

Preliminary Physico-Chemical Analysis of Different Market Samples of *Hingu* (*Ferula foetida* Regel.) Before and After *Shodhana*

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Abstract—Introduction: *Hingu* (*Ferula foetida* Regel.) is the oleo-resin gum. It is extracted from the dried sap of the stem and roots. It is a famous herbal drug, which is used in different ailments of the GI tract. It is used for the preparation of medicines and food flavouring. In the market currently, pure and compound forms of *Hingu* are available. *Hingu Shodhana* has been found in Ayurveda classics before using it in the preparation of medicine. Previously no published work regarding the physico-chemical parameters of *Ashuddha Hingu* and *Shuddha Hingu* in different market samples is found. Thus, here an attempt is made to compare the preliminary physico-chemical parameters of *Ashuddha Hingu* and *Shuddha Hingu* in three market samples. **Materials and methods:** Three samples of *Hingu* were collected from the local market of Vadodara and labelled as AH1, AH2 and AH3. *Shodhana* was carried out with the reference of Rasatarangini, and they were labelled as SH1, SH2, and SH3 respectively. Preliminary physico-chemical parameters i.e., pH, loss on drying, total ash, acid insoluble ash, water soluble extractives and alcohol soluble extractives of these market samples were done before and after *Shodhana*. **Result:** Market sample AH1 fails to meet the standard parameters mentioned in API. Also, data showed a decreased value of loss on drying, total ash, acid insoluble ash, water soluble extractive and alcohol soluble extractive in *Shuddha Hingu* samples when compared to *Ashuddha Hingu* samples. **Conclusion:** After *Shodhana* of *Hingu* in *Goghrita*, it transmits certain changes in *Ashuddha Hingu*. Thus, it is advised by seers that *Hingu* should be use in formulations only after the *Shodhana* process. Further advanced analysis might shed more light on this. The data generated here can be applied to further research.

Index Terms—*Shuddha Hingu*, *Ashuddha Hingu*, *Rasa Hing*, *Compound Hing*, *Asafoetida* (key words)

I. INTRODUCTION (HEADING 1)

Hingu (*Ferula foetida* Regel.) is the oleo-resin gum extracted from the dried sap of the stem and roots [1]. It belongs to the umbelliferae family [2]. It is commonly known as Hing or Devil's dung. It is a native species of Iran, Afghanistan and Pakistan. It is a well-known herbal drug, which is being used in a vast range of diseases like *Krimi-roga* (Helminthiasis), *Hridaroga* (Disease of heart), *Agnimandhya* (Digestive impairment), *Anaha* (Flatulence), *Gulma* (Abdominal lump), *Shoola* (Colicky pain) and *Udararoga* (Disease of abdomen) [3]. In Charak Samhita, it is described to have *Chhedaniya* (Detachment of vitiated *Dosha*), *Deepaniya* (Digestion and metabolic enhancing), *Anulomana* (Evacuation of flatus) and *Vata-Kapaha Prashamana* (Alleviation of *Vata* and *Kapha*) [4]. It contains approximately 40% to 60% asafoetida resin, 25% gum, 10% to 17% volatile oils, and 1.5% to 10% ash [5]. It carries various therapeutic and pharmacological properties like Anti-oxidant [6], Anti-cancer [7], Anti-ulcer [8], Anti-spasmodic [9], Anti-inflammatory [10], Anti-bacterial [11], Anti-viral [12], Anti-tumor [13], Anti-hepatotoxic [14] and Anti-proliferative activity [15].

Shodhana is an important intermediary pharmaceutical process used for the purification. *Hingu* have *Tikshna* (Sharpness) and *Ushna* (Hotness) *Guna* which causes *Utkleda* (Nausea). *Acharya* Sharandhara has mentioned to use *Bharjita Hingu* to avoid *Utkleda* [16]. Thus, it is advised by seers that *Hingu* should be use in formulations only after the *Shodhana* process like *Bharjana*.

Currently, in the market of India pure and compound forms of *Hingu* are available. Among them, pure *Hingu* is found in lump form and compound *Hingu* is found in lump or in powder form [17]. Out of them lump form is used for medicine preparation and powder is used for food flavouring. Compound *Hingu* contains asafoetida resin, rice flour, white wheat flour, gum, volatile oil and ash [18]. Pure and compound *Hingu* are available in market by name of *Rasa Hing* and *Bandhani Hing* respectively. Prize for each sample are varied and commercially many pharmacies are using *Bandhani Hing* as it poses a lower prize then *Rasa Hing*. Only work found on market samples of *Hingu*. Considering this, here an attempt has been made to develop preliminary physico-chemical profile of *Ashuddha Hingu* and *Shuddha Hingu* of three different market samples.

