WORLD JOURNAL OF PHARMACEUTICAL RESEARCH
SJIF Impact Factor 6.805
Volume 6, Issue 1, 1113-1120. Research Article ISSN 2277– 7105

DEVELOPMENT OF PRELIMINARY PHARMACOGNOSTICAL AND PHYSICO-CHEMICAL PROFILE OF *SHYAMAKA* (*ECHINOCLOA FRUMENTACEA* LINN.)

Bhavana Patel[*], Shubhangi Kamble[**], Harisha C. R.[***] and Vinay J. Shukla[****]

[*]MD Scholar, Dept. of Basic Principles, [**]Assistant Professor, Dept. of Basic Principles, [***]Head, Pharmacognosy Laboratory, [****]Head, Modern Pharmaceutical Chemistry Laboratory, I.P.G.T and R.A., GAU, Jamnagar, Gujarat, India.

Article Received on
17 Nov. 2016,

Revised on 06 Dec. 2016,
Accepted on 27 Dec. 2016

DOI: 10.20959/wjpr20171-7667

***Corresponding Author**
Dr. Bhavana Patel
MD Scholar, Dept. of Basic Principles, I.P.G.T and R.A., GAU, Jamnagar, Gujarat, India.

ABSTRACT

Shyamaka (*Echinocloa frumentacea* Linn.) belongs to the Gramineae family, is important *Dhanya* (millet) for *Rukshana Upakrama* (Dryness Therapy) in Indian System of Medicine. It is annual grass found throughout tropical India, used in form of *Krishara* in the fast. Till date no work has reported the pharmacognostical characters of its seed. Hence, present study was planned with an aim to develop the pharmacognostical and preliminary physico-chemical profile of *Echinocloa frumentacea* seed and to collect classical data related to *Shyamaka*. Seeds of *Echinocloa frumentacea* were collected from local market of Jamnagar. Its macroscopic, microscopic, powder characters and preliminary physico-chemical parameters were studied. Physico-chemical parameters showed that water soluble extract 0.4954% w/w is less than methanol soluble extract 2.1479% and loss on drying 4.123%, etc. HPTLC was carried out after organizing appropriate solvent system in which maximum four spots were distinguished at 254 nm and three spots at 366 nm. The findings of the study will be useful for the identification and standardization of the *Echinocloa frumentacea* seed.

KEYWORDS: *Shyamaka*, *Echinocloa frumentacea*, Pharmacognosy, Physico-chemical analysis, HPTLC.

INTRODUCTION

Shyamaka (*Echinocloa Frumentacea* Linn.) belongs to family Poaceae or Gramineae, commonly known as 'Japanese Barnyard millet'. Its classical names are *Shyamaka, Shyama, Tribeeja, Sukumaaro, Rajadhanya, Trunbijottama, Avipriya*. It is known as *'samo'* in Gujarat. It is an annual grass 1.25m tall, cultivated in the plains of India for its grains.[1] It is described in Ayurveda under the classification of '*Kudhanya* (millets)'. Three different types or species of *Shyamaka* viz. *Shyamaka*, *Ushtrashyamaka* and *Hastishyamaka* have been mentioned in classical texts of Ayurveda.[2] It is having *Kashaya*, *Madhura rasa*; *Ushna virya, Katu vipaka* along with *Laghu guna; Rukshana, Shoshana, Kaphapittashamaka* properties.[3] *Shyamaka* is useful in *Urustambha*[4], *Sthaulya*[5] etc. Generally it is used as a food article and few recipes of *Shyamaka* (*Echinocloa Frumentacea* Linn.) have been described in ayurvedic texts of ancient and medieval period. Like *Virukshaniyayavagu* is the dietary formulation in which *Shyamaka* has been used as main content.[6] It is used in food articles, so its dose varies according to digestive capacity of person and nature of the food items.[7]

To evaluate the quality of finished products, it becomes necessary to subject the drug or raw materials to different chemical analysis/studies in the prospect of science. The drugs which are used should be well understood in the light of Modern Chemistry to provide proper scientific background. The present research work deals with the studies of some important Pharmacognostical, Physicochemical and Phytochemical characteristics of the grains of *Echinocloa frumentacea* as whole and its powdered form including HPTLC.

