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Standardization and formulation development of herbal tablet from poly herbal powder

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Abstract
The present study focuses on the standardization and formulation development of a herbal tablet utilizing a polyherbal powder blend comprising *Sida cordifolia* (Bala Moola), *Cuminum cyminum* (Jeeraka), and *Zingiber officinale* (Shunthi). The churna, consisting of selected medicinal herbs, was prepared by authenticating, drying, powdering, and blending in prescribed ratios. Tablets were formulated through powder processing, granulation, and compression techniques. The final product was evaluated for physical characteristics such as bulk density, tapped density, angle of repose, Hausner ratio, and Carr's index to assess powder flow and compressibility. The tested physical parameters indicate good quality and suitability of the churna powder for tablet formulation. This work highlights the importance of stringent quality controls, providing a model for integrating traditional herbal medicines into reliable tablet formulations suitable for contemporary therapeutic use.

Keywords: Churna, standardization, formulation, herbal tablet

Introduction
Churna is a fine powder made by certain drugs or combination of drugs. Each ingredient is pulverized separately and mixed together. There are many varieties of Churna and every Churna has its own demand in the market. Ayurvedic pharmacy comprises of different sections such as Vati, Asava, Arista, lehya, Lepa etc. under one unit. The term "Ayurveda" combines the Sanskrit words ayur (life) and Veda (science or knowledge). It is one of the traditional medicinal systems, with an established history if many centuries. It is based on the belief that health and wellness depend on a delicate balance between the mind, body and spirit. The primary focus of Ayurvedic medicine is to promote good health and prevent Illness, rather than fight disease.

Types of Churnas
These are solid dosage form of medicament meant for internal use
These are two types
1. Simple Churnas: - It contains only one medicament.
2. Compound Churnas: - It contains two or more than two medicaments

Nayopayam Kashayam
Uses and Benefits of Nayopayam Kashayam
This herbal formulation is beneficial in respiratory problems, especially in case of cough and asthma. It also relieves hiccups. It is good in catches too.

Benefits of Ingredients
1. Bala Moola (*Sida cordifolia*)
Bala is a medicinal plant which is used in the treatment of various ailments such as respiratory disorders and conditions where the fluid is retained inside the body. It is analgesic, anti-inflammatory and anti-asthmatic in activity. It is beneficial to inner strength and improves immunity. It acts as a general health tonic as well

2. Jeeraka (*Cuminum cyminum*)
Jeeraka, a popular Indian medicine which is extensively used for the treatment of various digestive and respiratory ailments.

It is digestive stimulant and carminative in nature. It is piercing and hot in potency. It helps to eliminate phlegm and clears the air pathway for comfortable breathing. It controls hiccups as it removes flatulence.

3. Shunthi (*Zingiber officinale*)

Shunthi is anti-inflammatory, anti-emetic and digestive in nature. It is natural pain reliever and an expectorant in action. Due to its expectorant activity, it is useful in the treatment of cough [1, 2].

Experimental Section

Materials and methods

Preparation of Churna

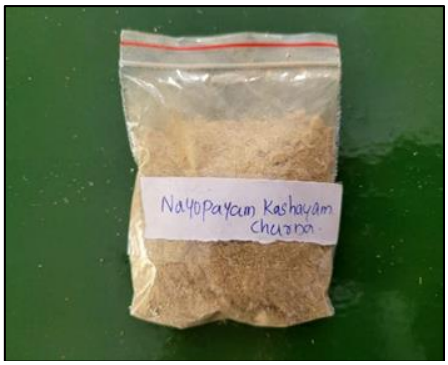

Fig 1: Nayopayam kasahyam churnam

Preparation of dried powder of *Sida cordifolia*, Ginger, and cumin. Pass all the powder separately through sieve No.80. Mix all the powdered herbal drugs geometrically. Now pack the powder churna in suitable container.

Table 1: Drug profile

Sl. No.	Common name	Figure	Category
1.	*Sida cordifolia*		Anti-inflammatory, Analgesic, CNS depressant
2.	Cumin		Carminative, aromatic, stimulant, Expectorant, flavouring agent
3.	Ginger		Carminative, laxative, stomachic, Useful in digestion, aphrodisiac, Inflammations,

Table 2: Ingredients of Churna for digestive property

Sl. No.	Ingredients	Taken quanity
1	*Sida cordifolia*	20 g
2	Ginger	5 g
3	cumin	5 g

Preparation of Ethanolic Extract

Ethanolic extract of Nayopayam Churna herbal formulation was prepared by cold maceration method. Thirty grams of each plant material in powder form was weighed in an Erlenmeyer of 500ml to which 100ml of ethanol (96%) is added for pre-extraction. The Erlenmeyer is placed in dark for three days in room temperature. The mixture was filtered using what man No.1 filter paper. The filtrates were exposed to 60 ºC in water bath for 30 min for ethanol evaporation. The filtrates were kept at 4ºC until use.

