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Preparation and Evaluation of Trikatu Churan

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Abstract: ***Most of the traditional system of medicine in India is effective but they lack standardization. So there is a need to develop a standardization technique. Standardization of herbal formulation is essential in order to assess the quality, purity, safety and efficacy of the drug. Two marketed formulation samples and in-house preparation were taken and physical characteristics and physicochemical screening tests are performed. Trikatu is a compound churna as it consists of more than one ingredient or three herbs. Trikatu is a very well known 'Rasayana' in Ayurveda and widely used as a polyherbalayurvedic formulation throughout India. It consists of three well known plants parts namely Piper longum, Piper nigrum, and Zingiberofficinalis in equal ratio. The principle of using churnas is due to the fact that therapeutic value of most of the substances increases when they are reduced to a very fine powder. Pharmacological activities of Trikatuchuran includes, antioxidant, analgesic, anti-anorectic, anti-inflammatory, antimicrobial, antifungal, anthelminitic, anti-arthritic, adaptogenic, antihyperlipidemic and antitumor activity.***

Keywords: Trikatu, Adaptogenic; Antimicrobial; Anthelmintc.

1. Introduction:

In Trikatu as essential ingredients of numerous prescriptions and formulations used for a wide range of disorders. As per Ayurvedic pharmacology, 'Trikatu' means 'Katu-Tikta rasa' (bitter- pungent or acrid taste), 'Usna' (hot), 'Virya' (potency), 'Madhura rasa' (sweet taste) and 'Vata-kaphaNasaka'[1-2] (air and mucus destroyer under the disease conditions) [3].The Ayurvedic system of medicine has described various herbal formulations in the treatment of diseases, which play an important role in modern health care and curing various ailments and diseases. The uses of herbal medicines are increasing as dietary supplements to fight or prevent common diseases.

The Trikatu Churna is one of the classical Ayurvedic dosage form used in Ayurvedic system of medicine. It is official in Ayurvedic Formulary of India is combination of three reputed herbs comprised of the fruits of Piper longum L (Pippali), fruits of Piper nigrum L (Marica) and rhizomes of Zingiberofficianalis R (Saunthi).

Ayurveda is concerned with healthy living along with curative measures that synchronize an individual physically, mentally and spiritually. In this modern era, it is getting accepted as a self-care system for individual well-being. Focusing primarily towards correcting imbalances before they develop into diseases, it is a solution, for all those who acknowledge responsibility for their own health and want a healthy and long life.[3] The need of quality control for Ayurvedic drug is due to the fact that the preparation of drug according to the ancient method has been reduced due to the commercialization of Ayurvedic Pharmacy. The absence of post-market surveillance and the purity of test laboratory facilities also makes the quality control of Ayurvedic medicines exceedingly difficult at this time. Therefore, standardization of herbal formulation is essential in order to assess the quality of drug for therapeutic value[4].

2. Materials and Methods:

2.1 Collection of powder drug:

Trikatu Churna consist of three main ingredients in powder form, it consist of powder fruits of Piper nigrum, fruits of Piper longum and rhizomes of Zingiberofficinale. All ingredients procured from local market, Pune. Ingredients were identified on the basis of morphological and microscopically chracters.

2.2 Collection of marketed formulations:

The marketed preparations of various brand of Taritatu Churnawas purchased from market and named as MTC 1 respectively.

2.3 Method of preparation of Trikatu Churna:

Trikatu Churna was prepared in laboratory using method described in Ayurvedic Formulary. All the ingredient passed through 80# sieve and then mixed together in equal proportion to get uniform blended churna by using spatula.[5]

3. Experimental Section:

3.1 Procurement of Churna:

The two marketed formulations were purchased

3.1.1 Preparation of Polyherbal Formulation:

Formulation was made by taking equal proportion of each powdered drugs. All the procured and authenticated individual drugs were dried in shade and cleaned by hand sorting. The individual drugs were then crushed using willing grinder and passed through mesh no. 40. The individual drugs were then weighed as per the quantity required. The drugs were mixed geometrically using a double cone blender (Kshitij innovations[6], ambala). The mixed formulation was unloaded, weighed, and packed in labeled glass bottles[7]

3.1.2 Trikatu Churna Formulation:

Table 1: Trikatu Churna Formulation

S. no.	Other Common Name	Botanical Name	Family	Parts
1	Peeper	Piper longum L.	Piperaceae	One part
2	Black Pepper	Maricha	Piper nigrum L.	One part
3	Dried Ginger	Sunthi	Zingiberofficinale Roscoe	One part

3.2 Organoleptic Characteristics [8-9]:

Organoleptic evaluation refers to evaluation of formulation by appearance, colour, odour, taste, etc. The organoleptic characters of the preparations were carried out. However, these characteristic are judged subjectively and substitutes or adulterants may closely resemble the genuine material, it is often necessary to substantiate the findings by microscopy and physicochemical analysis

i. **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.

ii. **Odour:** Two gram Churna was smelled.

