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Research Article

PHYTOCHEMICAL STUDY OF ASHODHIT AND SHODHIT GUNJA (ABRUS PRECATORIUS) PERICARPS

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ABSTRACT

Objective: The aim of the present research work was to carry out the effect of Shodhana on Gunja pericarps by using advanced analytical tools. It is attributable to the plant Abrus precatorius L. belonging to family fabaceae having three types of plants white, red and black seeds.

Methods: Three varieties of Gunja seed's pericarps were subjected for Swedana in cow's milk and Kanji. The Shodhit and Ashodhit Gunja pericarps were subjected for analytical parameters. For the establishment of the effect of Shodhana, the percentage of total ash, acid insoluble ash, total protein and successive extractives were carried out on Ashodhita and Shodhita pericarps.

Results: The study showed that the percentage of total ash was reduced in Shodhit samples as compared to Ashodhit samples. The percentage of hexane and chloroform extractives in milk Shodhit pericarps were increased in all the samples, however, no significant variations were observed in Kanji Shodhit samples. On the contrary, the percentage of alcohol and water extractives value decreased in Shodhit samples.

Conclusion: It was found that most of the phytochemicals were decreased in Shodhit samples of Kanji as compared to cow milk.

Keywords: Gunja, Kanji, Shodhana, Swedana, Upavisha.

INTRODUCTION

The therapeutics use of poisons has been documented in classical Ayurvedic texts[1]. *Abrus prectorius* Linn.f (Papilionaceae -Fabaceae) is a slender, perennial climber widely found in India. It is commonly known as Gunja in India and well-known plant of Ayurveda under Upavisha gana[2]. According to Sushruta Samhita, Gunja is classified under Moolvishavarga[3]. In the Ayurvedic classical text, the seed of Shodhita Gunja is being used widely in different formulations with great therapeutic consequence. The seeds of Shodhita Gunja are used to treat alopecia (Indralupta) [4], itching (Kandu) [5], edema (Shotha) [6], urinary disorders (Prameha) [7] etc. Indian tribes are used Gunja seeds as purgative, nervous disorders, [8] pneumonia, [9] skin diseases, [10] abortifacient, antifertility [11] and as antimicrobial agents [12]. It is good for eyes and Shukrajanan[13]. The root of Gunja is emetic, alexiteric and also used in nervous disorders, sore throat, dry cough, rheumatism and leucoderma[14,15]. According to Ayurvedic literature, the seeds of Gunja are poisonous and it should be given to the patients after Shodhana.[16] Shodhana is an Ayurvedic technique which can remove impurities, make less toxic, minimize the side effect and improve the therapeutic efficacy of a drug [17]. Though some research work has been carried out on the effect of Shodhana on Gunja kernels [18] but there is very least research work on pericarps of Gunja Shodhana. The aim of the present study was to carry out the effect of Shodhana on the phytoconstituent of pericarps of Gunja purified by Godugdha (cow's milk) and Kanji (Sour gruel).

MATERIALS AND METHODS

All three varieties (white, red and black) of Gunja seeds were collected from the medicinal garden of Department of Dravyaguna, Banaras Hindu University, Varanasi during the month of December-January, 2016. The identification of the plant material was done at the Department of Dravyaguna, Faculty of Ayurveda, Institute of Medical Sciences, Banaras Hindu University, Varanasi. A voucher specimen (JAN/HERB/16-17/33-36) of the all three variety of Gunja has been placed at the Department of Rasa-Shastra, Faculty of Ayurveda, Institute of Medical Sciences, Banaras Hindu University, Varanasi, Uttar Pradesh, India for further reference.

Separation of pericarps

All the three varieties of seeds were coarsely grounded and pericarps were separated.

