

Development of Instant Herbal Porridge Mixtures from Heenbowitiya (*Osbeckia octandra* L.) Leaves

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ABSTRACT. Studies were conducted to develop instant herbal porridge mixtures containing medicinally valued Heenbowitiya (*Osbeckia octandra* L.) leaves, rice, soyabean and spices by using two different techniques, conventional oven drying and drum drying. The prepared mixtures were evaluated based on physico chemical and sensory properties. In the oven drying process, pre treated (hot water blanched green leaves at 60°C, pre-soaked rice at 80°C, boiled soyabean at 80°C) ingredients were dried to a final moisture of 5% in the oven. Grinding dried ingredients separately and using that passing 95% through US mesh 100 and blending according to an Ayurvedic formula was found to be better for a quality product. In the drum drying process, water extracted juice of leaves, blended according to the same formula and ground with other pre-treated ingredients to a thick slurry was fed into a steam heated drum drier and the dried flakes were collected. It was observed that better reconstitution can be achieved by adding water and boiling for 5 min. Colour measurement of reconstituted mixtures showed more chlorophyll breakdown in the drum drying process. Sensory evaluation indicated a significant preference ($p < 0.05$) for the colour and overall acceptance of an oven dried mixture reconstituted with water to that of drum dried mixture. However, when the products were reconstituted with coconut milk, both mixtures can be compared with home made herbal porridge.

INTRODUCTION

Herbal porridge or *Kolakenda* is a traditional semi solid food basically consisting of rice, coconut milk and the extract of different edible green leaves. It is a popular beverage and health drink in both rural and urban areas. However, the preparation of *Kolakenda* is fast disappearing due to difficulties in obtaining the desired leaves and difficulties in the traditional method of preparation.

Instant *Kolakenda* made up of medicinally important green leaves is a product, which is demanded by the modern society mainly because of the awareness of its nutritional and medicinal values as well as for convenience. As an alternative to conventional drying, extrusion cooking and drum drying are feasible advanced technologies that are widely used for the commercial production of these instant food items. In Ayurveda, *Kolakenda* made up of *Heenbowitiya* has been recommended for those suffering from diabetes and hepatitis (Jayaweera, 1982). Although there are instant *Kolakenda* mixtures, which are prepared from common green leaves already available in the market, products formulated with *Heenbowitiya* leaves are not available.

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This study was carried out to (a) develop an instant herbal porridge mix by two dehydration techniques, namely conventional oven drying and drum drying and (b) to evaluate their nutritional, physico chemical and sensory properties.

MATERIALS AND METHODS

Quality red raw rice, soyabean, ginger, garlic and table salt were procured from the local market and *Heenbowitiya* green leaves were collected from Meepe and Homagama area. All the materials, except salt, were washed with water to remove dirt, dust and foreign materials.

Method 1: Preparation of instant herbal porridge mixture using oven drying method

Preparation of green leaves, rice, soyabean and spices

Green leaves (5 kg) were blanched in boiling water (20 l) containing 1000 ppm magnesium oxide for 5 min. The blanched leaves were washed with water and dried in a Thermotec oven (model SPF 600, Sibata) at 60°C to a final moisture of 5%. Cleaned rice (5 kg) was soaked in water (10 l) for 4 h, the water was drained and the rice was dried in the oven at 80°C to a final moisture of 5%.

Cleaned soyabean (500 g) was boiled in water (2 l) for 25 min, the water was drained and the beans were manually dehulled. The blanched beans were dried in the oven at 80°C to a final moisture of 5%. Drying parameters for green leaves, raw rice and soyabean were selected based on Thevakaran (1998). Dried powder of ginger and garlic were prepared according to the method given by Pruthi (1976).

