Research Article

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STANDARDIZATION OF BALABILWADI MODAKA: AN AYURVEDIC COMPLEMENTARY FOOD

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ABSTRACT

Standardization of Ayurvedic formulations is an important step for establishment of consistent chemical profile, biological activity and quality assurance for the manufacturing of herbal drugs. Most of the pharmaceutical industries are using substitute drugs instead of authentic drugs. Balabilwadi modaka is an Ayurvedic polyherbal preparation comprising of Baalabilwa (Unripe fruit of *Aegle marmelos*), Ela (*Elettaria cardamomum)*, Sarkara (sugar candy) and Laajasaktu (Parched rice)which possess properties like laghu (light to digest), deepana (appetizer) and santarpana (nourishment) etc. Keeping above facts in mind it is aimed to standardize Balabilwadi modaka, employing standard testing protocol for AYUSH drugs. Physicochemical studies, like loss on drying at 105 °C, total ash, acid insoluble ash, water soluble ash, alcohol soluble extractive, water soluble extractive and HPTLC were performed as per standard methodology. Qualities indicating physical and chemical tests were done and standard values for Balabilwadi modaka were recorded. HPTLC finger print profile of the ethanolic extract of Balabiwadi modaka revealed the presence of seven polyvalent phyto constituents with Rf values ranging from 0.05 to 0.97. Standardization tests done on Balabilwadi modaka helped in authenticating the polyherbal preparation and also in ensuring the quality of the same.

Key words: Balabilwadi modaka, Baalabilwa, Ela, Laajasaktu.

INTRODUCTION

The World Health Organization defines complementary food as any food whether manufactured or locally prepared, suitable as a complement to breast milk or to infant formula, when either become insufficient to satisfy then nutritional requirements of the infant. Such food is also commonly called weaning food or breast-milk supplement.[1] Many combinations of complementary feeds have been detailed in Ayurvedic literatures and Balabilwadi modaka is one among them. Balabilwadi modaka comprises of Baalabilwa (Unripe fruit of *Aegle marmelos*),[2] Ela (*Elettaria cardamomum)*, Sarkara (sugar candy) and Laajasaktu (Parched rice). Balabilwadi modaka possess properties like laghu (light to digest), deepana (appetizer) and santarpana (nourishment) etc. and can fulfill all nutritive aspects during weaning period.[3]

The standardization of Ayurvedic formulations including Balabilwadi modaka is most important for the establishment of its chemical profile, its biological activity and its quality assurance in manufacturing of herbal drugs.[4] The issues regarding the quality, safety and efficacy of herbal drugs have raised up with the increase in its usage.[5] There is increased general awareness about the necessity for developing standards for the purpose of quality control by the manufacturers as well as by the Drug control Authorities as the Ayurvedic medicines come under the purview of Drugs and Cosmetics Act.[6] At present, the quantity of raw material is not sufficient in the market. Most of the pharmaceutical industries are using substitute drugs instead of authentic drugs.[7] So to prepare best quality drugs it is necessary to authenticate raw drugs. Keeping the current trend in mind, Balabilwadi modaka was subjected for standardization procedures. From the current study, quality indicating parameters Balabilwadi modaka was derived.

MATERIALS AND METHODS

Physical and chemical studies, like loss on drying at 105 °C, total ash, acid insoluble ash, water soluble ash, alcohol soluble extractive andwater soluble extractive valueswere carried out according to official methods[8-10]. HPTLC studies were carried out following the method of Harborne[11] and Wagner et al[12].

Plant Material

Among the ingredients of Balabilwadi modaka, Baalabilwa (Unripe fruit of *Aegle marmelos*) was collected from Botanical garden of SDM College of Ayurveda and Hospital, Hassan and rest collected from local market of Udupi, Karnataka. The modaka was prepared from the same and was identified and authenticated (no: 15090801) by the experts at SDM Ayurveda Pharmacy, Kuthpady, Udupi, Karnataka state, India.

