

COMPARATIVE EVALUATION OF AYURVEDIC FORMULATION *SITOPLADI CHURNA* OF DIFFERENT BRANDS

ABSTRACT

In ayurvedic system of treatment, churnas are as good as are asavas and arishtas for the eradication of diseases. As a part of evaluation, Dabur and Baidhyanath brands properties of *Sitopladi churna* were tested for relevant organoleptic, physiochemical, micromeritics and fluorescence properties. The Dabur formulation is more elegant in colour, odor and in taste. Moisture content of both formulations was found within pharmacopoeial limit. In the present study, Dabur churna emitted white and Baidhyanath emitted off white fluorescence under day light, in short UV light and in long UV light. The micromeretic parameters (bulk density, tap density, angle of repose & Carr's index) were checked to determine its flow property; both formulations were found with good flow. Preliminary phytochemical screening indicated presence of saponins, tannins, alkaloids, flavonoids and phenolics. The results were found in close proximity for both brands. This study on *Sitopladi churna* was reproducible, precise and may be considered as a method for its quality control.

Keywords: Standardization, *Sitopladi churna*, ayurvedic formulation, respiratory disorders and expectorant

INTRODUCTION

The subject of herbal drug standardization is extremely wide and deep. For the purpose of research work on standardization of herbal formulation and nutraceuticals, a profound knowledge of the important herbs found in India and widely used in ayurvedic formulation is of importance¹. India can emerge as the major country and play the lead role in production of standardized, therapeutically effective ayurvedic formulations. This can be achieved only if the herbal products are evaluated and analyzed using sophisticated modern techniques of evaluation².

Sitopladi churna, an ayurvedic polyherbal formulation, consisting of *Bambusa aurundinacea*, *Piper longum*, *Cinnamomum zeylanicum*, *Elettaria cardamomum* and Sarkra, is effective in relieving coughs associated with various respiratory disorders. It also increases the appetite, helps digestion, and provides strength to the body. It is recommended for seasonal coughs and colds, as it is a very good expectorant. It is also very supportive in allergic and viral respiratory infections. It reduces pharyngeal and chest congestion by stimulating melting of thickened mucous in airways³. Among all the ayurvedic medicines for the cough and cold, *Sitopladi churna* is the most celebrated one with less quality control methods for its evaluation. Dabur and Baidhyanath are two well known and established brands in ayurvedic formulations since many years. A quality ayurvedic formulation must confirm test for identity, potency, purity, safety and efficacy. According to Bhaishajya Ratnawali⁴, *Sitopladi churna* is composed of Sarkara and four herbs, but there is not a single standard mentioned for ensuring its identity,

potency, purity, safety and efficacy. This paper reports on the characteristics, phytochemical, physiochemical and micromeritic methods for ensuring the identity, potency, purity, safety and efficacy of *Sitopladi churna*.

MATERIALS AND METHODS

Collection of samples

The marketed samples of *Sitopladi churna* of Dabur (batch no. 28 and DOM-1/08) and Baidhyanath (BATCH NO. ALOO40 and DOM- 1/07) brands were purchased from Ayurvedic pharmacy from the local market of Mandsaur in the month of May 2019.

Organoleptic evaluation

Organoleptic evaluation refers to evaluation of the formulation by color, odor, taste, texture, etc. The organoleptic characters of the samples were evaluated based on the method described by Siddiqui et al⁵.

Physiochemical constant and fluorescence analysis

Physiochemical investigations (determination of total ash, acid-insoluble ash, water soluble ash, water-soluble extractive, alcohol-soluble extractive, and chloroform-soluble extractive, moisture content) of the marketed formulations of Dabur and Baidhyanath brands were carried out, as described in Ayurvedic Pharmacopoeia⁶. Fluorescence study was carried out as per the standard procedures⁷. In the present study, the sample powder was treated with 1 N aqueous sodium hydroxide, 1 N alcoholic sodium hydroxide, 1 N hydrochloric acid, 50 % sulphuric acid, nitric acid, picric acid, acetic acid and nitric acid with ammonia.

Table I: Physicochemical parameters of the both brands of *Sitopaladi churna*

S. No.	Parameter	Test sample (Dabur) (n = 3) ± SD	Test sample (Baidhyanath) (n = 3) ± SD
1.	Total ash	4.347 ± 0.077	5.456 ± 0.098
2.	Acid insoluble ash	0.967 ± 0.073	1.256 ± 0.045
3.	Water soluble ash	1.126 ± 0.013	1.769 ± 0.076
4.	Water soluble extractives	46.541 ± 0.023	43.621 ± 0.032
5.	Alcohol soluble extractives	18.026 ± 0.065	16.036 ± 0.040
6.	Chloroform soluble extractives	5.046 ± 0.024	1.92 ± 0.004
7.	Moisture content	8.253 ± 0.233	9.568 ± 0.0865

Values are reported as mean + SD of three determinations

Chemical evaluation

The standard method of Brain and Turner^{8,9} was used for the phytochemical examination.

