

COMPARITIVE PHARMACOGNOSTIC AND PHYTOCHEMICAL STUDY OF DIFFERENT MARKET SAMPLES OF ASAFOETIDA (*Ferula narthex* Bioss)

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ABSTRACT

Asafetida is an oleo gum resin obtained from the rhizome and root of *Ferula narthex* Bioss, & other species of *Ferula*, family Umbelliferae. This spice is used as a digestive aid, in food as a condiment and in pickles. It is still widely used in India (commonly known there as Hing) as a food and even as a medicine in Indian systems of Medicine like Ayurveda. Despite its *Katu rasa*; Asafoetida is known to alleviate *Udara shoola*, *Sheeta*, and *Admana* (flatulence).

Since Asafetida is not a native of India it has been importing from Middle East countries like Afghanistan. Since it is costlier and not available in pure form, practices like adulteration has been observed in Market.

Hence in this study different market samples of Asafetida were analyzed on Pharmacognostic and Phytochemical Parameters and compared them with Standards of Pharmacopeia.

KEYWORDS: Asafoetida, Pharmacognostic, Phytochemical, Market samples

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INTRODUCTION

Botanically Asafetida is an oleo gum resin obtained from the rhizome and root of *Ferula narthex* Bioss & other species of *Ferula* family of Umbelliferae¹ **Geographical source** *Ferula narthex* grows abundantly in the villages of Kashmir in Baltistan, and other species like *Ferula foetida* grows in Persia, Kandahara, and Afganistan².

Method of collection of drug

In the cortex of the stem and also in the root there are numerous large schizogenous ducts filled with whitish gum resinous emulsions. After about five years when the roots has stored sufficient reserves and is about 12 to 14 c.m. thick at the crown, it throws up a large flowering stem about 10 c.m. thick and 2.5 to 3 meter high. About the end of March just before the plant is about to flower, the upper part of the root is laid bare and the stem is cut off close to the crown, the exudation flows from the cut surface and while it is hardening is protected by the dome like covering of stick and leaves. A few weeks later the hardened gum resin is scraped off, a slice of root is cut off and juice is again allowed to exude. This process will be repeated several times with interval about 10 days³.

Characteristics of Asafoetida available in market

Asafoetida is available in Market in three forms *i.e.* **Paste, Tear, and Masses**. Among them tear and Paste are purer form, but the mass form is adulterated one⁴.

1. **Paste**:-It also contains extraneous matter.
2. **Tears**:- These are rounded or flattened and about 5-30 mm in diameter. They are grayish white, dull, yellow or reddish brown in colour. The fractured surface either remains yellow and translucent or gradually changes from opaque white to pink or red to reddish brown. Fresh tears are tough but when dried are hard and brittle. Tears are internally milky white or yellowish translucent or opaque. Tears are usually agglutinated and few are separate.
3. **Masses**:- Mass asafoetida is common in commercial form. It consists of tears agglutinated into more or less uniform mass. It contains impurities like roots, earth etc.

Adulteration and substitution

The common adulterants are stones, sand, powdered gypsum, potato, Acacia gum, Gum Arabica and wheat or barley-flour, which are mixed in various proportions, according to the consistency of asafoetida⁵.

Qualities of pure of Asafoetida

1. Gradually dissolves in water forming milky white without a residue at the bottom.
2. Burns without residue.
3. It should have strong alliaceous odour, acrid and bitter taste⁶.

Qualities of impure Asafoetida

1. Dissolves in water and settles in bottom.
2. Does not burn completely on fire.
3. Differs in smell and taste⁷.

MATERIALS AND METHODS

Market samples were collected from four different markets viz Belagaum, Mumbai, Pune and Mysore named them as Sample A, B, C and D respectively. All the Pharmacognostic and Phytochemical studies are carried out in Central Research Laboratory of KLEU'S Shri BMK Ayurveda Mahavidyalaya, as per the standard procedures⁸⁻¹¹.

Organoleptic characteristics

Organoleptic characters of medicinal plant material are based on color, odour, taste, & appearance of cut surface. Microscopic study is not carried out because samples are inorganic in nature.

Identification tests for Asafoetida

1. Fractured surface of the drug if treated with sulphuric acid which changes to red or reddish brown colour.
2. When treated with 50% of nitric acid the drug changes to green colour.
3. When treated with water, it forms the yellowish- orange emulsion.
4. Triturates about 0.5 gm of Sample with sand and 5ml of HCL add little quantity of water to it and filter, and to the filtrate add equal volume of ammonia. A blue fluorescence is produced due to presence of Umbelliferone. In physical methods quantitative standards like total ash, acid insoluble Ash, alcohol soluble extract, water-soluble extract, total percentage of volatile oil, Resin, Acid value, saponification value etc. are determined.

Qualitative chemical tests were conducted for aqueous extracts of Asafoetida to identify the various phyto constituents. Screening for Carbohydrates, Proteins, Tannins, Saponins, and Steroids

RESULTS AND DISCUSSION

The samples procured from Belgaum (Sample A), Pune (Sample C), and Mysore (Sample D) are the processed samples and Mumbai (Sample B) is raw sample. Cost of all samples varies from Belgaum, Pune, Mysore and Mumbai from low to high respectively. The sample procured from Mumbai (Sample B) Satisfy the all the Ayurvedic Pharmacopial Standards.