MATERIALS AND METHODS

To fulfil the motto of the conceptual study, references have been compiled from all the available Ayurvedic Classics and their commentaries, various publications, text books, research papers. *Echinocloa frumentacea* Linn. has been collected from local market of Jamnagar. It was authenticated in Pharmacognocy Laboratory and Modern Pharmaceutical Chemistry Laboratory, IPGT & RA, Gujarat Ayurved University Jamnagar.

Parts used: Dried decorticated grain.

Pharmacognostical evaluation[8]

The seeds of *Echinocloa frumentacea* Linn. were identified and authenticated in Pharmacognosy Laboratory, I.P.G.T. &R.A., Gujarat Ayurved University, Jamnagar. The

identification was done on the basis of the morphological, organoleptic and powder microscopic characters of the drug. The study has been carried out under the Carl Zeis Trinocular Microscope attached with camera, with and without stain. The microphotographs were taken under the microscope.

Pharmaceutical analysis

Physico-chemical parameters

Shyamaka was analyzed by using standard qualitative and quantitative parameters at the Modern Pharmaceutical Chemistry Laboratory, I.P.G.T. & R.A., Gujarat Ayurved University, Jamnagar. Parameters were selected on the basis of common parameters mentioned for powder in Ayurvedic Pharmacopoeia of India and CCRAS guidelines.[9] The drug was assessed for ash value, loss on drying, water and methanol soluble extracts.

High Performance Thin Layer Chromatography Study (HPTLC)[10]

Methanol extract of *Shyamaka* was spotted on pre coated silica gel GF 254 aluminium plate as 5 mm bands, 5 mm apart and 1 cm from the edge of the plates, by means of a Camag Linomate V sample applicator fitted with a 100 µL Hamilton syringe. Ethyl acetate: water: Acetic acid (8:1:1) were used as the mobile phase. After development, Densitometry scanning was performed with a Camag TLC scanner III in reflectance absorbance mode at 254nm and 366nm under control of win CATS software. The slit dimensions were 6 mm×0.45 mm and the scanning speed was 20 mm per second. All HPTLC plates were scanned with filter fraction Savitsy-goloy 7, minimum slope 5, minimum height 10 AU, minimum area 50 AU, and maximum height 990 AU with absorption unit.

RESULTS WITH DISCUSSION

Organoleptic characteristics

Organoleptic characters of *Echinocloa Frumentacea* seed were recorded and placed in table no.1.

Table 1: Showing Organoleptic Characteristics of *Shyamaka*

Characters	Observations
Colour	Creamish white
Odour	Slightly Bitter
Taste	*Kashaya* (Astirngent), *Madhura* (Sweetish)
Texture	Coarse

Macroscopy

Grain is oval to rounded in shape, plano-convex and up to about 4 mm in length; pericarp brown, adherent to seeds, can be removed by rubbing; as seen under hand lens, on the convex side of caryopsis, there is one central line, and on the plane surface, three lines; inside pericarp is a shiny brown seed; seeds possess three prominent ridges on the convex side and in between the seridges, fine striations are present; plane side of the seed shows finely striated oval central depression, apical side pointed.

Powder microscopy

Diagnostic characters are starch grain with and without endosperm cells, simple fibres, prismatic crystal, trichomes and starch grains [Plate 2].

Plate 1: *Shyamaka*

	
Seed of *Shyamaka*	**Powder of *Shyamaka* seed**

Plate 2: Microphotographs of *Shyamaka* (*Echinocloa Frumentacea* Linn)

