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### A Comparative Phytochemical Analysis of *Choorna* and *Bhavitha Choorna* of *Apamarga* (*Achyranthes aspera* Linn.)

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#### ABSTRACT: -

*Samskara* is a pharmaceutical process which aids in the transformation of the inherent attributes of a *dravya* which provides to the addition of a new property in them. The *samskara* or the processing helps in the qualitative and quantitative alterations to the improvement, intensification, modification and lowering the unwanted effects of the substance. *Bhavana* is one mode of *samskara* in which the powdered drugs are soaked in an appropriate *Drava* (liquid medium like *Swarasa*, *Kashaya* etc.). *Dravya* is kept completely immersed in *drava* or it is triturated in *drava* for specific time period. The drug *Apamarga* (*Achyranthes aspera* Linn.) is selected as the drug of choice for the purpose of *bhavana*. The phytoconstituents present in the drug determines its efficacy. As the *bhavana* can amplify the efficacy of a drug the present study aimed to compare the findings of phytochemical analysis of both the *choorna* and *bhavitha choorna* of the drug. The tannin, fiber, phenol content and extractive values obtained for the *bhavitha choorna* was found more than that obtained for the *choorna* indicating quantitative enhancement of phytoconstituents which substantiate the fact that process of *bhavana* will help to increase the potency and efficacy of a drug.

**Key words:** *Apamarga*, *samskara*, *bhavana*, phytoconstituents



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## INTRODUCTION

There is nothing in the universe which cannot be used as medicine.<sup>[1]</sup> But the necessity is to employ proper *yukti* (intelligence) according to the need of the situation for the proper and effective utilization of the medicament. *Samskara* is the pharmaceutical procedure which aids in imparting new properties in the substance.<sup>[2]</sup> *Bhavana* is one mode of *samskara* in which the powdered drugs are soaked in an appropriate *drava* (liquid medium like *swarasa*, *kashaya* etc.) in which the *dravya* is kept completely immersed in the *drava* or it is triturated in *drava* for specific time period.<sup>[3]</sup> The process of *bhavana* fulfill different purposes in *Ayurvedic* pharmaceutical field as the procedure helps in the purification of drugs, removing its adverse effect, amplifying the therapeutic activity, reducing the excessive concentration of active principles that can be harmful or removing the toxicity in the drug, decreasing the *tikshnatha* of a drug and to increase its potency.<sup>[4]</sup> As the process of *bhavana* intensifies the efficacy of a drug a small dose of that particular drug can be made to produce a very high therapeutic effect.

*Apamarga* is a well-known drug that has been widely used in *Ayurvedic* classics. The plant was extensively used since *Vedic* period and has been renowned for immense medicinal value such as *rakshogna*, *rasayana*, *asmari nasana*,

*ojovardhana* etc.<sup>[5]</sup> In *Samhithas* the drug is mentioned in various single and compound preparations like gruel preparation of *apamarga bija* along with *godharasa* (inguana meat) in treatment of *kshuda*.<sup>[6]</sup> Various researches on phytochemical and pharmacological studies of the drug was conducted by various scholars. Several active principles such as alkaloids, flavonoids, steroids, saponins, terpenoids etc. having potent pharmacological actions like antihyperlipidemic, antihyperglycemic and anti-obesity effect has been isolated from the plant.<sup>[7],[8],[9]</sup> Considering the medicinal values of the drug it was selected for the process of *bhavana*. The phytochemicals or the active constituents determines the effect of the drug in the body. As the *bhavana* can potentiate the drug, the present study aimed to compare the findings of phytochemical analysis obtained for the *choorna* and *bhavitha choorna* of the drug *Apamarga* (*Achyranthes aspera* Linn.)

## MATERIALS AND METHODS

### Collection and preparation of drug

#### i. Collection

The mature fresh plant *Apamarga* (*Achyranthes aspera* Linn.) devoid any contamination and insect infestation was uprooted and collected as a whole plant from cultivated lands of kozhinjampara Panchayat in Palakkad district.



**Figure no. 1 Plant of Apamarga**  
(*Achyranthes aspera* Linn.)

### **i. Identification**

Collected fresh whole plants of the drug were then identified from the department of Dravyagunavijnanam, Government Ayurveda College, Tripunithura.

### **iii. Preparation**

The fresh whole plant was washed thoroughly with water to remove physical impurities. A sufficient quantity of the drug was used for the preparation of *swarasa* (juice) for *bhavana* and for the *choorna* (powder) preparation. Preliminary phytochemical evaluation was conducted in both the *choorna* and *bhavitha choorna* of the drug.