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

3.3 Evaluation of Physical Parameters

3.1 Determination of pH[10]:

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.

3.2. Determination of loss on drying[11]:

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.

3.3. Determination of Ash Values[12-13]:

3.3.1 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 dessicator and total ash in mg per gm of air dried material is calculated.

3.3.2 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 lter 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.

3.3.3 Water Soluble Ash Value:

5gms of each Trikatu 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 and water soluble extractive value was calculated.

3.4 Determination of Extractive Values [14-15]

3.4.1 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.

3.4.2 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.

4. Determination of Physical Characteristics:

4.1. Bulk Density[16]:

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

4.2. Tapped Density[17]:

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.

4.3. Angle of Repose[18]:

Angle of Repose has been used as indirect methods of quantifying powder flowability because of its relationship with inter particle cohesion [16].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

Table 2: Angle of Repose I.P limits[19]

S. No.	Angle of Repose	Powder flow
1.	<25	Excellent
2	25-30	Good
3	30-40	Passable
4	>40	Very Poor

4.4. Hausner Ratio[20-21]:

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.

Table 3: Hausners ratio limits[21]

S. No	Hausner's Ratio	I.P Limits value
1	Excellent	1.00 – 1.11
2	Good	1.1 – 1.18
3	Fair	1.19 – 1.25
4	Possible	1.26 -1.34
5	Very poor	1.35 -1.45
6	Very very poor	>1.60

4.5 Carr's Index [22-23]

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: Carr's Index I.P limits[23]

S. No.	Carr's Index	IP Limits value
1	Excellent	<10
2	Good	11 – 15
3	Fair	16 – 20
4	Possible	21 – 25
5	Poor	26 – 31
6	Very poor	32 – 37

5. Result and Discussions:

In house Trikatu Churna formulation was prepared by the method mentioned in Ayurvedic formulary and also collected marketed TrikatuChurna formulation were set for standardization or quality control parameters. So the quality control parameters required as per standard references were performed in comparison with the marketed sample was discussed.

5.1 Orgnoleptic characteristics:

The Trikatu Churna formulations were studied for organoleptic characteristic like the appearance, colour, taste and odour. The results are as follows.

Table 5: Organoleptic Characters

S. No.	Trikatu Formulation	Appearance	Color	Odour	Taste
1.	Marketed 2 Churna	Fine powder with smooth texture	Buff brown	Pungent	Astringent and Sour 3.
2.	In-House Churna	Fine powder with smooth texture	Slight brown	Pungent	Bitter after taste

5.2 Physico-chemical properties:

All the TrikatuChurnawere studied for their physicochemical parameters mentioned as follows.

Table 6: Physico-chemical properties of drugs

Sr.No.	Physico-Chemical Parameter	Marketed 2 Churna	In-House Churna
1.	pH	5.9	6.2
2.	Total ash	3.8	3.5
3.	Acid insoluble ash	1.9	1.5
4.	Water soluble ash	2.1	2.2
5.	Water soluble extractive	0.15 gm	0.80 gm
6.	Alcohol soluble extractive	0.56 gm	1.30 gm
7.	LOD	2.6070 gm/cm3	0.6118 cm3

5.3 Physical properties:

Table 7: Physical characteristics

S. No.	**Physical Parameters**	**Marketed Churna**	**In-House Churna**
1.	Tapped density	0.645 gm/cm3	1.111 gm/cm3
2	Bulk density	0.434 gm/cm3	0.769 gm/cm
3	Angle of repose	45º	45º
4.	Houser's ratio	0.673 gm/cm3	0.692 gm/cm
5	Carr's Index	48.61	44.47

6. Conclusion:

Trikatu Churna was found to possess higher the rate of phytoconstituents and promising, sinusitis, Athma, Rhinitis, tonsillitis & antibacterial activity. It is also confirmed that, these spicy products triggers natural immune system to fight against enteric bacterial infection This study would provide the preliminary scientific evidence for ethno-botanical and traditional use of this Churna for prevention of enteric bacterial infections. The developed thin layer Chromatography method for estimation of Piper longum, p.nigrum & Zingiberofficianalis from Trikatu Churna could be used as a valuable Analytical tool in the routine analysis, to check the Batch to batch variation. Ayurvedic medicine Tikatu Churna has been standardized by intervention of modern scientific quality control measures in the traditional formulation described in classical texts. Pharmacognostic characters established for the raw materials could be employed as quality control standards for evaluating its identity and can be used for routine analysis. Purity and potency of the materials and formulations following the procedure given could be performed in quality control and assurance of pharmaceuticals.

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