The studies were done at SDM Centre for Research in Ayurveda and Allied Sciences, Kuthpady, Udupi, Karnataka state, India as per standard procedure.

Loss on drying at 105°C: 10 g of sample was placed in tarred evaporating dish. It was dried at 105˚C for 5 hours in hot air oven and weighed. The drying was continued until difference between two successive weights was not more than 0.01 after cooling in desiccators. Percentage of moisture was calculated with reference to weight of the sample.

Total Ash: 2 g of sample was incinerated in a tarred platinum crucible at temperature not exceeding 450˚C until carbon free ash was obtained. Percentage of ash was calculated with reference to weight of the sample.

Acid insoluble Ash: To the crucible containing total ash, 25ml of dilute HCl was added and boiled. The insoluble matter on ash

less filter paper (Whatmann 41) was collected and washed with hot water until the filtrate was neutral. The filter paper containing the insoluble matter was transferredto the original crucible and dried on a hot plate and ignited to constant weight. The residue was allowed to cool in suitable desiccator for 30 minutes and weighed without delay. The content of acid insoluble ash was calculatedwith reference to the air dried drug.

Water soluble ash: The ash was boiledwith 25 ml of waterfor 5 min; insoluble matter was collected on an ash less filter paper, washed with hot water, and ignited for 15 minutes at a temperature not exceeding 450˚C. The weight of the insoluble matter was subtractedfrom the weight of the ash; the difference in weight represented the water soluble ash with reference to the air-dried sample.

Alcohol soluble extractive: Approximately 4 g of the sample was weighed accurately in a glass stoppered flask. 100 ml of distilled alcohol (approximately 95%) was added and shaken occasionally for 6 hours. It was allowed to stand for 18 hours and then filtered rapidly without losing any solvent. The filtrate (25ml) was pipette out in a pre-weighed 100 ml beaker and evaporated to dryness on a water bath. It was then kept in an air oven at 105°C for 6 hours, cooled in a desiccator for 30 minutes and weighed. The percentage of alcohol extractable matter of the samplewas calculated. The steps were repeated twice, and the average value was taken.

Water soluble extractive:Approximately 4 g of the sample was weighed accurately in a glass stoppard flask. Distilled water(100 ml) was added, shaken occasionally for 6 hours. It was allowed to stand for 18 hours and filtered rapidly taking care not to lose any solvent. The filtrate (25ml) was pipetted out in a pre-weighed 100 ml beaker and evaporated to dryness on a water bath. It was then kept in an air oven at 105°C for 6 hours, cooled in a desiccator for 30 minutes and weighed. The percentage of alcohol extractable matter of the sample was calculated. The steps were repeated twice, and the average value was taken.

HPTLC: The HPTLC system (CAMAG, Muttenz, Switzerland) consisted of (i) Linomat 5 sample applicator using 100 µL syringes and connected to a nitrogen tank; (ii) chamber ADC 2 containing twin trough chamber 20×10 cm; (iii) Camag TLC visualizer; (iv) Camag TLC scanner 3 linked to winCATS software.TLC plate consisted of 20 x10 cm, precoatedwith silica gel 60 F254 TLC plates (E.Merck) (0.2mmthickness) with aluminum sheet support.One gram of powdered samples were dissolved in 10 ml ethanol and kept for cold percolation for 24h and filtered. 4, 8 and 12µl of the above samples of were applied on a pre-coated silica gel F254 on aluminum plates to a band width of 7 mm using Linomat 5 TLC applicator. The plate was developed in Toluene: Ethyl acetate (7.0: 1.0). The developed plates were visualized in UV 254nm, 366 nm and then derivatised with vanillin sulphuric acid reagent and scanned under UV 254nm, 366nm and 620nm following derivatisation R_f, colour of the spots and densitometric scan were recorded.