Micromeritic evaluation of churna formulation

Micromeretic parameters of a powder include its bulk density, true density or tapped density, Carr's index and angle of repose and were determined for different formulations. The term bulk density refers to packing of particles or granules. The equation for determining bulk density (D_b) is $D_b = M/V_b$ where M is the mass of particles and V_b is the total volume of packing. The volume of packaging can be determined in an apparatus consisting of a graduated cylinder mounted on a mechanical tapping device that has a specially cut rotating can. The initial volume is noted and sample is tapped until no reduction in volume is noted. The initial volume gives the bulk density value and after tapping the volume gets reduced, it gives the value of tapped density¹⁰.

Angle of repose has been used as an indirect method quantifying powder flow ability because of its relationship with interparticle cohesion. The foxed funnel and the free standing cone method employ an apparatus that is secured with its tip at a given height (H) above the glass paper that is placed on a flat horizontal surface. Powder or granules is carefully poured through the funnel until the apex of the conical pile just touches the tip of funnel.

Carr's index is another method of measuring the powder flow from bulk density. The equation for measuring Carr's indexes $I = (D_t - D_o/D_t) \times 100$

where D_t is the tapped density and D_o the bulk density

Determination of total phenolic content

The total phenolic content of both churna formulations was measured using Folin Ciocalteu's reagent. Total phenolic content was determined using Gallic acid as standard¹¹.

Determination of total flavonoid content

The total flavonoid content of both churna formulations was measured. Total flavonoids content was recorded according to a standard established curve with quercetin¹².

Determination of crude saponin content

20 g Drug powder of the churna was added to a conical flask containing 100 mL of 20 % aqueous ethanol. The solution was heated for 4 h with constant stirring at 55 °C. The solution was filtered and marc was extracted with 200 mL 20 % ethanol. After that, both extracts were mixed and solvent was evaporated till 40 mL volume of extract remained. The concentrated extract was extracted with 20 mL of diethyl ether in separating funnel. The aqueous layer was recovered while the ether layer was discarded. The aqueous extracts were purified by adding 60 mL *n*-butanol. Further, it was washed with twice 10 mL of 5 % aqueous NaCl. The solution was dried and the saponin content was calculated as percentage¹³.

Determination of tannins content

Stock solution of 1 mg mL⁻¹ of tannic acid was prepared by dissolving 100 mg of accurately weighed tannin acid in water. 1-10 mL Aliquots were taken in clear test tube. 0.5 mL of Folin-Denis reagent and 1.0 mL of sodium carbonate solution was added to each test tube. Each tube was made upto 10 mL with distilled water. All the reagents in each tube were mixed well and kept undisturbed for about 30 min and read at 760 nm against blank reagent¹⁴.

RESULTS AND DISCUSSION

As a part of evaluation, both (Dabur and Baidhyanath) formulations of *Sitopaladi churna* were tested for relevant organoleptic parameter, physicochemical parameters like extractive values (chloroform, ether, ethanol and

distilled water), ash value (total ash, water soluble ash, acid insoluble ash), micromeretic parameters (bulk density, true density and angle of repose) and fluorescence analysis (shown in Table I). Dabur preparation was more elegant in its taste, odor and in colour. The physical evaluation of the drug is an important parameter in detecting adulteration or improper handling of formulation¹⁵. The moisture content of the drug is not too high, thus it could discourage the bacterial, fungal or yeast growth, as the general requirement for moisture content in crude drug is not more than 14 %. Equally important in evaluation, is the ash value and acid insoluble ash value determination. The ash value is generally an index of the purity as well as identity of the drug, particularly important in the evaluation of foreign inorganic matter such as metallic salt and silica. The ash value of Baidhyanath formulation was more in comparison to Dabur formulation (Table I). The higher limit of ash values indicates the presence of various mineral substances like sand, soil calcium oxalate, chalk powder or other drugs. Baidhyanath churna showed more percentage of total ash than the Dabur one and hence is more prone to contamination. Many phytochemicals fluoresce when suitably illuminated. The fluorescence color is specific for each compound. A nonfluorescent compound may become fluorescent if mixed with impurities that are fluorescent. In the present study, Dabur churna emitted white and Baidhyanath emitted off white colour under day light, in short UV light and in long UV light. Preliminary phytochemical screening indicated presence of saponins, tannins, alkaloids and flavonoids, phenolics. The micromeretic parameters (bulk density, tap density, angle of repose and Carr's index) of the powdered drugs were determined to check its flow properties. A drug with good flow characteristics can be used in various formulations. In case of *Sitopaladi churna* of two different brands, Dabur emerged with good flow characteristics. Total phenolic and flavanoids contents of both the churnas were determined by UV spectrophotometric method. The given values are mean \pm SD of three different determinations. Dabur brand contains more amount of phenolics (2.24 ± 0.34) and flavanoids (5.55 ± 0.84) as compared to Baidhyanath. The total tannins contents were determined by UV spectrophotometric method. Tannins bind to proteins and inhibit the protein synthesis¹⁶. Total saponin content of Baidhyanath brand (2.42 ± 0.24) was found more as compared to Dabur brand. The total tannins content of Baidhyanath brand was found to be more (8.96 ± 1.54) %w/w than in Dabur's. Therefore, preliminary phytochemical screening might be proved valuable in the detection and further quantitative analysis of these therapeutically important compounds.

CONCLUSION

Ayurvedic medicine, *Sitopaladi churna* of different brands (Dabur and Baidyanath) has been evaluated by intervention with modern scientific quality control measures in the traditional systems of medicine. These analytical findings and data analysis reveal that parameters remain in close proximity.

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