

# A Comparative Preliminary Phytochemical Analysis of *Choorna of Methika* and *Bhavitha Beeja choorna of Methika (Trigonella foenum – graecum Linn.)*

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**Abstract**— *Trigonella foenum – graecum Linn*, called 'Methika' in Ayurveda is a medicinal plant with wide range of uses in Ayurveda. Seeds are the main useful part of the plant. It belongs to 'Chathurbeeja', a group of seeds of four medicinal species in Ayurvedic system of medicine, which is an ingredient of many formulations. The drug Methika is used for treating various metabolic disorders such as diabetes, dyslipidemia etc. Bhavana is a pharmaceutical process done for potentiating or purification of drugs. The process Bhavana will help to decrease the dose of drug and the small dose even can produce a very high result. Thus this is an attempt to compare preliminary phytochemical analysis of choorna of Methika and its bhavitha choorna. The preliminary phytochemical analysis includes Determination of the physicochemical parameters, Determination of Extractive values, Determination of the phytochemical constituents. The physico-chemical evaluation is done by assessing various physico-chemical parameters such as foreign matter, ash values, tannin content, sugar content, phenol content etc. The comparative preliminary phytochemical analysis of choorna of Methika and its bhavitha choorna showed the process bhavana helped to increase the potency and efficacy of the drug.

**Keywords**— *Trigonella foenum-graecum Linn*; *Methika*; preliminary phytochemical analysis.

## I. INTRODUCTION

**B**havana is a pharmaceutical process done for potentiating or purification of drugs. The drugs are completely immersed in an appropriate *drava*, and kept for a specific period of time or it is triturated in that *drava* for specific time period. This process is called Bhavana.<sup>1</sup> Grinding, boiling, soaking etc. are some of the methods of *Bhavana* mentioned in Ayurvedic texts. It is done for fulfilment of different purposes such as increase the potency of the drug, Purification of drugs, removing the adverse effect of a drug, enhancing the therapeutic activity of raw drugs, decrease the *theekshnatha* of a drug etc. The most important feature of this process is that it can increase the potency of drug. So the process *Bhavana* will help to decrease the dose of drug and the small dose even can produce a very high result. The potency of the drugs may be further potentiated by doing the *Bhavana* process using their own *swarasa*. *Acharya Charaka in Kalpasthana* emphasizes that the potency of the drug will be increased, if the drug is done *Bhavana* with its own liquid (*Swarasa / Kashaya*).<sup>2</sup>

*Methika (Trigonella foenum-graecum Linn.)* is a common medicinal plant. The references of this drug are available from Vedic period. Detailed description of the drug is available in *Nighantus*. It is used throughout India as a tastemaker. The drug is mentioned in the treatment of *Vatasonita* in *Chikitsamangari*, an authentic Malayalam manuscript.<sup>3</sup> So it was selected and a comparative preliminary phytochemical analysis of *choorna* of *Methika* and its *bhavitha choorna* has been performed in the present study. The phytochemical analysis was done at Drug Standardization unit of Department

of Dravyaguna vijnanam, Government Ayurveda College, Tripunithura.

## II. MATERIALS AND METHODS

### A. Collection of Test Drugs

*Bhavitha Methika Choorna (Trigonella foenum-graecum Linn.)* was prepared according to the reference in *Bhaishajyaratnavali*. Sufficient quantity of *seetha kasaya* of the seed of *Methika* was prepared by steeping one part of coarsely powdered *choorna* in 6 parts of water and keeping for overnight. Then the contents were filtered. *Bhavana* was done by fully soaking the drug in the *seetha kasaya*, and drying in shade to avoid the loss of essential phytochemicals. This process was repeated 3 times. After attaining proper dryness, drug was made into fine powder and sieved through mesh with size-120.

The phytochemical analysis was done at Drug Standardization Unit of Department of Dravyagunavinjanam, Government Ayurveda College, Tripunithura.

### B. Reagents

Concentrated and dilute Hydrochloric acid, Xylene, Concentrated and dilute sulphuric acid, Concentrated and dilute Nitric acid, Sodium hydroxide solution, Lead acetate solution, Sodium oxalate, Potassium permanganate(KMNO<sub>4</sub>) solution, Anhydrous Sodium carbonate, Petroleum ether, Cyclohexane, Acetone, Alcohol, Fehling's Solution A&B, Chloroform water, Dragendroff's reagent, Mayer's reagent, Wagner's reagent, Neutral ferric chloride, Magnesium ribbon, Methylene blue reagent, Sodium bicarbonate solution and Copper Sulphate, Catechol, Folin cio catechu phenol reagent.



Fig. 1. Methika (*Trigonella foenum-graecum* Linn.)

**C. Apparatus**

Silica crucible, Round bottom flask, Dean and stark’s apparatus, Clevenger’s apparatus, Soxhlet apparatus, Water condensers, Buchner funnel, Hot air oven, Muffle furnace, Bunsen burner, heating mantle, G4 crucible, glass beakers, petri dishes, standard flask, measuring jars, conical flask, funnel, glass rods, watch glass, burettes, pipettes, shaker, centrifuge etc.