The Poly-herbal churna and Poly-herbal churna extract was subjected to phytochemical tests to assess the qualitative

chemical composition by standard methods for Alkaloids, Tannins, Saponins, Carbohydrates, Flavonoids, Steroids, Triterpenoids etc.[3]

Fig 2: Ethanolic extract

Phytochemical analysis

Preliminary Phytochemical tests were conducted on test extract to detect the presence of Phyto constituents and carried out according to standard procedures [4].

Table 3: Phytochemical Analysis

Sl. No.	Test	Polyherbal churna	Polyherbal extract
1	Alkaloids	+	+
2	Glycosides	-	-
3	Tannins and phenolics	+	+
4	Flavonoids	+	+
5	Carbohydrates	-	-
6	Proteins and amino acids	-	-
7	Saponins	-	-

Evaluation of Physical Parameters of Churna powder [5]

Organoleptic Characteristics

Color: Churna was taken into watch glasses and placed against white background in white tube light. It was observed for their color by naked eye.

Odour: Two-gram Churna was smelled.

Taste: A pinch of Churna was taken and examined for its taste-on-taste buds of the tongue.

Determination of pH

Placed accurately weighed 1 gm of churna in a 100 ml volumetric flask and made up the volume up to 100 ml with distilled water. The solution was sonicated for about 10 minutes. pH was measured with the help of digital pH meter.

Determination of loss on drying

Loss on drying was determined by weighing about 2 gm of the powdered material in previously weighed dried petridish (tarred evaporating dish) and dried in an oven at 105-110 ºC, till two consecutive weights, which do not differ by more than 5mg. The weight after drying was noted and loss on drying was calculated. The percentage was expressed as % w/w with reference to air dried Sample.

Determination of Ash Values

Total Ash Value: 2 gm of churna was weighed accurately in a previously ignited and tarred silica crucible. The material was then ignited by gradually increasing the heat to 500-600°C until it appeared white indicating absence of carbon. It is then cooled in a desiccator and total ash in mg per gm of air-dried material is calculated.

Acid Insoluble Ash Value

To the crucible containing total ash, 25 ml of HCl was added and boiled gently for 5minutes, and then about 5 ml of hot water was added and transferred into crucible. The insoluble matter was collected on an ashless filter paper. This was then washed with hot water until filtrate is neutral and the filter paper along with the insoluble matter was transferred into crucible and ignited to constant weight. The residue was then allowed to cool and then weighed.

Determination of Extractive Values

Water Soluble Extractive Value: 5 gm of churna was accurately weighed and placed inside a glass stoppered conical flask. It is then macerated with 100ml of chloroform water for 18 hours. It was then filtered and about 25ml of filtrate was transferred into a china dish and was evaporated to dryness on a water bath. It was then dried to 105° C for 6 hours, cooled and finally weighed.

Alcohol Soluble Extractive Values: Ethanol was used as solvent in place of chloroform water and remaining procedure was the same as that of water-soluble extractive value.

Determination of Physical Characteristics [6-8]

Bulk Density: Bulk or fluff density is the ratio of given mass of powder and its bulk volume. It is determined by transferring an accurately weighed amount of powder sample to the graduated cylinder with the aid of a funnel. The initial volume was noted as untapped or poured volume. The ratio of weight of the volume it occupied was calculated.

Bulk Density = (W/V0) gm/ml Where, W = mass of the powder V0 = untapped volume

Tapped Density: It is measured by transferring a known quantity (25 gm) of powder into a graduated cylinder and tapping it for a specific number of times. The initial volume was noted. The graduated cylinder was tapped continuously for a period of 10-15 min. The density can be determined as the ratio of mass of the powder to the tapped volume.

Tapped Volume = (w/vf) gm/ml

Where, W = mass of the powder Vf = tapped volume.