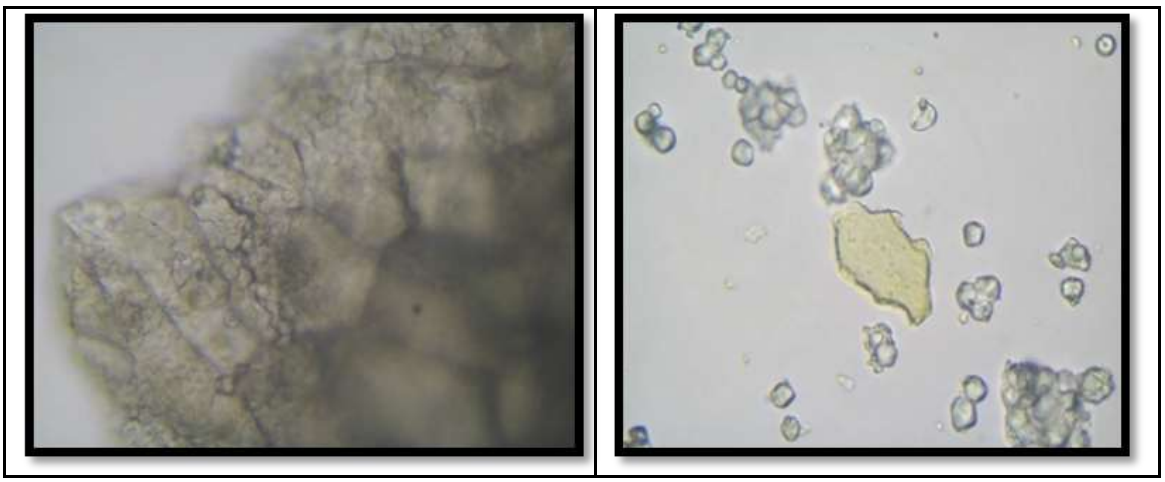


Figure 1: Endosperm cells with starch grains

Figure 2: Starch grians

Figure 3: Stained Starch grains

Figure 4: Simple fibre

Figure 5: Prismatic crystal

Figure 6: Trichomes

Physico-chemical parameters

Drug was evaluated for physico-chemical parameters like loss on drying, ash value, methanol-soluble extract, water-soluble extract, pH and its results are placed in table 2.

Table 2: Showing Preliminary Physico-Chemical Analysis of *Shyamaka.*

Sr. No.	Parameter	Result
1	Loss on Drying	4.123 % w/w
2	Ash Value	0.199 % w/w
3	Water-soluble Extract	0.4954 % w/w
4	Methanol-soluble Extract	2.1479 % w/w
5	pH (5% solution)	6

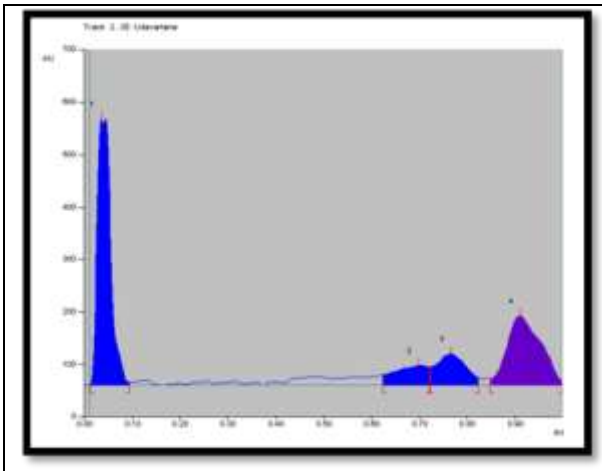
HPTLC

Methanol extract of drug was spotted on pre-coated silica gel at 254 nm and 366 nm. Results are depicted in the table no.3 and plate no. 3.

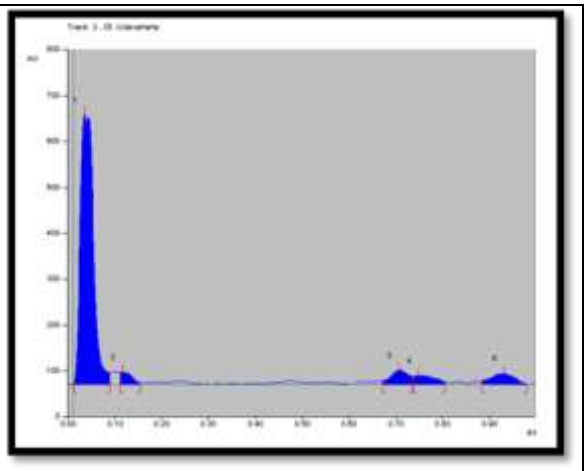
Table 3: Showing HPTLC profile of *Shyamaka*

Drug	Condition	No. of spots	Max. Rf	Area
Shyamaka	Short UV (254 nm)	4	0.04, 0.64, 0.81, 0.92	6720.2, 505.5, 2159.8, 7814.8
	Long UV (366 nm)	3	0.4, 0.8, 0.94	3759.7, 499.2, 1545.4