#### **Preparation of choorna (Powder)**

A sufficient quantity of the drug was properly cleaned and dried under sunlight. It was then made into fine powder and sieved through mesh with size-120.

#### **Preparation of Swarasa (juice) for bhavana**

*Swarasa* from the whole plant is prepared based on its method of preparation mentioned in *Sarangadhara samhitha*.<sup>[10]</sup> Fresh whole plant the drug was washed thoroughly to remove physical impurities like soil, mud etc. and the excess water was strained out using a strainer. The whole plant was cut into small pieces, crushed and pounded. It was then placed in a

cotton cloth, pressed and squeezed out through the cloth and the expressed juice of the drug was collected in a clean container.

#### **Preparation of bhavitha choorna (processed powder)**

*Bhavitha churna* (processed powder) of whole plant of *Apamarga* (*Achyranthes aspera* Linn.) was prepared according to the reference of *bhavana vidhi* mentioned in *Bhaishajya ratnavali*.<sup>[11]</sup> The *choorna* (powder) of the drug was taken in a wide mouthed plastic tray. It was spread uniformly in the tray so that it forms a thin layer of thickness 1 cm. The *swarasa* of the drug was then gradually poured into the fine powder such that the *swarasa* get drained into the powder. Thus pouring of *swarasa* was continued until a thin layer of *swarasa* was seen present on the surface of the drug. Using a clean sharp thin rod ensured the complete soaking of each and every fine particles of the drug. To ensure uniform spreading of *bhavana dravya* in the fine particles of the powder the tray was slowly and uniformly shaken on both sides. Then the tray was then left overnight. On the next day morning the tray was taken and covered with a clean thin cloth to prevent the occurrence of any contamination from the external environment. It is then dried under sunlight. When the top layer

of the *choorna* was completely dried it was mixed with a thin sharp rod for uniform drying of all the areas of the fine powder. Ensured that there was no fungal contamination. The properly dried powder was then made into fine powder and sieved through the mesh size 120. Likewise the dried powder obtained after each *bhavana*

was finely powdered. Thus the entire process of *bhavana* was repeated for 7 times.

The phytochemical analysis of both the powder was done at Drug Standardization Unit of Department of Dravyagunavijnanam, Government Ayurveda College, Tripunithura.



**Figure no: 2 Choorna of the whole plant of Apamarga (*Achyranthes aspera* Linn.)**



**Figure no. 3 Bhavitha choorna of whole plant of Apamarga (*Achyranthes aspera* Linn.)**

### 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. 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.

### 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 the drug. The ash of both test drugs was subjected to qualitative analysis to confirm the presence of acid radicals carbonate, phosphate, chloride and sulphate and for the 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* the drug were subjected to qualitative analysis for detecting 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.

## RESULTS

Results of the preliminary phytochemical analysis done are tabulated below:

#### a. Determination of Physico-chemical parameters

**Table No.1 Physico-Chemical Parameters of *Choorna* and *Bhavitha Choorna* of Whole Plant of *Apamarga* (*Achyranthes Aspera* Linn)**

Sl no.	Parameters	<i>Choorna</i>	<i>Bhavitha Choorna</i>
1	Foreign matter	Nil	Nil
2	Total ash	10.5%	11%
3	Acid Insoluble Ash	3.5%	4%
4	Water Insoluble Ash	5%	5.8%
5	Moisture Content	10.7%	12%
6	Volatile oil	Nil	Nil
7	Fibre	29.08	37.07
8	Tannin Content	5.3%	10.6%
9	Total sugar	3%	1.79%
10	Reducing sugar	1.39%	1.21%
11	Phenol	2.72%	8.78%
12	pH	6.62	3.03

### b. Qualitative analysis of ash

The ash of both the *choorna* showed the presence of both acid radicals and basic radicals.

**Table No. 2 Qualitative Analysis of Ash of *Choorna* and *Bhavitha Choorna* of Whole Plant of *Apamarga* (*Achyranthes Aspera* Linn)**

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

### c. Determination of extractive values (water soluble and alcohol soluble)

Observed extractive values such as cold and hot alcohol soluble extractives, hot and cold water

soluble extractives of both the *choorna* and *bhavitha choorna* of the whole plant were tabulated.

**Table No. 3 Extractive Values (Water Soluble And Alcohol Soluble) of *Choorna* and *Bhavitha Choorna* of Whole Plant of *Apamarga* (*Achyranthes Aspera* Linn.)**

Sl.no	Type of Extractives	<i>Choorna</i>	<i>Bhavitha choorna</i>
1	Cold Alcohol soluble	5%	13%
2	Hot Alcohol soluble	6.4%	13.5%
3	Cold water soluble	12.1%	14.7%
4	Hot water soluble	14.1%	19%

### d. Determination of Successive solvent extractive values

Following extractive values were obtained for

successive solvent extraction of both *choorna* and *bhavitha choorna* in solvents like petroleum ether, cyclohexane, acetone and alcohol.

