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Shubhangi Rathore

Post Graduate Scholar,
Department of PG Studies in
Kaumarabhritya, Sri
Dharmasthala
Manjunatheshwara College of
Ayurveda and Hospital, Udipi,
Karnataka, India

Chethan Kumar VK

Associate Professor,
Department of PG Studies in
Kaumarabhritya, Sri
Dharmasthala
Manjunatheshwara College of
Ayurveda and Hospital, Udipi,
Karnataka, India

Sharashchandra R

Assistant Professor,
Department of PG Studies in
Kaumarabhritya, Sri
Dharmasthala
Manjunatheshwara College of
Ayurveda and Hospital, Udipi,
Karnataka, India

Correspondence

Shubhangi Rathore

Post Graduate Scholar,
Department of PG Studies in
Kaumarabhritya, Sri
Dharmasthala
Manjunatheshwara College of
Ayurveda and Hospital, Udipi,
Karnataka, India

Preparation of Amruta abheervadi drops: An ayurvedic formulation for neonatal jaundice

Shubhangi Rathore, Chethan Kumar VK and Sharashchandra R

Abstract

Arka Kalpana (process of distillation) is important pharmaceutical preparation in Ayurveda. It is very specific in its mode of preparation and due to virtue of this particularity; it may have all volatile active substances in effective form in its final product. Amruta Abheervadi preparation is mentioned in Ayurvedic classics, contains the ingredients like *Tinospora cardifolia* (Thunb.) Miers (*Amruta*), *Asparagus racemosus* Willd. (*Abheeru*), *Trichosanthes dioica* Roxb. (*Patola*), *Azadiracta indica* A.Juss. (*Nimba*), *Pterocarpus santalinus* (*Raktachandan*) and *Hemidismus indica* Linn (*Sariva*). In this article, Amruta Abheervadi drops were prepared by using modern pharmaceuticals equipment. During the process of preparation, the method of preparation of Arka according to The Ayurvedic Formulary of India was followed.

Keywords: Amruta abheervadi, pharmaceuticals, Preparation, Arka, volatile substances

Introduction

Neonatal jaundice is a condition seen in the first week of life with the symptoms of yellowish discoloration of eyes, face, nails, urine and stools in the neonates [1]. For its treatment in neonates, Ashtanga Hridaya, an Ayurvedic treatise mentions Amruta abheervadi formulation [2]. Every drug can be a medicine but some pharmaceutical procedures are done to change or potentiate its original properties. The basic idea behind the administration of drug is to make it more suitable to the body elements. To achieve this, many processes were invented in a sense of manufacturing process, these are termed as Kalpanas (pharmaceutical preparation) [3]. Arka kalpana kalpana (process of distillation) is one among them, mentioned in an Ayurvedic text named Ravanakrita Arka Prakash [4]. The method by which the volatile oil and active principles of the drug are collected is called as Arka-kalpana (process of distillation) and the compound prepared through this procedure is called as Arka (distillate) [5]. This article highlights the different steps and stages of preparation of Amruta Abheervadi drops.

Materials and Method

Ingredients of the formulation [6]

1. *Tinospora cordifolia* (Thunb) Miers (Amruta)
2. *Asparagus racemosus* Willd. (Abheeru)
3. *Tricosanthes dioica* Roxb. (Patola)
4. *Azadirachta indica* A Juss. (Nimba)
5. *Pterocarpus santalinus* L.f. (Rakta chandana)
6. *Hemidesmus indicus* Linn. R.Br. (Sariva)

Tinospora cordifolia (Willd.) Miers ex. Hook. F. Thoms belongs to the family Menispermaceae, commonly known as Guduchi. Preliminary studies for photochemical screening suggests the presence of alkaloids, diterpenoid lactones, glycosides, steroids, sesquiterpenoid, phenolics, aliphatic compounds and polysaccharides. GCMS analysis of its stem showed the presence of many compound in different studies such as: Berberine, Choline, Magnoflorine, Palmatine, Palmatine, Tembetarine (0.012%), Magnoflorine (0.075%), Tetrahydropalmatine, Tinosporin etc. Guduchi is one of the most important herbs of Ayurveda use as samshamaniya (maintain homeostasis), rasayana (rejuvenator) have wide ranging health benefits. It is a potent hepatoprotective agent may be due to antioxidant and/or free radical scavenger property and ability to induce hepatic regeneration. The stem enriches the blood and cures jaundice. The extract of its stem is useful in skin diseases [7].