Determination of required fineness and method of reconstitution

Required particle size for dehydrated materials were obtained by grinding all ingredients in a mixer grinder (model HL 3294/C Phillips) separately and those passing 95% through US meshes 100, 60 and 40 screens were separated. Ingredients with the same particle size were blended according to the formula given by an Ayurvedic medical practitioner. The formula to prepare 25 cups of *Kolakenda* was rice 500 g, fresh leaves 275 g, soyabean 10 g, raw garlic 10 g, raw ginger 25 g, salt 15 g and water 5 l.

The reconstitutibility of the products were tested by adding hot water directly, adding water and boiling for 5 and 10 min (10 g sample with 190 ml water) for mixtures with different fineness. Observations were made on the viscosity, appearance and consistency of the rehydrated product. The required fineness and the method of reconstitution were selected based on the quality of the reconstituted product.

Method 2: Preparation of instant herbal porridge mix by drum drying technique

Soyabean (100 g) was boiled in water (4 l) for 25 min and rice (5 kg) which is presoaked in water (10 l) for 4 h, added to it and boiled for a further 5 min. The water was drained and the soya-rice mixture was mixed with filtered juice extracted by grinding green leaves (2.75 kg) with water (5 l) in a Waring commercial blender. This mixture was further ground with water (5 l) by adding salt, chopped ginger and garlic to a fine slurry in the same blender. The slurry was fed into a steam heated double drum drier (model 20, Serial 720) and at the time of drying, steam pressure, surface temperature of the drum and speed of rotation of the drum were 60 psi, 121°C and 1 rpm respectively. Dried flakes were collected and packed in LDPE bags for further experiments.

Physico chemical properties

The samples prepared by these two methods were analysed for physico chemical and sensory properties. Colour of reconstituted mixtures were measured on a colour difference meter (model ZE 2000, Nippon Denshoku). Brightness and greenness of reconstituted mixtures were measured as 'L', 'a' coordinates, where 'L' represented lightness or darkness (the higher the value, the lighter the colour) and '+a' = redness, '-a' = greenness for colour (Ranganna, 1986).

Viscosity values of reconstituted mixtures at room temperature were measured on a viscometer (model BL, Tokimec) and the average of four measurements was recorded. Dried instant porridge mixtures were analyzed for moisture, crude fiber, crude protein, crude fat and total ash using methods described in Association of Official Analytical Chemists (AOAC, 1990) and carbohydrate content was calculated by difference.

Sensory evaluation

The drum dried and oven dried instant mixtures reconstituted with water, reconstituted with first extract of coconut milk and home made *Heenbowitiya* herbal porridge (prepared with fresh materials using the Ayurvedic formula, however, with coconut milk used instead of water) were organoleptically evaluated using an untrained consumer panel consisting of 40 adults for acceptability and other parameters (colour, flavour, aroma and consistency). The scores were allotted to different quality characters according to the method of Ranganna (1986) on a 9-point hedonic scale, indicating 9 = like extremely, 8 = like very much, 7 = like moderately, 6 = like slightly, 5 = neither like nor dislike, 4 = dislike slightly, 3 = dislike moderately, 2 = dislike very much and 1 = dislike extremely. The sensory evaluation data were analysed by Friedman test using Minitab Statistical Package.

Statistical design

A complete randomized block design was used with three replicates in all experiments. The data were subjected to analysis of variance using the SAS package. Least Square Means procedure was used to separate treatment means when differences were significant ($P < 0.05$).

RESULTS AND DISCUSSION

Herbal porridge basically consists of a high amount of rice. In the preparation of an instant product, it is important to incorporate quick cooking rice into the formulation. Presoaking of rice in excess water reduces the time of cooking (Sowbhagya and Ali, 1991). Therefore, pre-soaked rice (dehydrated) was incorporated into the products.

It is important to have a uniform particle size for all ingredients to get a product with good consistency for the oven dried product. Particle size of ingredients may affect appearance, viscosity, consistency and reconstitutability of the final product. The preliminary experiment on determination of the required fineness for the mixture and the method of reconstitution, showed that adding hot water directly and stirring is insufficient to get a good reconstituted product at all three levels of fineness used. However, the mixture obtained by passing through US mesh 100 screen was found to be better when reconstituted by adding water and boiling for 5 min than mixtures passing through US mesh 60 and 40 screens. It was observed that the best reconstitution can be achieved by adding water or coconut milk and boiling for 5 min.