**Table No. 4 Extractive Values (In Different Solvents) of *Choorna* and *Bhavitha Choorna* of Whole Plant of *Apamarga* (*Achyranthes Aspera* Linn.)**

Sl no	Solvents	<i>Choorna</i>	<i>Bhavitha choorna</i>
1	Petroleum ether	5.0%	6.4%
2	Cyclohexane	2%	2.8%
3	Acetone	2.6%	3.1%
4	Alcohol	6.5%	9.1%

## Determination of the phytochemical constituents

### a. Qualitative analysis of the drug

The results obtained in the qualitative analysis of both the *choorna* and *bhavitha choorna* showed

the presence of alkaloids, flavonoids, saponins, carbohydrates, phenols, proteins, steroid and tannins. A marked presence of these phytoconstituents was noted in *bhavitha choorna*.

**Table No. 5 Qualitative Phytochemical Analysis of Choorna and Bhavitha Choorna of Whole Plant of Apamarga (*Achyranthes Aspera* Linn.)**

Sl.no	Experiment	Choorna	Bhavitha choorna
1	Alkaloids Dragendroff's test	+	++
	Meyer's test	+	++
2	Flavonoids	+	++
3	Saponins	+	++
4	Carbohydrates Fehling's test	+	++
	Benedict's test	+	++
5	Proteins	+	++
6	Phenols Ferric chloride test	+	+
	Lead acetate test	+	++
7	Steroids	+	++
8	Tannins Ferric chloride test	+	+++
	Lead acetate test	+	+++

(+) Presence, (+) Marked presence, (+++) more marked presence

### b. Qualitative analysis of successive solvent extractives

Results obtained for qualitative analysis of successive solvent extractives in petroleum ether,

cyclohexane, acetone and alcohol of *choorna* and *bhavitha choorna* were tabulated.

**Table No. 6 Qualitative Phytochemical Analysis of Solvent Extracts of *Choorna* of Whole Plant of *Apamarga* (*Achyranthes Aspera* Linn.)**

Sl. No	Extract	Steroids	Alkaloids	Flavonoids	Phenols
1	Petroleum ether	+	+	+	+
2	Cyclohexane	+	+	+	+
3	Acetone	+	+	+	+
4	Alcohol	-	-	+	-

**Table No. 7 Qualitative Phytochemical Analysis of Solvent Extracts of *Bhavitha Choorna* of Whole Plant of *Apamarga* (*Achyranthes Aspera* Linn.)**

Sl no	Extract	Steroids	Alkaloids	Flavonoids	Phenols
1	Petroleum ether	+	+	+	+
2	Cyclohexane	+	+	++	+
3	Acetone	+	++	++	+
4	Alcohol	+	-	+	-

(+) Presence, (++) marked presence

## DISCUSSION

To determine the quality and purity of the drug a detailed preliminary phytochemical evaluation was carried out in both the powder i.e. *choorna* (powder) and *bhavitha choorna* (processed powder) of whole plant of *Apamarga* (*Achyranthes aspera* Linn.). Foreign matter in a drug sample includes presence of particles of stone, sand or any other debris of insects and other animal contaminants. In the present study the foreign matter was absent in both the drugs indicating the purity of drug. The ash value is the residue remaining after incineration of the drug. Total ash mainly represents the inorganic salts and impurities like sand, soil etc. present in the drug. The measurement of silica present in the drug especially as sand and siliceous earth is acid insoluble ash. The total ash value of both *choorna*

and *bhavitha* was found to be 10.5% and 11% respectively. The total ash value obtained for both the powder were found in normal limit as mentioned in the Ayurveda Pharmacopoeia of India and The Quality Standards of India hence the possible contamination and adulteration in the drug was thus ruled out. The acid insoluble ash values of powder obtained was 3.5%. The acid insoluble ash was comparable with the same mentioned in Ayurveda Pharmacopoeia of India and The Quality Standards of India. The acid insoluble ash value of processed powder was 4% and it remained within the normal range as that mentioned in Ayurvedic Pharmacopoeia of India. The water insoluble ash values for powder and processed powder values were 5% and 5.8% respectively. The moisture content in both the drugs was 10.7% and 12% respectively. A slight