Plate 3: Showing HPTLC profile of *Shyamaka* (*Echinocloa Frumentacea*) millet (powder)



Densitogram of *Shyamaka* millet at 254 nm



Densitogram of *Shyamaka* millet at 366 nm

Shyamaka is very popular as food article in Ayurveda as well as in present day. It comes under the classification of *Kudhanya* (millets). The name "Millet" has been derived from the word "mil or thousands" referring to the large number of grains that can be produced from a single seed. However, the Hindi word "*Kadanna"* has came from Sanskrit word "*Kadannam*", which refers to food grains of the poor or *Nindita Anna*, which does not holds good in true sense, because, they are used by devotees during their fast and these are rich in nutritional value.[11] This grain is usually eaten during fasting and religious ceremonies because it is easy to digest. With digestible fibres, it is a healthier and lower glycemic substitute for white rice for people who are watching their sugar intake or blood sugar levels, such as individuals with diabetes. It will make you feel fuller for a longer period of time, thus reducing the food intake and helping in portion control and loss of weight.

CONCLUSION

Diagnostic characters of *E. Frumentacea* Linn. seed showed starch grains with and without endosperm cells, simple fibres, prismatic crystal, trichomes and starch grains. The results of

pharmacognostical and physico-chemical parameters can be considered as reference standards in future studies.

ACKNOWLEDGMENT

I am thankful to all my teachers for their guidance and support.

REFERENCES

1. Pandit Bhavamishra, Bhavaprakasha Nighantu (Commentary of Prof. Krushnachandra Chunekar), Porva Khanda, Dhanyavarga, 8/71,Chaukhambha Bharatiya Academy, Varanasi, 2010; 645
2. Dalhana, Nibandhasangraha Commentary of Sushruta Samhita, Sutrsthan, Annapanvidhim Adhyaya, Kudhanya varga, 46/21, 7th edition, Jadavaji Trikamji Acharya, Chaukhambha Surbharati Prakashan, Varanasi, 2013; 216.
3. Charaka. Charaka Samhita (Ayurveda Dipika Commentary of Chakrapanidatta), Sutrasthana, Annapanvidhim Adhyaya, 27/16, Jadavaji Trikamji Acharya, 7th edition, Chaukhambha Surbharati Prakashan Varanasi, 2013; 154.
4. Charaka. Charaka Samhita (Ayurveda Dipika Commentary of Chakrapanidatta), Chikitsasthana, Urusthmbha Chikitsa Adhyaya, 27/26, Jadavaji Trikamji Acharya, 7th edition, Chaukhambha Surbharati Prakashan Varanasi, 2013; 614.
5. Charaka. Charaka Samhita (Ayurveda Dipika Commentary of Chakrapanidatta), Sutrasthana, Astauninditiya Adhyaya, 21/25, Jadavaji Trikamji Acharya, 7th edition, Chaukhambha Surbharati Prakashan Varanasi, 2013; 117.
6. Charaka. Charaka Samhita (Ayurveda Dipika Commentary of Chakrapanidatta), Sutrasthana, Apamargtanduliya Adhyaya, 2/26, Jadavaji Trikamji Acharya, 7th edition, Chaukhambha Surbharati Prakashan Varanasi, 2013; 26.
7. Charaka. Charaka Samhita (Ayurveda Dipika Commentary of Chakrapanidatta), Sutrasthana, Matrashitiya Adhyaya, 5/3, Jadavaji Trikamji Acharya, 7th edition, Chaukhambha Surbharati Prakashan Varanasi, 2013; 36.
8. Anonymous, Indian Pharmacopoeia. Government of India, Ministry of Health and Family Welfare.Appendix -8.1: A-95. New Delhi, Controller of publications, 1996; 2.
9. Anonymous, The Ayurvedic Pharmacopoeia of India, Part 1, Vol.1, New Delhi: Ministry of Health andFamily Welfare, Department of AYUSH, Govt. of India, 2001.

10. Gurdeep R. Chatwal, Sham K. Anand, Industrial Method of Chemical analysis, 5th revised and enlarged ed.Himalaya publishing house, 2.272-2.503, 2.599-2.616, and 2.673-2.700.
11. J.P.Singh, B Dayakar Rao, J V Patil, A. Ansari, Millets development jaipur, Sourghum research Hyderabad, Overview of Millets cultivation in India.