Physical properties

The physical characters of colour, visual lightness (L) and greenness (-a) of reconstituted herbal porridge samples are given in Table 1. According to the statistical analysis, -a' and L values of the developed instant products are significantly different ($p < 0.05$). The oven dried product received the highest values for visual lightness and greenness, whereas the drum dried product obtained lower values indicating more chlorophyll breakdown in the drum drying process. Viscosity values for reconstituted products are not significantly different from each other.

Table 1. Physical properties of instant herbal porridge mixtures.

Samples	Average L	Average (-a)	Viscosity (cp)
Drum dried mix	40.34 ^a	-2.02 ^a	187.34 ^a
Oven dried mix	30.68 ^b	-0.17 ^b	185.12 ^a

Each value is an average of four measurements. Means bearing different letters within same column are significantly different ($p < 0.05$).

Proximate composition

Developed mixtures were analyzed for moisture, protein, fat, fibre and total ash content. The proximate compositions of prepared mixtures are given in Table 2. Both products have almost similar protein content, *i.e.*, 12-13%, on dry weight basis. Crude fibre and total ash contents of oven dried samples are significantly different ($P < 0.05$) from drum

dried samples. This may be due to the use of filtered extract of green leaves in the drum drying method. Green leaf content in the mixture is the main contributor of fibre and ash to the formulation. In the preparation of the oven dried mix, whole leaves were used, whereas in the drum drying process only the filtered extract of leaves were used so a considerable amount of the fibrous materials of the leaves were thus discarded.

Table 2. Proximate composition (%) of instant herbal porridge mixtures.

Sample	Moisture	Protein	Fat	Fibre	Ash	Carbohydrate
Drum dried mix	5.2 ^a	12.5 ^a	7.5 ^a	0.8 ^a	1.1 ^a	72.9 ^a
Oven dried mix	5.6 ^a	12.0 ^a	7.6 ^a	1.0 ^b	1.8 ^b	72.0 ^a

Each value is an average of four measurements. Means bearing different letters within same column are significantly different ($p < 0.05$).

Sensory evaluation

The median values of sensory attributes of porridge mixtures reconstituted with water are shown in Table 3. There was a significant differences ($p < 0.05$) for sensory scores of colour and overall acceptance between oven dried and drum dried mixtures reconstituted with water. Results of the study suggest that instant products reconstituting with coconut milk gave organoleptically more acceptable product than products reconstituted with water. Panellist commented that the viscosity of instant products were much thicker than home processed product. This can be attributed to the dried powder of rice being used in the formulation of instant products unlike for the home processed product.

Table 3. Median values of the sensory scores of instant products and the home processed product.

Sample	Colour	Aroma	Taste	Consistency	Overall acceptability
T1	7.5 ^a	6.5 ^a	6.3 ^a	5.8 ^a	7.0 ^a
T2	5.8 ^b	5.8 ^a	6.0 ^a	5.9 ^a	6.1 ^b
T3	8.3 ^c	8.2 ^b	7.9 ^b	8.1 ^b	8.5 ^c
T4	7.2 ^d	8.0 ^b	8.0 ^b	8.2 ^b	8.4 ^c
T5	8.5 ^c	8.2 ^b	8.2 ^b	8.4 ^b	8.6 ^c

Each value is an average of four measurements. Means bearing different letters within same column are significantly different ($p < 0.05$). T1 and T2 - water reconstituted oven dried and drum dried samples, respectively; T3 and T4 - coconut reconstituted oven dried and drum dried samples, respectively and T5 - normal home processed product.

CONCLUSIONS

It can be concluded that organoleptically acceptable instant herbal porridge mixtures, capable of reconstitution by boiling with water or coconut milk for 5 min can be prepared by using conventional oven drying and drum drying method.

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