables

Table 1: Acceptable quality of land for the procurement of herbs

No.	Description	Charaka	Sushruta	Vagbhatta
1.	Jangala (desert like) region	+	-	+
2.	Sadharana (moderate kind) region	+	-	+
3.	Having seasonal balance	+	-	-
4.	Soil should be even	+	+	+
5.	Attached/adjacent to water resource	+	+	-
6.	Suitable grassland	+	+	+
7.	Unctuous soil	+	+	+
8.	Black/golden coloured soil	+	+	+
9.	Yellowish/reddish coloured soil	-	+	-
10.	Sweet pleasant smelling	+	-	-
11.	Soil scattered by the plough	+	-	-
12.	Not in proximity of any dominating tree or herb	+	-	-

Table 2: Unacceptable quality of soil/place for the procurement of herbs

No.	Description	Charaka	Sushruta	Vagbhatta
1.	Burial ground	+	+	+
2.	Temples/worship places etc	+	+	+
3.	Road side	+	+	+
4.	Ravines and anthills	+	+	+
5.	Ushar (salty)/Bhangura (dry)	-	+	-

Table 3: Acceptable qualities of herbs

No.	Quality	Charaka	Sushruta	Vagbhatta
1.	Collected during suitable season	+	+	-
2.	Fully matured quality i.e. having maximum concentration of active constituents (Rasa-Virya etc)	+	+	+
3.	Physico-chemical or pharmacological qualities - not spoiled by any natural (sun/fire/water/air) or unnatural (insects) causes	+	+	+
4.	Spread wide with big roots directed towards north	+	+	+

Table 4: Collection of different parts in specific season

No.	Parts of drug	Collection season	Charaka	Vagbhatta
1.	Fresh branches & tender leaves	Varsha (rainy) and Vasanta (spring)	+	+
2.	Roots	Grishma (summer) or Shishira (dewy)	+	+
3.	Full grown leaves, barks, tubers and sap	Sharad (autumn)	+	+
4.	Pith & exudation	Hemanta (early winter)	+	+
5.	Flowers and fruits	Appropriate seasons	+	+

Table 5: Seasonal variation in alkaloid profile

Months -	*Jan.*	*Feb.*	*March*	*Apr*	*May*	*June*	*July*	*Aug*	*Sep*	*Oct*	*Nov*	*Dec*
% alkaloid (dry wt basis)	0.8 - 0.9	0.6 - 0.7	0.4 - 0.6	0.3 - 0.5	0.7 - 0.75	1.1 - 1.5	1.5 - 1.9	1.5 - 2.0	1.5 - 2.0	1.5 - 2.0	1.0 - 1.5	0.9 - 1.0

Table 6: Seasonal variation in Total solid content

Month	January	March	September
Total Solid Content	13.88 % w/v	9.068 % w/v	9.508 % w/v

Table No 7: Asannapakva Avastha Lakshana of Avaleha

Signs	Illustration
Darvi Pralepatva	Stickiness of Sugar solution to ladle
Tantumatvam (1*Tar*, 2*Tar*)	When drop of in-process (during heating) sugar solution is put over thumb, keep the index finger over it and stretching of index finger produces thread in between thumb and index finger. The number of threads denotes the degree of consistency.
Appasu Majjanam with Saranam	When drop of sugar solution is poured into vessel filled with water, it sinks and spreads in water.
Appasu Majjanam with Sthiratva	The drop sinks to bottom but does not spread and easily picked with finger
Patitastu Na Shiryate	When drop is poured over plate, it does not spread or break.

Table 9: Completion test of Sneha paka

Paka	*Sneha*	*Kalka*	Fire test	
			Sneha	*Kalka*
Mridupaka	Without Moisture	Sticky	+ve	-ve
Madhyam Paka	Without Moisture	Can be molded into *Varti* (spindle) form	+ve	+ve
Khara Paka	Without moisture	Rough, dry, brittle	+ve	+ve

Table No 8: Supakva Avastha Lakshana of Avaleha

Signs	Illustration
Sukh Sparsha	Soft to touch/ soft texture
Sukh Marda	Feels soft even after rubbing between fingers i.e. non sticky consistency
Gandha–Varna-Rasattapoti	having taste, colour, smell as that of ingredients i.e. good palatability
Pidite Mudra	Forms impression of thumb when pressed indicates proper frying

Table 10: Determination signs for fermentation in Asava-Arishta preparations

Onset	Completion
Floating of *Prakshepa Dravya*	Sunken *Prakshepa Dravya*
Presence of effervescence	Absence of effervescence (froth)
Presence of hissing sound	No sound
Mild sour taste	Appreciation of sour taste and
Aroma of Prakshepa Dravya	Alcoholic aroma
Extinguishing of burning candle	Continuation of burning of a lighted candle
Lime water taste – milky colour	No change in appearance of lime water

Table No 11: Details of various R_f values of four samples i.e. Vasa Swarasa, Vasa Avaleha(S), Vasicine & Vasicinone

Sample	R_f value	R_f value	R_f value
Vasa Swarasa	0.18	0.59	0.90
Vasa Avaleha (S)	-	0.55	0.90
Vasicine (Std)	-	0.55	-
Vasicinone (Std)	-	0.52	-

Table No 12: Details of various Rf values of four samples i.e. Vasa Kwatha, Vasa Avaleha (K), Vasicine & Vasicinone

Sample	R_f value	R_f value	R_f value
Vasa Kwatha	0.22	0.73	0.97
Vasa Avaleha (K)	-	0.66	0.97
Vasicine (Std)	-	0.68	-
Vasicinone (Std)	-	0.73	-

T.L.C. studies, while comparing with standards shows that presence of Vasicine & Vasicinone in *Vasa Avaleha(S)*, and Vasicine in *Vasa Avaleha (K).*

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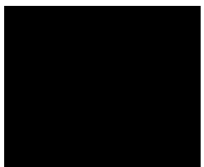

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