Shodhana of Gunja in cow's milk

All the three types of pericarps (250 g) were wrapped in a cotton cloth separately to form a Poṭṭali. Poṭṭali was hanging in an iron pot holding cow's milk in such a way that the Poṭṭali was totally immersed in milk but did not contact the bottom of the vessel. Heating (90°C) was given to the vessel by hot plate constantly for 6 h (2 Prahara) to aid the Swedana process. During the Swedana process, an adequate amount of fresh cow milk was added at regular gaps to uphold the level of milk in the vessel. After 6 h, the Poṭṭali was removed from the milk and pericarps were washed with hot water thrice and kept it for shade dried[19].

Preparation of Kanji (sour gruel)

Rice and Kulthi were taken in stainless steel pots along with 40 liters of distilled water separately. The pots were placed over a mild fire, boiled and reduced to one fourth and filtered through cotton cloth. Both the prepared Kwath of Rice and Kulthi were mixed and kept in an earthen pot layered inside with mustard oil. Hingu was fired in oil and rest of the ingredients (3-8) were mentioned above were also put in the pot (Table 1). The mouth of the pot was tied by cloth and kept for 15 days and filtered before use. Thus 20 liters of Kanji was prepared[20].

Shodhana of Gunja in Kanji (sour gruel)

The process of Shodhana in Kanji was similar to that of milk except that the boiling time was 3 hours instead of 6 hours[19].

Table 1: Ingredients of Kanji

Drug	Part used	Quantity
Oryze sativa L.	Seeds	5 kg.
Dolichos uniflorus Lamk	Seeds	5 kg.
Sodium Chloride		5 kg.
Vigna radiate L.	Dough	1.25 kg
Curcuma longa L.	Rhizome	1.25 kg
Brassica nigra L.	Seed	1.25 kg
Ferula assa-foetida L.	Resin	1.25 kg
Mustard	Seed Oil	1.25 mL.
Bambusa arundinaceae Retz.	Leaves	1.25 kg
Cuminum cyminum L.	Seeds	650 gm.
Zingiber officinale Rosc.	Rhizome	650 gm.
Oryze sativa L.		160 Lt.

Table 2: Shodhit samples with milk

Parameters	White pericarps	Red pericarps	Black pericarps
Weight of Gunja pericarps	250 gm	250 gm	250 gm
Volume of cow's milk consumed	3 liter	3 liter	3 liter
Total time consumed in whole process of Shodhana of Gunja pericarps	7 hours	7 hours	7 hours
Net volume of the total cow's milk remained in the vessel of Dola-Yantra after the Shodhana process was over	3.3 liter	3.3 liter	3.3 liter
Total consumed milk	1.1 liter	1.0 liter	1.2 liter
Weight of Gunja pericarps obtained after the Shodhana process and dried in shade	225gm	220gm	220gm
Colors after Shodhana process	light cream	black	dark black

Estimation of different physicochemical values

For quantitative estimation of total ash and acid insoluble ash all the samples of Ashodhit and Shodhit pericarps of Gunja were carried out as per Ayurvedic Pharmacopeia20. The protein percentage was also calculated by spectrophotometeric method described by Lowery et al [21] a standard curve at 700 nmabsorbance was prepared with bovine serum albumin (B.S.A.) and 2% potassium sodium tartrate, 1% CuSO4.5H2O, 2% sodium carbonate in 0.1 NaOH were used as test solution. Extraction with non-polar to polar solvents (alcohol and water) was made with the help of soxhlet apparatus and the percentage of each extractive was calculated after evaporating the respective solvents. The thin layer chromatography was performed on pre-coated silica gel G254F plates using the different solvent system according to as per the nature of the constituents present in the extractives and their respective Rf values were calculated and recorded.

Observations

Details of Ashodhita (crude) samples

The weight of Gunja pericarpas each (white, red and black)-250gms.