Ayurvedic properties

Rasa: Tikta, Kashaya

Guna: Guru, Snighda

Veerya: Ushna

Vipaka: Madhura

Dosha Karma: Tridosha samaka,

Karma: Jwarahara, Rasayana, Sangrahi, Dipana, Amahara,

Balya, Krimghana, Chaksusya, Vayasthapana

Asparagus racemosus (willd.), commonly known as Shatavari belongs to the family Liliaceae. Ayurvedic treatises depict the importance of Shatavari as the “Queen of herbs”. Shatavari means “Curer of Hundred Diseases”. Preliminary studies for phytochemical screening suggests the presence of alkaloids, saponins, steroids, terpenoids, amino acid, proteins, Asparagine A and disaccharides in different extracts [8]. It is also reported to have ulcer healing effect as it heals duodenal ulcers without inhibiting acid secretion. *A. racemosus* is known to possess *Escherichia coli*, *Shigella dysenteriae*, *Shigella sonnei*, *Shigella flexneri*, *Vibrio cholerae*, *Salmonella typhi*, *Salmonella typhimurium*, *Pseudomonas pectida*, *Bacillus subtilis* and *Staphylococcus aureus*. *A. racemosus* significantly reduces the enhanced levels of serum transaminase and alkaline phosphate in CCl4 induced hepatic injury in rats [9].

Ayurvedic properties

Rasa: Madhura, Tikta

Guna: Guru, Snehana

Veerya: Sheeta

Vipaka: Madhura

Dosh Karma: Vatapitta samaka, Vata samaka

Karma: Rasayana, Medhya, Pusti Vardhaka, Netrya, Atisarajit,

Sukravardhaka, Stanyavardhaka, Balya, Sothahara, Vrisya, Gulmanasaka

Trichosanthes dioica (Roxb.) belongs to the family Cucurbitaceae, called as Patola. GCMS of aqueous extract of roots showed the presence of Phthalic acid, butyl undecyl ester, Dibutyl phthalate, Methoxyacetic acid, 4-tridecyl ester, Octadecane, 2methyl-, Sulfurous acid, pentadecyl pentyl ester, Eicosane, 2-methyl, 2-methyltetracosane, Eicosane, 7-hexyl, 2-methylhexacosane, Heptacosane, Octacosane¹⁰.

Ayurvedic Properties

Rasa: Tikta, Katu

Guna: Laghu, Rooksha

Vipaka: Katu

Veerya: Ushna

Dosha Karma: Pittahara

Karma: Pachaka, Deepaka, Hrudyta, Balya

Azadirachta indica A. Juss. Syn; *Melia azadirachta* Linn., belongs to the family Meliaceae is commonly known as nimba and neem. Neem and its constituents remarkably exhibit immunomodulatory, anti-inflammatory, antihyperglycaemic, antiulcer, antimalarial, antifungal, antibacterial, antiviral, antioxidant, antimutagenic and anticarcinogenic properties [11].

Ayurvedic properties

Rasa: Tikta

Guna: Laghu

Virya: Sita

Vipaka: Katu

Karma: Kandughna, Sitagrahi, Ahrdya, Kaphahara, Pittahara, Rucya Dipana, Visaghna, Vransodhana

Pterocarpus santalinus Linn.f., belongs to the family Fabaceae, commonly known as Red sanders. Phytochemical investigations of aqueous and ethanol extracts of stem bark revealed the presence of alkaloids, phenols, saponins, glycosides, flavonoides, triterpenoides, sterols, and tannins. The heart wood contains isoflavone glucosides and two anti-tumour lignans, viz., savinin and calocedrin. The heartwood of Red sanders is known to have antipyretic, anti-inflammatory, anthelmintic, tonic, hemorrhage, dysentery, aphrodisiac, and diaphoretic activities. It has also been used as a cooling agent [12].

Ayurvedic properties

Rasa: Tikta, Madhura

Guna: Guru, Rooksha

Vipaka: Katu

Veerya: Sheeta

Dosha Karma: Kaphapitta samaka, Kapha samaka, Pittahara.

Karma: Trsnahara, Varnya, Vrnya, Jwarahara, Vrana ropaka, Vishahara, Dahakara, Chardihara

Hemidesmus indicus (Linn.) R.Br. belongs to the family Asclepiadaceae is commonly known as Indian Sarsaparilla or Anantmula. Preliminary studies for phytochemical screening suggests the presence of alkaloids, glycosides, carbohydrates, polyphenol, steroids, terpenoids and saponin in different extracts. GCMS profiling revealed the presence of volatile contents- 2-hydroxy-4-methoxybenzaldehyde (91%) and ledol (4.5%), which are to isolate in pure form, as the major constituents. It has been known to possess significant activity against immunotoxicity and acts as effective chemopreventive agent in skin and also ameliorates hydroperoxide-induced cutaneous oxidative stress and tumor promotion and also significantly prevents rifampicin and isoniazid-induced hepatic injury in rats [13].

