FORMULATION AND EVALUATION OF COMPOUND AYURVEDIC FORMULATION

KRISHNADI CHURNA

Saurabh Sharma*, Satish Nayak and Sushil Mhaske

Bansal College of Pharmacy, Kota, Anand Nagar Bhopal, (M.P.) 462021

E-mail of Corresponding author: saurabh_mips17@yahoo.com

Abstract:
Quality assurance is an integral part and basic requirement for all the systems of medicines to ensure their quality of the formulation. Krishnadi Churna is one of the ancient Ayurvedic formulation consisting of five simple and valuable herbs. It consists of fine powder of dried fruits of Pippal, Ajwain, Bilva and rhizomes of Sonth and Nagarmotha in equal quantities. It is used in managing of GIT disturbances, nausea, vomiting and fever. In Ayurvedic formulation the main problem is lack of quality standards, there are batch-to-batch variation in the formulation. In present communication attempts have been formulation was prepared in laboratory according to procedure given in Ayurvedic Formulary of India. The ingredients were procured locally, identified and authentication was done. Formulation was subjected to physiochemical analysis, TLC profile and botanical characterization and compared using authentic ingredients as the references. Macroscopy, Microscopy and TLC profiling complement each other for the finding of the crude drugs are present in the formulation. The data is obtained from the analysis is adopted for detection, identification of Krishnadi Churna from other powdered drug formulations.

Key words: Krishnadi Churna; Quality control parameter; Ayurvedic formulation; TLC.

1. Introduction:
Krishnadi Churna is a polyherbal traditional formulation consisting of dried fruits of Pippal, Ajwain, Bel and rhizomes of Sonth, Nagarmotha. Piper longum (Piperaceae) is indigenous to north–eastern and southern India, Ceylon etc and cultivated in eastern Bengal. Dried Fruits of Trachyspermum copticum (Apiaceae) grows and is largely cultivated in eastern India, dried rhizomes of Zingiber officinale (Zingiberaceae) is native of south east Asia and cultivated in Caribbean island, Africa Australia and Mauritius, dried fruit of Aegle marmelos (Rutaceae) is indigenous to India and is found in Myanmar and Sri-lanka. Dried rhizomes of Cypruss rotundus (Cyperaceae) is found throughout the India, Ceylon and other hot countries.

Ayurvedic Churna is polyherbal formulation which contains single drug or mixture of drugs. Krishnadi Churna is used in digestive impairment, cough, cold, vomiting, nausea, fever. In GIT disturbances Krishnadi Churna has shown the good results.

The literature review of the components shows following biologic activities.

1) Bilva: The fruit of Aegle marmelos lowers blood glucose level, activity against ranikhet disease virus and some intestinal parasite. Syrup of bel fruit is effective in acute diarrhea and dysentery and other stomach problems.

2) Nagarmotha: Rhizomes of Cypruss rotundus shows astringent, bitter, appetizer, anthelmentic. It is useful in leprosy, thirst, fever, blood disease, dysentery and other stomach problems.

3) Pippal: The powder of Piper longum fruit is used in cough, cold, asthma, hoarseness and hiccup. It is also useful in fever, lacunaria, urinary discharge, tumors, piles, disease of spleen, pains, inflammation, leprosy, insomnia,
Jaundice, aphrodisiac and biliousness\textsuperscript{10}. 4) Sonth: Rhizomes of *Zingiber officinale* are used in prophylaxis of nausea, vomiting related to motion sickness, post operative nausea, pernicious vomiting in pregnancy and sea sickness and mostly used in cough, cold and flu, etc\textsuperscript{10}. 5) Ajwain. The dried fruit of *Trachyspermum copticum* shows antispasmodic stimulant, carminative activity. It is also recommend for sore throat, bronchitis and respiratory related problems\textsuperscript{9}.