**D. Procedure**

**Determination of the physicochemical parameters**

Parameters like foreign matter, total ash, acid insoluble ash, water insoluble ash, volatile oil, moisture content, fibre, tannin, total sugar, reducing sugar, phenol and pH was evaluated in *choorna* and *bhavitha choorna* of fruit of *Alabu* (*Lagenaria siceraria* (Mol.) Standely). The ash of both test drugs was subjected to qualitative analysis to confirm the presence of acid radicals carbonate, phosphate, chloride and sulphate and basic radical potassium.

**Determination of Extractive values**

The cold alcohol soluble, hot alcohol soluble, cold water soluble and hot water soluble extractive values of both test drugs was evaluated in the study.

Successive solvent extraction of both test drugs was also carried out using the solvents petroleum ether, cyclohexane, acetone and alcohol.

**Phytochemical parameters**

The presence or absence of phytochemical constituents like alkaloids, flavonoids, phenols, saponins, carbohydrates, proteins, steroids and tannins was evaluated.

Petroleum ether, cyclohexane, acetone and alcohol extracts of *choorna* and *bhavitha choorna* of fruit of *Alabu* (*Lagenaria siceraria* (Mol.) Standely) were subjected to qualitative analysis for analysing the presence of steroids, alkaloids, flavonoids and phenols.

The physical and preliminary phytochemical analysis was done by standard procedures mentioned in the Ayurvedic Pharmacopoeia of India.

**III. RESULTS**

Results of the preliminary phytochemical analysis done are tabulated below:

TABLE 1. Physico-chemical parameters of *Choorna* of *Methika* (*Trigonella foenum-graecum* Linn) and *Bhavitha Methika Choorna*

Sl no.	Parameters	<i>Choorna</i> of <i>Methika</i>	<i>Bhavitha Methika Choorna</i>
1	Foreign matter	Nil	Nil
2	Total ash	3.8%	3.9%
3	Acid Insoluble Ash	0.41%	0.25%
4	Water Insoluble Ash	1.85%	1.45%
5	Moisture Content	4.99%	6.09%
6	Volatile oil	5%	5.2%
7	Fibre	7.56%	8.33%
8	Tannin Content	10.60%	9.55%
9	Total sugar	4.71%	4.00%
10	Reducing sugar	Nil	Nil
11	Phenol	0.56µg	0.72µg
12	pH	5.6	5.2

TABLE 2. Qualitative analysis of ash of *Choorna* of *Methika* (*Trigonella foenum-graecum* Linn) and *Bhavitha Methika Choorna*

Sl no	Experiment	<i>Choorna</i> of <i>Methika</i>	<i>Bhavitha Methika Choorna</i>
Acid radicals			
1	Carbonate	-	-
2	Phosphate	-	-
3	Chloride	+	+
4	Sulphate	+	+
Basic radicals			
5	Potassium	-	-

TABLE 3. Extractive values (Alcohol soluble and Water soluble) of *Choorna* of *Methika* (*Trigonella foenum-graecum* Linn) and *Bhavitha Methika Choorna*

Sl.no	Type of Extractives	<i>Choorna</i> of <i>Methika</i>	<i>Bhavitha Methika Choorna</i>
1	Cold Alcohol soluble	9.13%	9.34%
2	Hot Alcohol soluble	11.98%	29.5%
3	Cold water soluble	29.3%	31.97%
4	Hot water soluble	30.63%	32.64%

TABLE 4. Extractive values (in different solvents) of *Choorna* of *Methika* (*Trigonella foenum-graecum* Linn) and *Bhavitha Methika Choorna*

Sl no	Solvents	<i>Choorna</i> of <i>Methika</i>	<i>Bhavitha Methika Choorna</i>
1	Petroleum ether	3.82%	4.33%
2	Cyclohexane	0.71%	0.87%
3	Acetone	1.96%	2.04%
4	Alcohol	3.19%	4.63%

TABLE 5. Qualitative phytochemical analysis of *Choorna* of *Methika* (*Trigonella foenum-graecum* Linn) and *Bhavitha Methika Choorna*

Sl.no	Experiment	<i>Alabu</i>	<i>Bhavitha choorna of Alabu</i>
1	Alkaloids	-	-
	a. Dragendroff’s test	-	-
	b. Meyer’s test	-	-
2	Flavonoids	+	+
3	Saponins	+	+
4	Carbohydrates	-	-
	a. Fehling’s test	-	-
	b. Benedict’s test	-	-
5	Proteins	+	+
6	Phenols	-	-
	a. Ferric chloride test	-	-
	b. Lead acetate test	-	-
7	Steroids	+	+
8	Tannins	+	+
	a. Ferric chloride test	+	+
	b. Lead acetate test	+	+

TABLE 6. Qualitative phytochemical analysis of solvent extracts of *Choorna of Methika (Trigonella foenum-graecum Linn)*

Extract	Steroid	Alkaloid	Flavonoid	Phenol
Petroleum ether	+	-	-	-
Cyclohexane	+	-	+	-
Acetone	+	+	+	-
Alcohol	+	+	+	+

TABLE 7. Qualitative phytochemical analysis of solvent extracts of *Bhavitha Methika Choorna*

Extract	Steroid	Alkaloid	Flavonoid	Phenol
Petroleum ether	++	-	-	-
Cyclohexane	++	-	++	-
Acetone	++	++	++	-
Alcohol	++	++	++	++

#### IV. DISCUSSION

For the determination of quality and purity of the drug, the detailed preliminary phytochemical evaluation was carried out.

