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Determination of Quality Standards for Herbal Formulation: Chaturjat Churna

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Herbal medicines in India preferred remedies in the traditional system. Large part of globe is now relying on herbal medicines because of having better tolerability. Chaturjat churna is well known ayurvedic formulation used for vata and kapha dosha. It comprises of barks of *Cinnamommum zeylanicum*, seeds of *Elettaria cardamomum,* flowers of *Mesua ferrea* and leaves of *Cinnamommum tamala.* This combination improves appetite, digestion and palatability of herbal formulations, also corrects respiratory and renal disorders. It is observed that consistency and content varies from one manufacturer to another which overall affects the therapeutic activity. Hence a need was felt to formulate, standardize and compare various formulations. In the present study two batches of marketed and laboratory formulations were compared and evaluated as per Indian Pharmacopeia and World Health Organization guidelines through physicochemical and phytochemical investigation like extractive value, total ash value, loss on drying, chemical constituents, microscopic and physical characterization. The result revealed that all batches were in close proximity with that of standard values.

Keyword: *Cinnamommum zeylanicum*, *Elettaria cardamomum*, *Cinnamommum tamala, Mesua ferrea,* World Health Organization (WHO) guideline.

1. Introduction

Ayurveda is a very ancient, trusted worldwide plant based system of medicines[1,2]. Chaturjat churna is one of the famous polyherbal ayurvedic formulation used for improving appetite, promoting digestion, curing hepatic and renal disorders[3,4]. It is officially given in Sharangdhara Samhita Madhyama Khanda 6/14**.** Therefore, the present study was undertaken to evaluate and establish various quality control parameters of chaturjat churna as per Indian Pharmacopeia and WHO guidelines involving physicochemical and phytochemical investigation like extractive value, total ash value, loss on drying, chemical constituents and microscopic determination along with physical characterization like bulk and tap density determination[5,6]. This paper deals in establishment of quality control parameters for different samples of Chaturjat churna with a brief comparative study between marketed and laboratory formulations.

2. Materials and Methods

2.1 Plant Material Collection, Authentication and Formulation Development

Chaturjat churna (CJC) comprises of four ingredients[7] viz. barks of *Cinnamommum zeylanicum* (dalchini), seeds of *Elettaria cardamomum* (elaichi), leaves of *Cinnamommum tamala* (tejpatra) and flowers of *Mesua ferrea* (kesara). The plant parts were purchased from local market of Jodhpur and were authenticated by Dr. P. J. Parmar, Joint Director, Botanical

Survey of India, Arid Zone Regional Center, Jodhpur (Rajasthan).
Two marketed formulation of churna (MKT-1and MKT-2) were purchased from local manufactures itself. While two laboratory formulations (LAB-1and LAB-2) comprising unit parts of each of four ingredients were dried at room temperature and grinded to moderately fine powder. Later were mixed together in a ratio of 1:1:1:1 and were stored in cool and dry place for future use. Formula used to calculate the amount used of each in preparation of laboratories batch is shown in table 1.

Table 1: Formulation and Ingredients

S. no	Names of ingredients	Ayurvedic name	Plant part	Synonym	Amount*
1	***Cinnamommum zeylanicum***	Tvak	Bark	Dalchini	60 gm
2	***Cinnamommum tamala***	Tamal patra	leaf	Tejpatra	60 gm
3	***Elettaria cardamomum***	Ela	Seed	Elaichi	60 gm
4	***Mesua ferrea***	Nagakeshara	Flower	Kesar	60 gm

Note: Amount used to calculate as per churna formula each have one part

2.2 Methods

Following quality control parameters were determined for the evaluation of both laboratory designed and marketed available formulation of Chaturjat churna. Each test was repeated three times and mean of triplicate determinations was calculated.

2.3 Macroscopical (Organoleptic) characterization

Organoleptic characterization of each part of drug used in formulation as raw form was successfully done in terms of color, texture, shape, odour and taste using naked eyes only. The observations for macroscopical analysis were shown in table 2.

Table 2: Macroscopic characteristics of used ingredients

S. no	Plant name	Color of medicinalpart	Shape	Odour	Taste
1	***Cinnamommum zeylanicum***	Light brown	0.5-1.5 mm thick, bark, rough and brittle	Pungent and sharp aroma	Warm with a bit sweet
2	***Elettaria cardamomum***	Brownish or pale buff	Obovate angular and 2 to 2.5 mm length	Aromatic pleasant	Aromatic with sharp feel
3	***Cinnamommum tamala***	Green leaves	Wider and long having three veins downwards	Aromatic sharp	Astringent and sour
4	***Mesua ferrea***	White flowers	four white petals and lots of yellow stamens.	Aromatic	Flat and dull taste

2.4 Microscopical Characterization

Fresh plant material viz. barks of *Cinnamommum zeylanicum,* seeds of *Elettaria cardamomum*, leaves of *Cinnamommum tamala* and flowers of *Mesua ferrea* were taken and microscopic characterizations were done on the basis of the

monograph of the plant/plant material given in the Ayurvedic Pharmacopeia of India and also referring various subject literatures[8,9].

2.5 Physical Characterization

The physical characteristics like bulk and tap density were determined according to the standard procedure[10-12].

Determination of bulk density: 10 gm of sample powder was filled in 25 ml of graduated glass measuring cylinder and the volume was measured as it is to determine its bulk density.

Determination of tap density: 10 gm of sample powder was filled in 25 ml of graduated glass measuring cylinder. It was then placed on a mechanical tapper apparatus which operates for a fixed number of taps (approx. 100) until the powder has reached to its minimum level. Volume was measured to determine its tapped density. Results of study of physical characteristics of churna are as shown in table 4.