II. MATERIALS AND METHODS

1) Procurement of *Hingu*

All three samples of *Hingu* and *Goghrita* were procured from the local market of Vadodara as per *fssai* standards in august, 2023.

2) *Hingu Shodhana* procedure

Hingu Shodhana were conducted at the Pharmaceutical Laboratory of Upgraded Department of Rasashastra and Bhaishajya Kalpana, Vadodara, Gujarat.

Hingu Shodhana was carried out as per the reference of Rasatarangini [19]. *Ashuddha Hingu* was taken and small pieces were made by pounding in a stainless-steel mortar and pestle. *Goghrita* was taken in s. s. vessel and heated. Pieces of *Hingu* were added in s. s. vessel and *Bharjana* was done. When *Hingu* became crispy it was removed carefully. Put and spread it on butter

paper. After drying, *Shuddha Hingu* was collected and stored in an airtight container. The same procedure was followed in all three samples.

Table no. 1: Sample labelling

Sr.no.	Name of the sample	Labelled as
1.	<i>Ashuddha Bandhani Hingu</i> sample 1	AH1
2.	<i>Ashuddha Bandhani Hingu</i> sample 2	AH2
3.	<i>Ashuddha Rasa Hingu</i> sample 3	AH3
4.	<i>Shuddha Bandhani Hingu</i> sample 1	SH1
5.	<i>Shuddha Bandhani Hingu</i> sample 2	SH2
6.	<i>Shuddha Rasa Hingu</i> sample 3	SH3

3) Preparation of sample for analysis

All three samples of *Ashuddha Hingu* and *Shuddha Hingu* were powdered with the mechanical grinder and passed through sieve #60. Collected powders were stored in airtight plastic bags.

4) Analytical parameters

All three samples of *Ashuddha Hingu* and *Shuddha Hingu* were analysed by using different organoleptic characters i.e., colour, odour, taste, and touch; physico-chemical parameters i.e., pH [20], loss on drying [21], total ash [22], acid insoluble ash [23], water soluble extractive [24], and alcohol soluble extractive [25]. Organoleptic and preliminary physico-chemical analysis were conducted at Quality Testing Laboratory, Upgraded Department of Rasasashtra and Bhaishjya Kalpana, Government Ayurved College, Vadodara, Gujarat.

III. OBSERVATIONS AND RESULTS

Samples of *Ashuddha Hingu* and *Shuddha Hingu* were subjected to assessment of organoleptic characters and the results were tabulated in Table no.1. [Figure 1]



AH1



SH1



AH2



SH2



AH3



SH3

Figure 1: Ashuddha and Shuddha Hingu samples

Table no.1: Observations on organoleptic parameter

Sr. no.	Sample	Colour	Odour	Taste	Touch
1.	AH1	Dark Cream	Characteristic	Tasteless	Hard
2.	AH2	Dark brown	Strong, characteristic	Slight Astringent	Hard
3.	AH3	Light brown	Strong, characteristic	Astringent	Soft
4.	SH1	Cream	Ghrita, characteristic	Tasteless	Hard, oily
5.	SH2	Dark brown	Ghrita, characteristic	Astringent	Hard, oily
6.	SH3	Light brown	Ghrita, strong, characteristic	Astringent	Brittle, slightly oily

The preliminary physico chemical analysis values of *Ashuddha Hingu* and *Shuddha Hingu* were analysed and also compared with API standard. (Table no.2.)

Table no.2: Results of preliminary physico-chemical parameters

Sample	AH1	AH2	AH3	API standard	SH1	SH2	SH3
pH	5.9	5.88	6.8	-	5.56	5.37	6.59
Loss on drying	3.58	6.27	9.51	-	1.91	3.17	3.38
Total ash	0.85	1.33	1.64	NMT 15	0.82	1.14	1.04
Acid insoluble ash	0.25	0.34	0.29	NMT 3	0.14	0.25	0.19
Water soluble extractive	24.63	52.65	65.61	NLT 50	7.11	31.22	34.61
Alcohol soluble extractive	12.22	56.24	65	NLT 50	3.03	8.38	11.76

IV. DISCUSSION

Hingu is derived from the dried sap of the stem and roots. It is oleo-resin gum. It is collected after making incisions at the upper part of the tap root or stem of more than five years old plants by scrapping in March and April just before flowering. This whole process was repeated many times. After few weeks it gets collected [26]. It contains phyto-chemicals i.e., terpenoids, flavonoids, alkaloids, saponins, glycosides, steroids, proteins, tannins and carbohydrates [27]. It is a well-known herbal drug, which is used in different diseases of GI tract. It is used in many formulations as an ingredient like, *Hingawashtaka Churna* [28], *Shivaksharapachana Churna* [29], *Shoolaharana Yoga* [30], *Amapachaka Vati* [31] etc.