RESULTS AND DISCUSSION

The standardization of Ayurvedic formulations requires rational approach and in this regard the main obstacle is the identification of biological source of the each ingredient/drugs. Regardless of the advent of modern technology in standardization of Ayurvedic formulations, only a few are standardized so far. The purpose of standardization is to ensure therapeutic efficacy since the active constituents may vary according to geographical source of the drug. Thus it may not be easy to standardize drug chemically and hence maintaining the quality of these plant products is an essential factor.

Standardization tests performed for Balabilwadi modaka were as per AYUSH testing protocol for Modaka. The Balabilwadi modaka sample has been shown in figure number 1. Balabilwadi modaka is found to be yellow in color with characteristic odour and bitter taste. The physicochemical parameter of Balabilwadi modaka has been detailed in table number 1. The physicochemical standards would serve as a preliminary test for the standardization of the formulation. Ash value is useful in determining authenticity and purity of the drug and also these values are important quantitative standards. Percent weight loss on drying or moisture content was found to be 20.0% w/w. The less value of moisture content could prevent bacterial, fungal or yeast growth.

The HPTLC finger print profile of alcoholic extract of Balabilwadi modaka at 254nm, 366 nm and post derivatisation at 600nm is presented in figure 2. Densitometric scan at 254nm, 366nm and post derivatisation are detailed in figure 3 to 5.In this study HPTLC fingerprint profile of ethanolic extract of Balabiwadi modaka revealed several peaks. The results from HPTLC finger print scanned at wavelength 254 nm for ethanolic extract of Balabiwadi modaka revealed the presence of seven polyvalent phytoconstituents (Figure 3). The Rf values ranged from 0.05 to 0.97. It is also clear from the chromatogram that out of seven components, the component with Rf values 0.59, 0.65 were found to be more predominant as the percentage area is more with 53.8% and 19.95% respectively. However, only five spots were detected under UV 366 nm with Rf value ranging from 0.11 to 0.94 respectively and the component with Rf value 0.54 showed the maximum peak area percent of 43.98%. Whereas, the chromatogram post derivatisation revealed nine polyvalent components with Rf values in the range of 0.04 to 0.97 (Figure 5). Thus the developed chromatogram is specific with the selected solvent system, Rf value and serves as a better tool for standardization of the extract**.**

These physicochemical parameters like loss on drying at 105 °C, total ash, acid insoluble ash, water soluble ash, Alcohol soluble extractive, Water soluble extractive, results ofTLC photo documentation, the unique Rf values and densitogram obtained at different wavelengths can be usedas fingerprint to check quality of Balabilwadi modaka.

Figure 1: Balabilwadi modaka sample

Table 1: Results of standardization parameters of Balabilwadi modaka

Parameter	Results n = 3 %w/w
Loss on drying	20.0
Total Ash	1.10
Acid Insoluble Ash	0.35
Water soluble Ash	0.49
Alcohol soluble extractive value	6.73
Water soluble extractive value	63.16

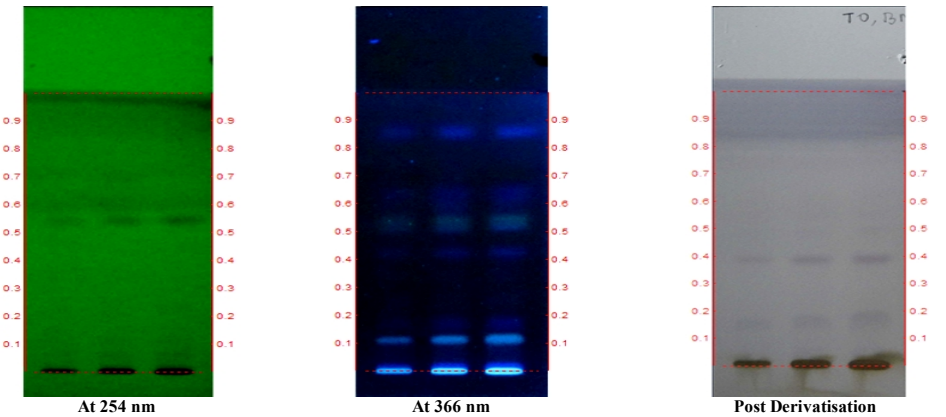

Figure 2: HPTLC finger print profile of alcoholic extract of Balabilwadi modaka at 254 nm, 366 nm and post derivatisation at 600nm Solvent system - Toluene: Ethyl acetate (7:1)Track 1: Balabilwadi modaka 4µl; Track 2: 2-8µl; Track 3: 3-12 µl