Foreign matter was absent in *Methika Choorna (Trigonella foenum-graecum Linn.)* and *Bhavitha Methika Choorna* which indicates the absence of physical impurities. Total ash value indicates the amount of residue remains after incineration of herbal drugs. The total ash in the both samples was within in the API parameters. The acid insoluble ash and water insoluble ash values of *Choorna of Methika (Trigonella foenum-graecum Linn.)* and *Bhavitha Methika Choorna* were found to be less than that off API parameters. This infers that the percentage of impurity in the crude drug was less.

Moisture is one of the major factors responsible for the deterioration of drugs and formulations. Low moisture content is always desirable for higher stability of drugs. The moisture content remains within normal limits. Thus it could discourage the growth of fungi and bacteria. Volatile oil content in *Choorna of Methika (Trigonella foenum-graecum Linn.)* and *Bhavitha Methika Choorna* found to be 5% and 5.2% respectively. Quantitative estimation of total sugar and reducing sugar, fibre content, tannin content and phenol content have been estimated by the standard procedures. Here the values for *Bhavitha Methika Choorna* were more than that of *Choorna of Methika (Trigonella foenum-graecum Linn.)* which justifies that process of *Bhavana* has the ability to increase the potency and efficacy of the drug.

Qualitative and Quantitative estimation of pH of *Choorna of Methika (Trigonella foenum-graecum Linn.)* and *Bhavitha Methika Choorna* in *Choorna* form was evaluated. The drug turned blue litmus paper into red indicating the acidic nature and shows an acidic pH of 5.6 and 5.2 for *Choorna of Methika (Trigonella foenum-graecum Linn.)* and *Bhavitha Methika Choorna* respectively. This shows that *Bhavitha Methika Choorna* is more acidic than *Choorna of Methika (Trigonella foenum-graecum Linn.)*. Both ash of *Choorna of Methika (Trigonella foenum-graecum Linn.)* and *Bhavitha Methika Choorna* show the presence of acid radicals chloride and sulphate. And basic radical potassium was also present in both samples.

Extractive values give evidence of adulteration of herbal drug with exhausted material. Also the nature of chemical

constituent present in the drug and nature of solvent in which the drug gives maximum extract can also be inferred. Moreover the values obtained indicate that more amounts of active principles are obtained in the water soluble extractives in both *Choorna of Methika (Trigonella foenum-graecum Linn.)* and *Bhavitha Methika Choorna*. When comparing hot water and cold water soluble extractive values amount of active principles is found more in hot water soluble extract, this suggests that the hot water can be a good *anupana* for the drug intake. Also both water soluble and alcohol soluble values for *Bhavitha Methika Choorna* were more than that of *Choorna of Methika (Trigonella foenum-graecum Linn.)* which justifies that process of *Bhavana* has the ability to increase the potency and efficacy of the drug.

Successive solvent extraction is done with solvents of increasing polarity from a non-polar solvent to a highly polar solvent so that maximum phytoconstituents in the drug can be extracted out into the solvents. While comparing the extractive values obtained in the successive solvent extraction between the *methika choorna* and *Bhavitha choorna of Methika (Trigonella foenum-graecum Linn.)*, it was found that *Bhavitha choorna of Methika* possessed more values than *choorna of Methika (Trigonella foenum-graecum Linn.)* which indicates that *Bhavana* process will help to improve the therapeutic property of the drug.

Qualitative analysis of the crude drugs shows the presence of flavonoids, proteins, steroids, and tannin on both *Choorna of Methika (Trigonella foenum-graecum Linn.)* and *Bhavitha Methika Choorna*.

Thus in the preliminary phytochemical evaluation, quantitative increase of phytoconstituents was seen in *Bhavitha choorna* which substantiate the fact that process of *Bhavana* will help to increase the potency and efficacy of the drug.

#### V. CONCLUSION

Preliminary phytochemical analysis of the test drugs including analysis of foreign matter, total ash, acid insoluble ash, water insoluble ash, moisture content, volatile oil, fibre content, tannin, sugar content, water soluble extractive and alcohol soluble extractives were done. Also, qualitative analysis of the crude powder and powdered ash was conducted. Obtained values are similar to those present in API. Some additional tests are performed other than API standards to affirm the purity and quality of study drug.

The results of preliminary phytochemical evaluation revealed that process of *Bhavana* helped to increase the phytoconstituents of a drug which in turn boost the potency and efficacy of the drug. By increasing the potency, the dosage of the drug can be reduced considerably. Powdering of the *Bhavitha choorna* of seed of *Methika* again reduces the particle size which also helps in increasing the bioavailability of the drug.

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