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Pharmacognostic, physicochemical and chromatographic characterization of Samasharkara Churna

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ABSTRACT

Background: Samasharkara Churna, a polyherbal Ayurvedic formulation, is prescribed for treating various conditions such as asthma and cough. Literature review suggested that characterization parameters of Samasharkara Churna are not reported.
Objective: To report characteristic parameters of Samasharkara Churna to conform its identity, quality and purity.
Materials and Methods: Samasharkara Churna was evaluated for pharmacognostic, physicochemical, microbiological, and chromatographic parameters.
Results: The chromatographic analysis was able to showed presence of all ingredients in Samasharkara Churna.
Conclusion: The characterization parameters presented in this paper may serve as standard reference for the quality control analysis of Samasharkara Churna.
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1. Introduction

According to World Health Organization (WHO); traditional, complementary, alternative, or non-conventional medicines are used by 70–95% of global population particularly in developing countries for their healthcare [1]. Moreover, the use of herbal medicines has increased remarkably in line with the global trend of people returning to natural therapies [2]. The growing use of botanicals (drug and other products derived from plants) by the public is forcing moves to assess the health claims of these agents and to develop standards of quality and manufacture.

Standardization of herbal medicines is the process of prescribing a set of standards or inherent characteristics, constant parameters, definitive qualitative and quantitative values that carry an assurance of quality, efficacy, safety and reproducibility. A herbal product cannot be considered scientifically valid if the drug tested has not been authenticated and characterized in order to ensure reproducibility in the manufacturing of the product. Moreover, many dangerous and lethal side effects have recently been reported, including direct toxic effects, allergic reactions, effects from contaminants, and interactions with herbal drugs [2]. On this background, standardization is an important step for the establishment of a consistent biological activity, a consistent chemical profile, or simply a quality assurance program for production and manufacturing of a herbal drug [3].

The Indian system of medicine, mainly comprising of Ayurveda, Siddha and Unani, is one of the oldest holistic management system with thoroughly documented remedies. Ayurveda, a part of cultural heritage of India, is widely respected for its uniqueness and global acceptance as it offers natural ways to treat diseases and promote healthcare [4]. Unfortunately, standardization and quality control have remained grey areas in the preparation of Ayurvedic medicines. Till date, most of the ayurvedic formulations are lacking in their defined quality control parameters and method of its evaluation [5].

Asthma is one of the most common chronic diseases affecting an estimated 300 million people worldwide and ranks third responsible for hospitalization [6,7]. The prevalence of asthma is increasing in most countries, especially among children. Asthma is a significant burden, not only in terms of health care costs but also of lost productivity and reduced participation in family life [8]. Asthma is not just a public health problem for high income

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countries, it occurs in all countries regardless of level of development. Over 80% of asthma deaths occur in low and lower-middle income countries [9]. Plant-based medicines are the 3rd most popular choice of both adults (11%) and children (6%) suffering from asthma.

Samasharkara Churna, an ayurvedic polyherbal churna (fine powder) formulation, is prescribed by Ayurvedic physicians for treating conditions such as Asthma (Shwasa Roga in Ayurveda) and cough [10]. It contains six ingredients, viz., Lavanga *(Syzygium aromaticum),* Jatiphala *(Myristica fragrans),* Pippali *(Piper longum),* Maricha *(Piper nigrum),* Mahaushadha *(Zingiber officinale)* and Sita (Sugar) mixed in equal proportion by weight. There is lack of information regarding scientific analysis of Samasharkara Churna, hence characterisation of Samasharkara Churna was planned to conform its identity, quality and purity.

2. Materials & methods

2.1. Plant materials

All the ingredients of Samasharkara Churna were procured from the local market of Bhubaneswar, Odisha, India, and were authenticated by botanist Miss. Rashmibala Sahoo, Scientific officer of the Department of Botany, State Drug Testing & Research Laboratory (ISM), Bhubaneswar, Odisha, India. Voucher specimens of these ingredients have been deposited in the Department of Pharmacognosy, State drug Testing & Research Laboratory (ISM), Bhubaneswar, Odisha, India, for future reference.

2.2. Methods

2.2.1. Preparation of Samasharkara Churna

The Samasharkara Churna was prepared as per the standard method described in Ayurvedic Formulary of India. As per the literature, all the ingredients were shade dried and powdered separately, passed through #80 sieve, and then mixed together in required proportions to get uniformly blended churna [11].