Macroscopic and Organoleptic observations

Physical appearance: All samples are hard in touch except sample B, *Color:* Sample B was yellowish brown while others were in different colors. *Smell:* Sample B was stronger and alliaceous odor than others. *Taste:* Sample B was strongly Pungent and acrid than others. The sample B passes through all macroscopic characters mentioned in API that means the sample was not adulterated. The sample B is standard one. Due to processing the other samples show changes in macroscopic character.

Common Identification Test Only sample B is passed all the tests of genuinity-*Physico-Chemical analysis:* Total moisture percentage was more in sample B when compared to all the three samples, due to high resin content.

Total ash value of the sample B was more i.e. 9.29% than others because it is unprocessed and indicates more amount of inorganic matter.

Total % of volatile oil w/v in sample B is more i.e., 6.9 than others because it is unprocessed.

pH values & Acid values of all samples, shows sample B was more acidic than other three samples,

Total percentage of Resin: More in sample B i.e. 25.3% as compare to other three samples.

Water-soluble extractive in sample B is 57.27 % was more than other samples.

Alcohol soluble extractive value in sample B is 36.25% was more than other samples.

Specific Gravity: Negligible variation was observed.

Above all these results are because of sample B is unprocessed Asafetida. *Preliminary phytochemical studies:* All the samples tested and positive results for Alkaloid and Carbohydrates. Negative results for Phenolic compounds, Steroids, Proteins and reducing sugars. Presence of starch in sample A, C and D indicates addition of starch in processing. Iron and Sulphates tested positive for all samples, and Chlorides are present only in sample C and sample A.

CONCLUSION

From the above studies it's evident that there is clear adulteration of Asafetida which is available in the market and it may affect the efficacy when asafetida is used as a Medicine. Further adulteration can be confirmed by other techniques like TLC and HPTLC.

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Table 1: Organoleptic Examination

CHARACTER	SAMPLE A	SAMPLE B	SAMPLE C	SAMPLE D
Physical appearance	Dry, hard irregular big & small masses	Irregular mass contains tear attached with each other. Soft & Sticky	Dry, Squire in shape, Hard big & small masses	Dry, long & irregular masses
Colour	Light brown	Yellowish brown	White yellow	Reddish brown
Smell	Strong	Strong alliaceous & Irritant	Not irritant	Strong
Taste	Strongly Pungent	Strongly Pungent, Acrid	Less Pungent	Strong Pungent

Table 2: Common Identification Tests of All Samples

TEST	SAMPLE A	SAMPLE B	SAMPLE C	SAMPLE D
Triturate with water	Whitish Yellow	Yellowish Brown	Whitish Brown	Yellowish Brown
Treatment with 50% nitric acid (HNO₃)	Light Green	Green	Greenish Brown	Greenish Yellow
Treatment with fractured surface with (H₂SO₄)	Yellowish	Reddish brown	Black	Reddish Black
Combined Umbelliferone test	Light Blue	Violet Blue	Light blue	Blue

Table 3: Chemical Tests for Detection of Inorganic Constituents

TEST FOR	SAMPLE A	SAMPLE B	SAMPLE C	SAMPLE D
Iron	Positive	Positive	Positive	Positive
Sulphate	Positive	Positive	Positive	Positive
Chloride	Positive	Negative	Positive	Negative

Table 4: Physico-Chemical Analysis

Name of the Taste	SAMPLE A	SAMPLE B	SAMPLE C	SAMPLE D
Foreign Matter	0.275	1.91	Nil	0.228
Total % of Moisture	13.86	12.39	11.75	13.82
Total ash value	8.53	9.29	7.22	8.37
Acid Insoluble ash value	2.64	2.94	1.39	1.74
Water Soluble ash	2.93	3.04	1.98	1.94
Sulphated ash	0.59	0.94	0.39	0.75
Total % of volatile Oil w/v	4.99	6.9	3.9	5
Specific gravity of aqueous ext.	1.011	1.008	1.01	1.007
pH of aqueous ext.	5.26	4.85	5.8	5.2
Acid Value	27.65	26.36	21.31	24.64
Total % of resin	19.15	25.3	9.39	22.8
Water soluble extract	40.87	57.27	40.42	49.26
Alcohol soluble extract	7.40	36.15	3.1	14.65

Table 5: Preliminary Phytochemical Screening

TEST FOR	SAMPLE A	SAMPLE B	SAMPLE C	SAMPLE D
Reducing test (benedicts test)	Negative	Negative	Negative	Negative
Carbohydrates Molish's test	Positive	Positive	Positive	Positive
Tannic Test for starch	Positive	Negative	Positive	Positive
Proteins	Negative	Negative	Negative	Negative
Steroids	Negative	Negative	Negative	Negative
Alkaloids	Positive	Positive	Positive	Positive
Tannins & Phenolic compounds	Negative	Negative	Negative	Negative

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