Table 3: Shodhit samples with Kanji

Parameters	White pericarps	Red pericarps	Black pericarps
Weight of Gunja pericarps	250 gm	250 gm	250 gm
Volume of Kanji consumed	2 liter	2 liter	2 liter
Total time consumed in whole process of Shodhana of Gunja pericarps	4 hours	4 hours	4 hours
Net volume of the total Kanji remained in the vessel of Dola-Yantra after the Shodhana process was over		3.4 liter	
Total consumed milk	1.1 liter	1.1 liter	1.2 liter
Weight of Gunja pericarps obtained after the Shodhana process and dried in shade	220 gm	215 gm	215 gm
Colors after Shodhana process	yellow	Light yellow	chocolaty

Table 4: Physicochemical values *Ashodhit* and *Shodhit* pericarps of *Abrus precatorius*

Material		Parameter (In percentage)						
		Total ash	Acid insoluble ash	Protein	Hexane extractive	Chloroform extractive	Alcohol extractive	Water extractive
White	Ashodhit precarp	2.0	0.25	1.4	0.35	0.39	2.5	14.4
	Shodhit with milk	1.7	0.11	0.4	4.75	0.88	2.2	16.8
	Shodhit with Kanji	1.7	0.2	0.1	0.97	0.74	2.6	8.0
Red	Ashodhit precarp	2.1	0.8	1.1	0.41	0.4	7.8	14.4
	Shodhit with milk	1.9	0.6	0.2	3.9	0.97	2.07	12.0
	Shodhit with Kanji	1.6	0.5	0.08	1.1	0.45	1.1	8.0
Black	Ashodhit precarp	3.3	0.8	1.4	0.55	0.22	7.0	19.2
	Shodhit with milk	2.9	0.6	0.3	1.44	0.36	0.9	14.4
	Shodhit with Kanji	1.9	0.7	0.2	0.2	0.01	0.1	16.6

Table 5: Rf values of alcohol extractive (from TLC plate) in pericarp using solvent system Toluene:Ethyl formate: Furmic acid: Water (100:80:20:2)

Rf values	Shodhit and Ashodhit pericarp of Gunja								
	WP	WPM	WPK	RP	RPM	RPK	BP	BPM	BPK
0.014	+	+	+	+	+	+	+	+	+
0.029	-	-	-	-	-	-	-	-	+
0.037	+	+	+	+	+	+	+	+	+
0.044	-	-	+	-	-	-	-	-	-
0.066	+	-	-	+	-	-	+	-	-
0.074	-	-	-	-	+	-	-	-	+
0.111	+	-	-	+	-	-	+	-	-
0.133	+	-	-		-	-	-	-	-
0.148	-	-	-	-	-	-	-	+	-
0.171	-	+	+	-	-	-	-	-	-
0.185	-	-	-	-			+	-	-
0.193	-	-	-	-	+	+	-	-	-
0.207	+	-	-	-	-	-	-	-	-
0.223	-	-	-	-	-		-	+	-
0.334	+	-	-	+	-	-	+	-	-
0.349	-	-	-	-	-	+	-	-	+
0.358	-	-	-	-	-	-	-	-	+

Spraying reagent Anisaldehyde sulphuric acid.

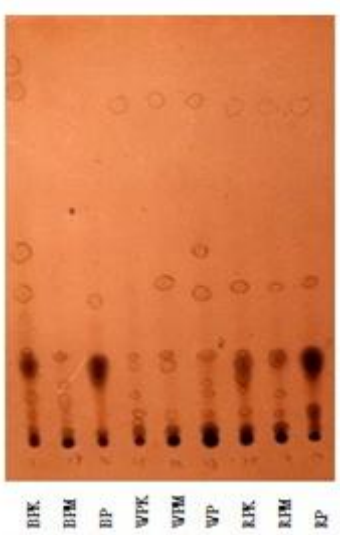

Fig1:TLC profile of alcoholic extractive

Solvent system Toluene: Ethylformate: Formic acid: Water
100 80 20 2

Abbreviations: WP-White Ashodhit Gunja Pericarp, WPM- White Gunja Pericarp Shodhit in milk, WPK- White Gunja Pericarp Shodhit in Kanji, RP- Red Ashodhit Gunja Pericarp, RPM- Red Gunja Pericarp Shodhit in milk, RPK- Red Gunja Pericarp Shodhit in Kanji, BP- Black Ashodhit Gunja Pericarp, BPM- Black Gunja Pericarp Shodhit in milk, BPK- Black Gunja Pericarp Shodhit in Kanji.