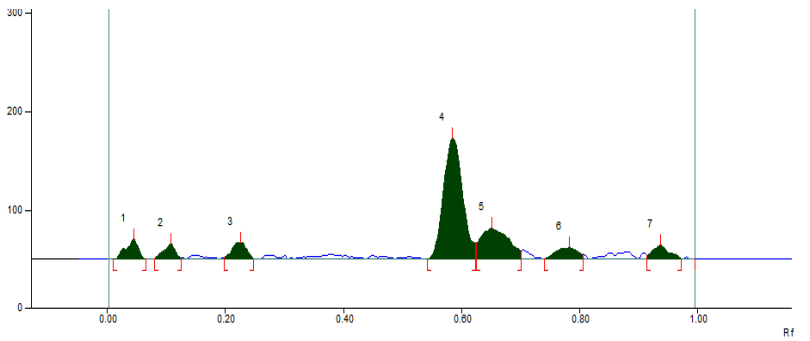

Figure 3: HPTLC finger print profile of ethanolic extract of Balabilwadi modaka (12µl) at UV 254 nm

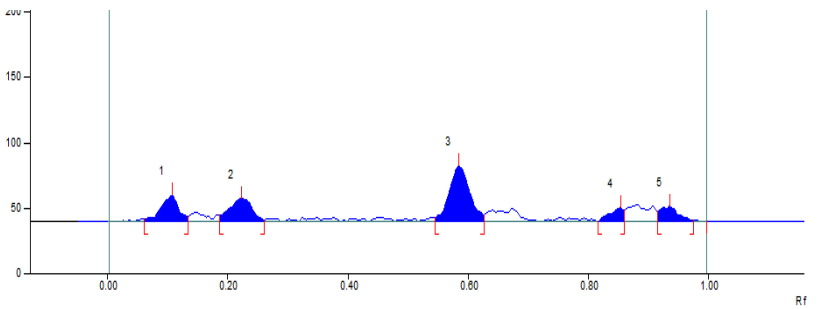

Figure 4: HPTLC finger print profile of ethanolic extract of Balabilwadi modaka(12µl) at 366 nm

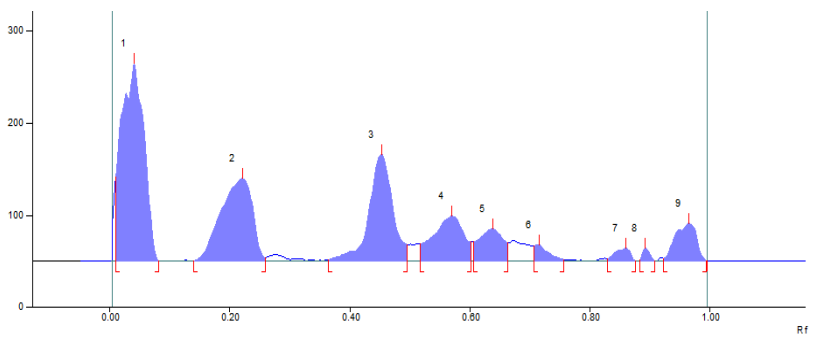

Figure 5: HPTLC finger print profile of ethanolic extract of Balabilwadi modaka(12µl) post derivatisationat 600nm

CONCLUSION

The quality indicating tests for Balabilwadi modaka reported from this study can be used as routine quality check parameter for this polyherbal preparation.

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