increase in the moisture content noted for *bhavitha choorna*, but it does not affect the quality of processed powder and it was free from fungal infestation and that slight increase observed may be due to *bhavana*. Volatile oil was found absent in both the *choorna*. In the quantitative estimation of tannin content *choorna* of the drug showed 5.3% of tannin content. *Bhavitha choorna* showed 10.6% of tannin content. Here the value for tannin in *bhavitha choorna* was found more than that of *choorna* and that change may be due to the repeated process of *bhavana* which resulted in the increase of tannin content. The fibre content in powder and processed powder were 29.08% and 37.07% respectively. An increased fibre content in *bhavitha choorna* indicates that augmentation of that value by the *bhavana vidhi*. The phenol content obtained in *choorna* and *bhavitha choorna* was 2.72% and 8.78% respectively. Phenol content was found increased in *bhavitha choorna* and it may be due to the repeated *bhavana*. *Choorna* and *bhavitha choorna* showed a total sugar content of 3% and 1.79% and that of reducing sugar content of about 1.39% and 1.21% respectively. In *bhavitha choorna* a reduction in the total sugar and reducing sugar content was noted. In *bhavitha choorna* the total and reducing sugar content was found decreased. In the qualitative and quantitative estimation of pH of *choorna* and *bhavitha choorna* of whole plant of *Apamarga (Achyranthes aspera* Linn.) was estimated. Both the powder turned blue litmus paper into red indicating the acidic nature. More acidic pH was obtained for in *bhavitha choorna*.

In the qualitative ash analysis of *choorna* and *bhavitha choorna*, the ash of both the powder showed the presence of all the acid radicals like carbonate, phosphate, chloride and sulphate and

basic radicals like potassium.

Any adulteration in herbal drug with exhausted material can be detected from extractive values. Extractive values mainly represent the percentage of organic plant constituents such as alkaloids, phenols, flavonoids, sugars, volatile oils, resins, steroids, glycosides present in the extract of drug. The extractive values such as cold alcohol soluble, hot alcohol soluble, cold water soluble and hot water-soluble extractives were estimated and the values were found to be within the normal range as that mentioned in Ayurveda Pharmacopoeia of India. *Bhavitha choorna* of the drug showed more extractive values than that of the *choorna* indicating enhancement of phytoconstituents. In both powder water soluble extractive values were higher than alcohol soluble extractives. Hence this indicates that maximum amount of active principles were extracted in the water soluble extractives. While comparing the extractive values between the *choorna* and *bhavitha choorna*, it was found that *bhavitha choorna* possessed more extractive values than that of *choorna* which indicates that *bhavana* process resulted in aggrandizing the extractive values of the drug.

Successive solvent extraction involves successive extraction with solvents of increasing polarity from a non-polar (petroleum ether) to a more polar solvent (methanol) done to ensure that a wide polarity range of compound could be extracted. Maximum phytoconstituents in the drug thus can be extracted out into the solvents. The extractive values of *choorna* and *bhavitha choorna* obtained in the successive solvent extraction were 5 % and 6.4% for petroleum ether, 2% and 2.8% for cyclohexane, 2.6% and 3.1% for acetone, 6.5% and 9.1% for alcohol. Maximum extractive values was obtained for

solvent extraction containing alcohol. The successive solvent extractive values was found more in the *bhavitha choorna*.

In the qualitative analysis of the drug the presence chemical constituent such as alkaloid, phenol, steroid, proteins, carbohydrates, flavonoids, tannin and saponins were observed in both the *choorna*.

The successive solvent extracts obtained was subjected to qualitative analysis for confirming the presence of phytoconstituents. In *choorna* of the drug flavonoids was present in all the solvent extracts of drug. Steroids, alkaloids and phenols were present in all the extracts except in alcoholic extract. In *bhavitha choorna* of the drug steroids and phenols were present in all the extracts. Alcohols and phenols were present in all the extracts except in alcoholic extract. Presence of phenols was not detected in the alcoholic extract. Thus from the findings of preliminary phytochemical evaluation, quantitative increase of phytoconstituents was seen in *bhavitha choorna* which substantiate the fact that process of *bhavana* will help in augmenting the potency and efficacy of the drug.

## CONCLUSION

The *samskara* is a process or tool by which a *dravya* can be modified as required. *Bhavana samskara* increases the efficacy of a drug. This is evident from the findings of preliminary phytochemical evaluation of *choorna* and *bhavitha choorna* of *Apamarga* (*Achyranthes aspera* Linn.). The tannin, fibre and phenol content and the extractive values obtained for the *bhavitha* was found more than that obtained for the *choorna*. This marked increase noted in the phytoconstituents in the *bhavitha choorna* can boost the potency of the drug and hence its dose can be reduced accordingly.

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