2.3. Pharmacognostical study

2.3.1. Determination of foreign matter

Total 100 g of the sample was spread out in a thin layer. The foreign matter was detected by inspection with the unaided eye or by the use of a lens (6×), separated, weighed and the percentage foreign matter was calculated [12].

2.3.2. Organoleptic parameters

The organoleptic characters like colour, odour, taste, appearance and texture of the ingredients and formulation samples were evaluated based on the reported method [13].

2.3.3. Fluorescence analysis

Fluorescence characters of powdered materials in different standard reagent solutions towards ordinary visible light and Ultra Violet light (both long 365 nm and short 254 nm wave lengths) were observed [14].

2.3.4. Microscopic study of Samasharkara Churna

Five mg of the sieved (#80) powder samples (churna and ingredients) were taken and washed with plain water. Then the samples were treated separately with iodine, chloral hydrate, pholorglucinol or potassium iodide; a drop of glycerine was added and mounted. The powder sample characters were then observed by Carl Zeiss binocular microscope attached with camera according to standard method [15,16].

2.4. Physicochemical investigation

Different physicochemical investigations of churna and its raw materials were carried out using standard pharmacopoeial methods, including determination of alcohol soluble extractives, water soluble extractives, total ash, acid insoluble ash, loss on drying and pH determinations [17,18].

2.5. Determination of physical characteristics of powder

Physical characteristics like bulk density, tap density, angle of repose, Hausner's ratio and Carr's index were determined for the churna formulations [19].

2.6. Qualitative phytochemical investigation

Comparative qualitative chemical tests were carried out for Samasharkara Churna and its ingredients on their different extracts of various polarities. These phytochemical screening included tests for alkaloids, tannins, steroid, glycoside, flavonoids, saponins, carbohydrates, terpenoids and proteins [20].

2.7. Determination of toxic contaminants

2.7.1. Heavy metal determination

Heavy metal analysis was performed using PERKIN ELMER AAS-200 instrument. As per protocol, sample digestion was carried out by multi-acid digestion system for Lead (Pb), Cadmium (Cd), Copper (Cu), Zinc (Zn), Nickel (Ni) and Chromium (Cr) [21]. After completion of digestion process, the filtered samples were analysed by Atomic Absorption Spectrometer (AAS). However being volatile, Mercury (Hg) and Arsenic (As) were digested using Nitric acid-Hydrochloric Acid-Potassium Permanganate system before analysis [22]. The Mercury Vapour Atomization (MVA) and Hybrid Vapour Generation (HVG) attachments were utilised for AAS analysis of Hg and As respectively. The standards of Lead (Pb), Cadmium (Cd), Arsenic (As), Mercury (Hg), Cupper (Cu), Zinc (Zn), Nickel (Ni) and Chromium (Cr) were purchased from Merck, Germany and utilised for development of the respective calibration curves for these metals.

2.7.2. Microbial limit test

Microbial analysis was carried out as per standard procedure mentioned in Ayurvedic Pharmacopoeia of India. It included total bacterial count, total fungal count, presence of pathogens like *Escherichia coli, Salmonella ebony, Pseudomonas aeruginosa,* and *Staphylococcus aureus* [23].

Table 1
Fluorescence analysis of Samasharkara Churna

Powdered drug	Visible/day light	Ultra violet light	
		254 nm	366 nm
Powder as such	Crimson to dark brown	Light yellow	Light yellow
Powder + conc. HCl	Yellow	Green	Green
Powder + 10% $K_2Cr_2O_7$	Yellow	Fluorescent green	Brown
Powder + 1 M NaOH	Red brown	Deep green	Fluorescent green
Powder + $AgNO_3$	Light yellow	Yellow	Yellow
Powder + conc. HNO_3	Orange yellow	Black	Fluorescent green
Powder + conc. H_2SO_4	Dark brown	Greenish black	Black
Powder + Br_2 water	Light brown	Fluorescent green	Fluorescent green
Powder + Methanol	Light brown	Fluorescent green	Fluorescent green
Powder + CH_3COOH	Light brown	Yellow	Yellow
Powder + NH_3	Yellow	Fluorescent green	Yellow
Powder + I_2	Light purple	No colour	No colour

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