| S.No. | Language  | Bel       | Ajwain   | Pippal | Nagarmotha | Sonth         |
|-------|-----------|-----------|----------|--------|------------|--------------|
| 1     | English   | Bengal    | Bishop   | Long pepper | Nut grass | Ginger root |
| 2     | Hindi     | Bael      | Ajwain   | Pipar   | Motha      | Sonth        |
| 3     | Sanskrit  | Bilva     | Dipyaka  | Kana    | Mustaka    | Ausadha      |
| 4     | Tamil     | Bilva     | Omam     | Arisi   | Korai      | Sukku        |
| 5     | Bengali   | Bela      | Yamine   | Pipul   | Mutha      | Suntha       |
| 6     | Telgu     | Maredu    | Vamu     | Pippalu | Tungamustalu | Sonthi      |
| 7     | Urdu      | Bel       | Ajwan    | Filfil daraz | Sad kafi | Sonth         |

2. Material and Methods
All the crude drugs of formulation were collected from the local market of Ujjain (M.P.). The crude drugs were authenticated by botanist Dr. Chitralekha Soni, HOD Botany Department, Vikram University, Ujjain. (M.P.). The crude drug was cleaned and made free from foreign matter. All the crude drugs were treated with water containing antimicrobial agent eg. Isopropyl alcohol (70%) and shade dried and reduced to a coarse powder in a mechanical grinder.

2.1 Morphology:
1) The dried pulp of *Aegle marmelos* is honey colored, slightly acrid but has agreeable taste, faintly aromatic, very sticky or glutiness in nature. Fruits are sub-globosely, 5-18 cm in diameter each contain several hairy seeds embedded in a reddish pulp.

2) The rhizomes of *Zinger officinale* are branched rhizomes, laterally flattened irregular branching pieces, 3-16 cm long, 3-14 cm wide 2 cm thick, odor characteristic and aromatic, taste pungent and externally buff colored.

3) The fruit of *Piper longum* are greenish black-to-black cylindrical, 2.5 to 5 cm long and 0.4 to 1 cm thick consisting of minute sessile fruits, surface ruff and composite, taste pungent, odour aromatic.

4) Rhizomes of *Cyprus rotundus* are bluntly conical and vary in size and thickness, crowned with the remains of stem and leaves. Dark brown and black externally, creamish yellow internally, odor pleasant and bitter taste.

5) Fruits of *Trachyspermum copticum* are yellowish brown color, it consist of cremocarps or separate mericarp with bifid stylopod size 7 to 3 mm long and 1.5 to 2.4 mm broad and 0.5 to 1.5 mm thick, aromatic taste and agreeable order\textsuperscript{11}.

2.2 Quantitative Determination of Crude Drugs\textsuperscript{1,2} : The various parameters were performed for quantitative determination of crude drugs. The determination of foreign matter, determination of moisture content (loss on drying), determination of ash values (total
ash, acid insoluble ash, water soluble ash) and extractive values was done.

2.3 Preparation of Churna: Drug taken in yoga was cleaned and dried properly. The crude drugs were separately powdered and sieved; each one of them (powder) was weighted separately and well mixed together.

2.4 Physico-Chemical Evaluation of Krishnadi Churna: Physico-chemical parameters such as extractive values, ash values (total ash, acid insoluble ash, and water soluble ash), determination of moisture content (loss on drying), determination of pH, determination of Physical parameters (angle of repose, bulk density, tapped density) was performed.

2.5 Phytochemical Evaluation of Krishnadi Churna: The aqueous extract of Krishnadi churna was subjected to phytochemical tests for the phytochemical identification of various plant constituents present in the formulation, with different chemical reagents.

2.6 Powder Microscopy of Krishnadi Churna: Small quantity of Churna was taken for the microscopic analysis, along with the genuine samples Pippal, Bel, Ajwain, Nagarmotha and Sonth. A Churna sample cleared by heating with chloral hydrate and mounted in glycerine was used to identify diagnostic microscopic characters of the ingredients.

2.7 TLC of Krishnadi Churna: Thin layer chromatography of all components viz Zingiber officinale, Trachyspermum copticum, Cyperus rotundus, Aegle marmelos, and Piper longum in the Krishnadi Churna was done in following manner. 4 g of the Churna was refluxed with 25 ml of ethanol for 30 minutes. Then it was cooled and filtered. The residue was further refluxed for two times with 25 ml of ethanol, cooled and filtered. All the filtrates were combined and concentrated to 10 ml and TLC was performed. 2 μl samples were applied on the individual TLC plate for the Krishnadi Churna and the respect of component of the formulation and results are shown in (Table 11).