Hingu possesses *Tikshna* and *Ushna Guna*, which causes *Utkleda* in the body. In Ayurveda classics, references of *Hingu Shodhana* have been found by *Bhavana*, *Agnisanyoga* and *Bharjana* principle. *Acharya Sharangdhar* has mentioned to use *Bharjita Hingu* to avoid *Utkleda* [32].

Currently, a pure and compound form of *Hingu* is available in the market. For this study three samples of *Hingu* were collected from the local market of Vadodara as per *fssai* standards. Among them, AH3 is sold as Rasa Hing which is the purest form of Hing because it contains asafoetida resin in major parts whereas AH1 and AH2 are sold as compound Hing due to these samples additionally contain rice flour and white wheat flour. AH1 contains 30% asafoetida resin and 70% rice flour, white wheat flour and gum while AH2 contains 60% asafoetida resin and 40% rice flour, white wheat flour and gum. AH1, AH2 and AH3 samples have market price 15000, 2000 and 800 rupees per kg respectively.

pH: pH values of all *Ashuddha Hingu* samples were slightly decreased after *Shodhana* which may due to heating provided in *Shodhana* procedure was vaporised its volatile contains like ferulic acid and umbelliferone [33]. Also, *Goghrita* used here as a *Shodhana* media has 5.9 pH [34]. This may be incorporate in decrease of pH. Thus, after *Shodhana* all samples of *Shuddha Hingu* become slight acidic than *Ashuddha Hingu* samples.

Loss on drying: Loss on drying was found more in *Ashuddha Hingu* samples in comparison to *Shuddha Hingu* samples may be due to evaporation of moisture content and volatile oil during *Shodhana*.

Total ash: AH3 have 1.64% ash content because it is pure form of *Hingu* which usually contains 1.5-10% ash value [35]. While AH1 (0.85%) and AH2 (1.33%) have lesser ash value than AH3. Ash value was found more in *Ashuddha Hingu* samples than in *Shuddha Hingu* samples. It may be due to some inorganic substances were removed during *Shodhana* procedure.

Acid insoluble ash: The value of acid insoluble ash indicates the purity of the sample; almost all inorganic material present is soluble in acid and digestible in human GI tract. Acid insoluble ash was found less in *Shuddha Hingu* samples than in *Ashuddha Hingu* samples.

Water soluble extractive: *Hingu* contains ferulic acid and umbelliferone, which are partially water soluble. During *Shodhana* with *Goghrita*, these alkaloids are decreases, this may lead to a decrease in the value of water-soluble extractive after *Shodhana*. *Hingu* should not contain water soluble extractive less than 50% [36]. AH3 was found 65.61% soluble in water because it is the pure form of *Hingu* while AH1 (24.63%) and AH2 (52.65%) less soluble than AH3 because they also contain rice flour and white wheat flour which is less soluble in water.

Alcohol soluble extractives: *Hingu* contains ferulic acid and umbelliferone, which are partially alcohol soluble. During *Shodhana* with *Goghrita*, these alkaloids are decreases, this may lead to a decrease in the value of alcohol soluble extractive after *Shodhana*. *Hingu* should not contain alcohol soluble extractive less than 50% [37]. AH3 was found 65% soluble in alcohol because it is pure form of *Hingu* while AH1 (12.22%) and AH2 (56.24%) less soluble than AH3 because they contain rice flour and white wheat flour which is less soluble in alcohol.

On analysis, found that the values of both the sample of compound *Hingu* AH2 and AH3 were compiled the quality parameter of compound *Hingu* mentioned in Gazette of India. Also, AH1 sample was not within the limits mentioned in the monographs in API. Thus, this sample should not be used for medicine preparation. AH2 and AH3 were within limits. Thus, both these samples should be used for medicine preparation.

V. CONCLUSION

After *Shodhana* of *Hingu* in *Goghrita*, it transmits certain changes in *Ashuddha Hingu*. Thus, it is advised by seers that *Hingu* should be used in formulations only after the *Shodhana* process. The analytical results clearly prove the chemical changes during

Shodhana process. Further advance analysis might shed more light on this. The data generated here can be applied to further research.

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