2.6 Physicochemical Investigation

Determination of total ash value: 2.0 gm of powder sample was placed into a previously dried crucible. The crucible was then kept in a muffle furnace at 100°C for 30 min. Temperature was raised in 50°C increments up to 250°C at the intervals of 30 min. After 30 min, the temperature was raised to 500 °C and the material was allowed to incinerate till it became white indicating the absence of carbon. Then the process was stopped. Crucible was allowed to cool completely in a desiccator. Total ash was weighed and percentage of total ash was calculated with reference to powder sample taken initially.

Table 3: Macroscopic characteristics of different batches

S .no	Batch code	Color	Odour	Taste
1	**MKT-1**	Dark brownish	Sweet and pleasant	Sweet
2	**MKT-2**	Dark brownish	Sweet and pleasant	Sweet
3	**LAB-1**	Brownish	Sweet and pleasant	Sweet
4	**LAB-2**	Brownish	Sweet and pleasant	Sweet

Determination of water soluble extractive value: 4 gm of powder sample was macerated with 100 ml of distilled water in a glass stopper closed flask for 6 hours. It was shaken frequently and allowed to stand for 18 hours. It was then filtered rapidly. 25 ml of filtrate was taken in a china dish, evaporated to dryness on a water bath at 105°C. The residue was weighed and the percentage of water soluble extractive value was calculated with reference to the powder sample taken initially.

Determination of alcohol soluble extractive value: 4gm of powder sample was macerated with 100 ml of ethanol in a glass stopper closed flask for 6 hours. It was shaken frequently and allowed to stand for 18 hours. It was then filtered rapidly. 25ml of filtrate was taken in a china dish, evaporated to dryness on a water bath at 105ºC. The residue was weighed and the percentage of alcohol soluble extractive value was calculated with reference to the powder sample taken initially.

Determination of ether extractive value: 4 gm of powder sample was macerated with 100 ml of Petroleum ether in a glass stopper closed flask for 6 hours. It was shaken frequently and allowed to stand for 18 hours. It was then filtered rapidly. 25 ml of filtrate was taken in a china dish, evaporated to dryness on a water bath at 105ºC. The residue was weighed and the percentage of

petroleum ether soluble extractive value was calculated with reference to the powder sample taken initially.

Determination of loss on drying: A clean china dish was taken and dried in a hot air oven at 105ºC for 30 min. Then 2.0 gm of powder sample was placed into it. The sample was then dried in an oven at 105ºC for 30 min. This process of drying was continued till a constant weight of sample was obtained (6 hours). After drying, the dish was allowed to cool to room temperature in a desiccator before weighing and then the weight of dried sample was recorded. The percentage loss on drying was calculated with reference to powder sample taken initially [12]. Results of study are given in table 4

Table 4: Comparative analysis between Observed Value and Standard Value of Various Physical and Physiochemical Parameters of Chaturjat Churna.

Parameters	*Marketed Batch		*Laboratory Batch	
	MKT-1	MKT-2	LAB-1	LAB-2
Bulk density	0.48 ±0.020	0.46 ±0.010	0.42 ±0.030	0.49 ±0.040
Tap density	0.68 ±0.001	0.64 ±0.004	0.61 ±0.007	0.66 ±0.010
Total ash value	15.51±0.320	15.72±0.410	15.91 ±0.230	16.17 ±0.210
Water soluble extractive	52.71 ±0.071	53.23±0.062	49.00 ±0.170	59.31 ±0.080
Alcohol soluble extractive	49.52 ±0.052	51.71 ±0.061	48.21 ±0.130	53.2 ±0.320
Pet Ether soluble extractive	1.19 ±0.04	1.27 ±0.02	1.33 ±0.12	1.21 ±0.08
Loss on drying	6.09 ±0.001	6.21 ±0.003	7.12 ±0.010	7.2 ±0.040

*All values are Mean ± Standard Deviation, N=3 (the experiment was performed in triplicate.

2.7 Phytochemical investigation

Aqueous extract of Churna material was obtained and used further for phytochemical investigation. The extract was subjected to various qualitative chemical tests to determine the presence of various Phytoconstituents like alkaloids, carbohydrates, flavanoids, glycosides, proteins/amino acids, phytosterols, terpenes, tannins, saponins etc [12-14]. Results of qualitative study and presence of different chemical groups are shown in table 5.

Table 5: Qualitative screening for various extracts of churna (MKT and LAB)

Test*	Water extract	Ethanolic extract	Pet-Ether extract
Alkaloids	Absent	Absent	Absent
Glycosides	Present	Present	Absent
Flavonoids	Absent	Present	Absent
Carbohydrate	Present	Present	Absent
Tannins/Fats	Absent	Present	Present

* General tests for presences

3. Results and Discussions

By microscopic inspection, it was found that plant material showed similar observation as were reported in the Ayurveda Pharmacopeia of India. Therefore, it can be concluded that the plant material used for study were of good quality. The observed values for both marketed (MKT-1, 2) and laboratory batches (LAB-1, 2) of Churna showing various quality control parameters are given in Table1 to 5. Phytochemical tests showed the presence of various phytoconstituents class like carbohydrates, flavanoids, glycosides, proteins and tannins in polar solvents like aqueous and ethanolic extract.

4. Conclusion

This evaluation study was intended to determine quality, purity, integrity of Chaturjat churna with due aid of comparative analysis of laboratory and marketed product. Evaluation studies showed similarities in all respect. The resultant data analysis and comparisons among them revealed that parameters obtained could be used to lay down a set of new standardization parameters for the preparation of Chaturjat churna for obtaining standard quality and efficacy of the herbal formulation.

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