Solvent system or mobile phase was used:
1) Zingiber officinale : n-Hexane : Ether (40:60)
2) Trachyspermum copticum : Hexane: Ethylacetate (3:1)
3) Cyperus rotundus: Toulene: Ethylacetate (9:1)
4) Aegle marmelos : Toulene: Ethylacetate (5:95)
5) Piper longum : Toulene: Ethylacetate (9:1)

3. Results and Discussion
The study of macroscopical characters of crude drugs viz. Bel, Nagarmotha, Ajwain, Sonth, and Pippal in formulation Krishnadi Churna were carried out. The powder microscopy of Krishnadi Churna shows

1. Fragments of parenchymatous cells
2. Oil globules round to oval
3. Epidermal cells
4. Fibers with dented walls
5. Starch grains
6. Unicellular Trichomes
7. Stone cells
8. Un lignified phloem cells
9. Calcium oxalate crystals.

The macroscopical characters are shown in (Table 2). Physico-chemical parameters of crude drugs and formulation like ash values, foreign matter, moisture content (loss on drying) and extractive values are show in (Table 3-9). The pH of formulation, Physical parameters like bulk density, tapped density and angle of repose are reported in (Table 9). The result of preliminary phytochemical screening is reported in (Table 10). Thin layer chromatographies were performed and results are tabulated in (Table 11).

Conclusion
From the present study we conclude that the quality control parameter could be used as a valuable analytical tool for the routine analysis of Krishnadi Churna. Standardization is a way to prove the
quality and purity of herbal preparation and evaluation parameter is used to check batch-to-batch variation. Hence the physiochemical parameters, phytochemical tests, physical parameters, chromatography profile and microscopy characteristics together may be used for quality evaluation and the standardization of the compound formulation. These investigations are very much helpful for the identification and standardization of Churna formulations, which is useful in field of herbal drug industry for further research activities. Further quantitative instrumental methods to determine potency of Krishnadi Churna should be used to ascertain the quality of product.

Table 2: Macroscopical Characters of Crude Drugs

| S.No. | Drugs               | Colour          | Odour          | Taste                   |
|-------|---------------------|-----------------|----------------|-------------------------|
| 1     | *Piper longum*      | Blackish green  | Pungent        | Acrid and bitter        |
| 2     | *Zingiber officinale* | Yellowish brown | Aromatic       | Pungent                 |
| 3     | *Trachyspermum Copticum* | Yellowish brown | Agreeable      | Aromatic and warm       |
| 4     | *Aegle marmelos*    | Orange brown    | Characteristic | Acrid and agreeable     |
| 5     | *Cyperus rotundus*  | Dark brown to black | Pleasant     | Pungent and astringent  |

Table 3: Determination of Foreign Matter

| S.No. | Particulars               | Foreign matter |
|-------|---------------------------|----------------|
| 1     | *Piper longum*            | Nil            |
| 2     | *Zingiber officinale*     | Nil            |
| 3     | *Trachyspermum copticum*  | 2.8%           |
| 4     | *Aegle marmelos*          | Nil            |
| 5     | *Cyperus rotundus*        | 3.5%           |

Table 4: Determination of Loss on Drying (% w/w)

| S.No. | Particulars               | Loss on drying (% w/w) |
|-------|---------------------------|------------------------|
| 1     | *Piper longum*            | 4.12±0.34              |
| 2     | *Zingiber officinale*     | 2.5±0.24               |
| 3     | *Trachyspermum copticum*  | 4.2±0.14               |
| 4     | *Aegle marmelos*          | 1.74±0.33              |
| 5     | *Cyperus rotundus*        | 2.31±0.29              |

All the values are in mean ±SD (Standard deviation) (where n=3)

Table 5: Determination of Ash Values (% w/w)

| S.No. | Particulars               | Total ash | Acid insoluble ash | Water soluble ash |
|-------|---------------------------|-----------|--------------------|-------------------|
| 1     | *Piper longum*            | 4.10±0.78 | 0.17±0.12          | 1.03±0.58         |
| 2     | *Zingiber officinale*     | 5.93±0.19 | 2.69±1.00          | 1.37±0.13         |
| 3     | *Trachyspermum copticum*  | 4.11±0.52 | 0.15±0.19          | 1.28±0.44         |
| 4     | *Aegle marmelos*          | 7.93±0.19 | 0.69±1.00          | 1.49±0.06         |
| 5     | *Cyperus rotundus*        | 6.11±0.54 | 2.27±0.19          | 1.39±0.47         |