DISCUSSION AND CONCLUSION

The objective of the present research work is to study as well as compare the effect of Shodhana on the concentration of various phytoconstituents of Gunja, which is attributable to pericarps of Abrus precatorius of white, red and black varieties. In this perspective white, red and black pericarp of Gunja were processed in cow's milk and Kanji and subjected to various phytochemical tests. The physicochemical evaluation is essential factors which facilitate and distinguishing the adulteration or inappropriate handling of the crude drug. The ash values are such type of quantitative standards which characterize the presence of different impurities like silica, oxalate and carbonate, this type of adulterant commonly occurring in crude drugs. As brought out by the present studies, the percentage of total ash decreased in the Shodhit material suggested that leaching out of some amount of inorganic salts may have occurred during Shodhana while acid insoluble ash consist mainly silica and indicate contamination with earthy material[22]. Similarly, the decrease in protein percentage from 1.4, 1.1, 1.4 to 0.4, 0.2, 0.3 in milk and 0.1, 0.08, 0.2 percent in Kanji was also due to the dissolution of water soluble protein in Shodhit material. Simultaneously the decrease was more prominent in Kanji as compared to milk, suggesting that Shodhana process by Kanji is much better than milk. The amount of hexane and chloroform soluble portions increased in the Shodhit material which may be due to the absorption of fats present in the milk by the pericarps during Shodhana. However, the percentage of alcohol and water soluble

extractive value decreases, which is possibly due to the extraction of water and alcohol soluble substances like sugar, glycosides, in milk and Kanji. It was found that most of the phytochemicals decreased in Shodhit samples of Kanji as compared to milk. This study proved showed that Shodhana in Kanji is more effective. All the analytical tools can be used further as a marker for Shodhana. These observations regarding organoleptic character showed that there was a change in the colour of all three verities of pericarps, white to cream, red to black and black to dark black, the same time a minute decrease in weight was also observed in all the Shodhit pericarps but there is no change in shape except they become soft[23]. The physicochemical values are very well depicted in table 4. The percentage of total ash was significantly reduced in Shodhit pericarps as compared to the Ashodhit one. For instance, it was 1.7, 2.9 and 2.9 % in milk Shodhit and 1.7, 1.6 and 1.9 in Kanji Shodhit pericarps while it was 2.0, 2.1 and 3.3% in Ashodhit pericarps, respectively. Likewise, the percentage of protein in Ashodhit and Shodhit pericarps was 1.4, 1.1 and 1.4% (Ashodhit) 0.4, 0.2 and 0.3 (in milk Shodhit), 0.1, 0.08 and 0.2 (in Kanji Shodhit) in white, red and black pericarps respectively. Simultaneously the decrease was more prominent in Kanji as compared to milk. The percentage of hexane and chloroform extractives in milk Shodhit pericarps increased in all the samples. On the opposite side, the percentage of ethyl alcohol and water-soluble extractives decreased. But systematic evaluation and comparison of thin layer chromatograms from different extractives of Shodhit and Ashodhit pericarps, it was revealed that these parameters can be utilized as markers for quality evaluation of Shodhit and Ashodhit pericarps of all the three types Gunja, However some significant changes with regards to some spots were also observed for example, the three spots at Rf values 0.066, 0.111 and 0.334 were present in alcohol extractive in solvent system by using solvent system Toluene: Ethyl-formate: Furmic acid: Water (100:80:20:2) in all three Ashodhit materials and were absent in Shodhit ones (table 5, Fig. 1). These variations may be explained that due to Shodhana there is some decline in the constituents which are either soluble in milk and Kanji or may be due to the reduction and degeneration[24].

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