Ayurvedic properties

Rasa: Madhura, Tikta

Guna: Guru, Snigdha

Vipaka: Madhura

Veerya: Sheeta

Dosha Karma: Tridosha samaka

Karma: Sukravardhaka, Swashara, Kasahara, Jwaraghna, Kushtaghana, Kandughna, Mehahara, Dougandhyanasaka, Trishnahara, Raktapittahara, Raktasodhaka, Balya, Dipana

Collection and authentication of raw drugs

The above mentioned drugs were collected from Sri Dharmasthala Manjunatheshwara Pharmacy, Udupi, Karnataka, India. The drug analysis and standardization was done at SDM centre for Research in Ayurveda and Allied Sciences, Udupi, Karnataka state, India and GC-MS analysis for the drops were done at, Department of Pharmacognosy, Siddha Central Research Institute, Arumbakkam, Chennai, India.

Apparatus required for distillation [14]

Distillation is the process by which liquid is vaporized and

recollected by cooling and condensing the vapor. The apparatus required for distillation are as follows

- 1) Boiler (Heating mantle) - which provides heat and maintain the heat.
- 2) Vessel, in which vapors are produced by heating the liquid up to its boiling point.
- 3) Condenser - This function as a cooling device of vapors either by circulation of water or air at atmospheric temperature.
- 4) Receiver - It is used for the collection of the condensed liquid.

Method of preparation

Amruta Abheervadi drops were prepared by using different parts of medicinally important plant such as Amruta (stem) (Fig. 1), Abheeru (tuberous root) (Fig. 2), Patola (leaves) (Fig. 3), Nimba (bark) (Fig. 4), Raktachandan (heartwood) (Fig. 5) and Sariva (root) (Fig. 6) in equal quantity of 200 grams each. The above mentioned plant materials were taken and made into coarse powder and soaked overnight in 10 parts of water. Next morning, the soaked drugs were subjected for the distillation process. The vapors are condensed and collected in a receiver. In the beginning, the vapors consist of only steam and may not contain the essential principles of the drugs. It should therefore be discarded. The last portion also may not contain therapeutically essential substance and should be discarded. The final product was in the form of drops (Fig. 7). This method of preparation of Arka is followed according to The Ayurvedic Formulary of India.



Fig 4: Bark of Nimba



Fig 5: Powder of Heartwood of Rakta Chandana



Fig 1: Stem of Amruta



Fig 6: Root of Sariva



Fig 2: Root of Abheeru



Fig 3: Leaves, fruit, stem of Patola



Fig 7: Amruta Abheervadi Drops

Precautions to be taken ^[15]

1. The drugs should be in coarse powder form.
2. The coarse powdered drugs should be soaked in water and then should be subjected to the distillation process.

Duration of preparation- 3 Hours**Test of Arka** ^[16]

Arka is a suspension of the distillate in water which should be clear and transparent. Color according to the nature of the drugs used and smell of the predominant drug. When Arka is filled in different Patra, the colour of Arka should be similar to Shankha, Kundan and moon rays.

Organoleptic parameters of finished product

- Color: colorless
- Consistency: liquid
- Smell: specific odor
- Taste: specific taste

Discussion

The finished product, Amruta Abheerwadi drops was colorless and liquid in consistency which establishes the optimum presentation of Arka preparation. The specific odor and taste of Arka is attributed to the ingredients used for its preparation. Over 60% of term and 80% of preterm babies develop clinical jaundice and by adult standards almost all newborn babies are jaundiced during the early days of life ^[17]. If remains untreated, leads to severe condition called kernicterus, where irreversible brain injury takes place ^[18]. Therefore, to prevent the rise of serum bilirubin in neonates this polyherbal preparation was made with all measures of sterility. Arka kalpana is explained in an Ayurvedic treatise named Arka Prakasha, where it has been said that Arka is the most potent among Kalka, Churna, Swarasa, Taila. Its shelf life is longer than other Kalpanas like Swarasa, Kwatha etc. This Kalpana is easy to administer in the patients of navajata (neonates) and one who hesitate to take medicines like Churna, Kwatha etc due its palatability ^[19]. Arka is Laghupaki, Vyavayi and Vikasi & thus assimilates quickly in the body there by gives immediate results. Arka Kalpana acquires highest position in obtaining the potentially active volatile oils as the condensation takes place during the process of distillation.

Conclusion

More practical approach must be incorporated in the field of Ayurvedic medicine manufacture even though the introduction of modern expertise in pharmaceutical sector has amplified the effectiveness of such medicinal formulations. Ayurveda is principle among the traditional health practice in the world hence traditional inspired practical approach should be made in preparing prime quality preparations.

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