All the values are in mean ±SD (Standard deviation) (where n=3)
### Table 6: Determination of Extractive Values (% w/w)

| S.No. | Particulars          | Water soluble extracts | Alcohol soluble extracts |
|-------|----------------------|------------------------|-------------------------|
| 1.    | *Piper longum*       | 21.73±1.09             | 09.14 ± 0.90            |
| 2.    | *Zingiber officinale*| 18.1 ± 0.66            | 07.43 ± 0.28            |
| 3.    | *Trachyspermum copticum* | 22.23±0.71         | 08.50 ± 0.67            |
| 4.    | *Aegle marmelos*     | 28.23±0.71             | 15.00 ± 0.67            |
| 5.    | *Cyperus rotundus*   | 15.24±0.21             | 10.53 ± 0.21            |

All the values are in mean ±SD (Standard deviation) (where n=3)

### Table 7: Organoleptic Evaluation of *Krishnadi Churna*

| S.No. | Formulation | Colour    | Odour       | Taste       |
|-------|-------------|-----------|-------------|-------------|
| 1.    | *Krishnadi Churna* | Brownish  | Characteristic | Acrid and bitter |

### Table 8: Determination of Extractive Values (% w/w)

| S.No. | Particulars          | Extractive value of *Krishnadi Churna* |
|-------|----------------------|----------------------------------------|
| 1.    | Water soluble extracts | 25.23±0.24                             |
| 2.    | Alcohol soluble extracts | 17.41±0.18                            |
| 3.    | n-Hexane              | 14.15±0.16                             |
| 4.    | Ether                 | 06.13±0.51                             |
| 5.    | Chloroform            | 14.20±0.11                             |

All the values are in mean ±SD (Standard deviation) (where n=3)

### Table 9: Physico-chemical analysis of *Krishnadi Churna*

| S.No. | Particulars          | Physico-chemical Tests | Results       |
|-------|----------------------|------------------------|---------------|
| 1     | *Krishnadi Churna*   | Total ash              | 6.10 ± 0.16   |
| 2     | *Krishnadi Churna*   | Acid insoluble ash     | 1.54 ± 0.10   |
| 3     | *Krishnadi Churna*   | Water soluble ash      | 1.48 ± 0.23   |
| 4     | *Krishnadi Churna*   | Loss on drying         | 3.54 ± 0.21   |
| 5     | *Krishnadi Churna*   | Determination of pH    |               |
|       |                      | (1 % solution W/V)     | 5.71 ± 0.11   |
|       |                      | (10 % solution W/V)    | 5.95 ± 0.30   |
| 6     | *Krishnadi Churna*   | Bulk density           | 0.53 ± 0.01   |
| 7     | *Krishnadi Churna*   | Tapped density         | 1.19 ± 0.01   |
| 8     | *Krishnadi Churna*   | Angle of Repose        | 26.34         |

All the values are in mean ±SD (Standard deviation) (where n=3)
Table 10: Phytochemical analysis of Aqueous Extract of Krishnadi Churna

| S.N. | Phytochemical Constituents | Aqueous extract |
|------|---------------------------|-----------------|
| 1    | Carbohydrate +            |                 |
| 2    | Glycoside +               |                 |
| 3    | Proteins -                |                 |
| 4    | Saponins +                |                 |
| 5    | Tannins +                 |                 |
| 6    | Alkaloids -               |                 |
| 7    | Flavonoids +              |                 |
| 8    | Volatile oil -            |                 |

+ = Present    - = Absent

Table 11: TLC of Krishnadi Churna Component

| S.No. | Component                  | RF Value |
|-------|----------------------------|----------|
| 1     | Zingiber officinale        | 0.84     |
| 2     | Trachyspermum copticum     | 0.88     |
| 3     | Cyperus rotundus           | 0.72     |
| 4     | Aegle marmelos             | 0.92     |
| 5     | Piper longum               | 0.87     |

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