Angle of Repose: Angle of Repose has been used as indirect methods of quantifying powder flowability because of its relationship with inter particle cohesion. The internal angle between the surface of the pile of powder and the horizontal surface is known as the angle of repose. The powder is passed through funnel fixed to a burette at a height of 4 cm. A graph paper is placed below the funnel on the table. The height and the radius of the pile were measured. Angle of repose of the powder was calculated using the formula

Angle of Repose= tan-1(h/r) Where, h=height of the pile r = radius of the pile

Hausner Ratio: It is related to inter particle friction and as such can be used to predict the powder flow properties. Powders with low interparticle friction such as coarse spheres have a ratio of approximately 1.2, whereas more

cohesive, less flowable powders such as flakes have a Hausner ratio greater than 1.6.
Hausner ratio is = Df / Do, Where Df = Tapped density & Do = Bulk density.

Carr's Index: Another indirect method of measuring the powder flow from bulk density is Carr's index.
Carr's index = % compressibility = (Df-Do/Do) × 100
Where Df = Tapped density & Do = Bulk density

Table 4: Physico-Chemical Parameters and Physical Characteristics

S. No.	Physico-Chemical Parameters and Physical Characteristics	In- House Churna
1	Color	Light brown
2	Odour	Pungent
3	Taste	Bitter
4	Ph	5.9
5	Total ash	3.8
6	Acid insoluble ash	1.9
7	Water soluble extractive	0.80 gm
8	Acid soluble extractive	1.38 gm
9	LOD	0.68 gm/cm3
10	Bulk density	0.469 gm/cm3
11	Tapped density	0.59 gm/cm3
12	Angle of repose	45º
13	Hausner Ratio	0.672 gm/cm3
14	Carr's Index	48

Formulation of Poly-herbal Tablets
In the present study, dried powder of extract was formulated into tablet dosage form by direct compression method. Formulation has the following composition: M charantia, starch (15 mg), magnesium stearate (33 mg), microcrystalline stearate (2 mg), and talc (2.5 mg). These were then compressed into tablets by using Tablet punching machine. Three batches of tablets were obtained and subjected to evaluation.

Fig 3: Formulation of poly-herbal powder

Table 5: Formulation of polyherbal tablets

Ingredients	Amount (mg) for One tablet
Ethanolic Extract	200
Starch	60
Magnesium Stearate	132
Talc	10
Total	400 mg

Evaluation of prepared tablets [9-11]
Prepared tablets were evaluated on the basis of following parameters

1. **Thickness:** Using vernier calipers, ten tablets at random from each batch can be used to determine thickness. Every reading was made three times.
2. **Hardness:** Using a Monsanto Hardness Tester, ten tablets at random from each batch can be used to determine hardness. About 3-5 kg/cm2 of hardness is considered as appropriate for uncoated tablets.
3. **Friability:** A Roche Friabilator was used to test the sample's friability. For four minutes, ten pre-weighed tablets were rotated at 25 rpm. After dusting, the tablets were weighed again. Friability is usually defined as the weight of the tablet decreasing in the container as a result of the surface's tiny particles being removed.
4. **Weight variation:** Ten tablets were randomly selected from each batch, individually weight; the average weight and percentage deviation from the average were calculated. It is done in order to ensure uniformity in the weight of tablets in a batch.
5. **Disintegration time:** Disintegration was identified using a USP basket-style apparatus. To examine One tablet was inserted into each of the six basket tubes, covering the tablets with a plastic disk, and the rack holding the tablets was placed in a one-liter beaker of water to allow for disintegration. The water's temperature was constantly kept at 37±20 C. The oscillation was applied to tablets at a frequency of 28-32 cycles per minute. After fifteen minutes, take the basket out of the liquid and check the tablets. When every tablet dissolves after 15 minutes, the test is considered successful. If one or two of the tablets do not dissolve, try the test again with 12 more tablets. The tablets pass the test if not less than 16 of the totals of 18 tablets has disintegrated.

Table 6: Physical parameters for herbal tablet.

S. No.	Physical Parameters	Result
1	Thickness	1.20 cm
2	Hardness	3.18kg/cm^2
3	Friability	1.03%
4	Weight variation	399.76 mg
5	Disintegration time	29 min

Conclusion and Discussion
On the basis of the results obtain in the present investigation, we concluded that Ethanolic extract of In-house formulation showed the presents of Tannin, Alkaloids, Flavonoids and Phenolic components. It can be concluded that the prepared tablet of polyherbal churna can overcome the disadvantages of churna such as poor patient compliance, pungent taste without altering its dozen chemical properties.

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