Research Article

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An exploratory study on Shirisharishta with leaves as alternative for bark, wood and heartwood of *Albizzia lebbeck* Benth

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ABSTRACT

Background: Lack of alternative part of use and unscientific harvesting are the two main causes for the medicinal plants becoming rare, endangered and threatened (RET). Now, there is a need to find out alternative part of use to save medicinal plants. Shirisharishta is a popular and commonly used Ayurvedic formulation prescribed to the patients of Shwasa (breathing difficulties), Kasa (cough) and others. Shirisha (Albizzia lebbeck Benth.) is the main ingredient of Shirisharishta; and the part of use of Shirisha is Sara (heartwood). Many a times collection of the heartwood from stem of the plant causes death of the plant. **Aims and Objectives:** This study is an attempt to explore leaf as an alternative for bark, wood and heartwood of A. lebbeck for preparation of Shirisharishta. **Methods:** Shirisharishta was prepared from heartwood, wood, bark and leaf of A. lebbeck. pH, specific gravity, total solid content, alcohol content and HPTLC profile of the prepared four samples were determined. **Result:** Alcohol content was more in Shirisharishta (heartwood) sample than other samples. HPTLC analysis revealed more band area in Shirisharishta (heartwood) sample and HPTLC fingerprint of Shirisharishta (heartwood) was completely different from Shirisharishta (leaf). **Conclusion:** The results of this reveal that heartwood the best part of use of A. lebbeck for preparation of Shirisharishta and leaf could not be an alternative of heartwood.

Keywords: Bark, Leaf, Wood, Heartwood, Shirisha, Shirisharishta.

INTRODUCTION

Ayurvedic medicines are mainly derived from the plants. About eighty percent of the raw materials for preparation of Ayurvedic medicines are obtaining from the plant source. In many of the cases, the root or wood or heart wood are the used parts of the plants. For collection of the used parts, sometimes the plants are to be sacrificed. This is one of reasons for the medicinal plants become rare, endangered and threatened (RET). It is the need of time to find the alternative part of use from the same plant having equally active phytochemical and therapeutic potential.

Shirisha (*Albizzia lebbeck* Benth.) is well known plant drug used for the treatment of various types of diseases such as Shwasa, Kasa, Visha, and others[1]. Acharya Charaka and Acharya Sushruta have utilized its activity for various purposes and have included it into various classes of drugs like Shiro-virechna, Vishaghna and Pitta-nasaka Gana[2,3]. The Sara (heart wood) is the main part of use of this plant. The heart wood is included in Asava Yoni (source for fermentation) for the preparation of its Asava – Arishta preparation[4]. Some recent studies reported various phytochemical present and pharmacological actions like antiasthamatic, antiinflamatory, and others, from the heartwood of Shirisha[5,6].

One of the very popular and effective formulations of Shirisha is Shirisharishta. This formulation is the outcome of the search for an effective compound formulation of the drug Shirisha along with plant drugs used for the treatment of Visha, Shwasa, Kasa, etc. Although the formulation Shirisharishta is mentioned in the context of Visha Chikitsa by Acharya Govinda Das in Bhaishajya Ratnavali (72/72-74)[7], various recent studies proved the effectiveness of this formulation in the ailments of respiratory system also, especially allergic in origin[8].

Shirisha Sara (heart wood) being the major component of the Arishta is required in a sizeable quantity for the production of a standard batch of Shirisharishta. The scarcity of genuine heartwood is a stumbling block to Ayurvedic industries in the manufacturing of Shirisharishta. The yield of the heart wood from a tree is very less and collection of it causes destruction of branches or the entire tree.

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Unscientific harvesting of the heart wood results in the damage of the trees. Moreover the natural occurrence of *A. lebbeck* is also drastically reduced due to various other reasons[9]. All these reasons contribute to the scarcity of *A. lebbeck* and its non availability in the Ayurvedic industries. An alternative to heart wood bark which could be used in the preparation without affecting the efficacy of the product and could be sustainably harvested has become an urgent requirement.

The present study is an attempt to explore whether the leaf of *A. lebbeck* is an appropriate alternate for the heart wood of *A. lebbeck*.

MATERIALS AND METHODS

Preparation of test drug

The used parts of *A. lebbeck* were taken and were made into course powder form (8 to 22 mesh size). The prepared powder was taken in a vessel; decoction (Kwatha) was prepared with water, was boiled until reduction to $1/4^{th}$. It was strained. Jiggery was mixed to the prepared decoction and it was allowed to complete cooling. The other drugs (Prakshepa Dravya) were made into fine powder form; these were mixed with the solution. It was filled in a porcelain jar. Before pouring the solution in the porcelain jar, the jar was washed by using hot water and was smeared by ghee at its inner side. Brim of the jar was closed properly. The jar was kept without agitation for four weeks. After that the jar was opened. Completion tests (match stick test, lime water test) were done properly. After successfully passing of the completion tests, the final product was collected after straining[7].

Physico-chemical tests

pH value

The pH of the prepared Shirisharishta samples was measured by using Systronics pH meter. 25 ml of the sample was taken in a glass beaker, the cathode of the pH meter was dipped in the liquid and the pH reading was noted.

Specific gravity

A clean and dry 25 ml capacity pycnometer was taken and its weight was noted. It was filled with the sample, stoppered and cleaned properly from outside and the weight was taken at 25°C. Then it was cleaned, rinsed and filled with distilled water, dried from outside and the weight was noted at 25°C. The weight of sample and distilled water was calculated. Then the specific gravity was determined by dividing the weight of the sample by the weight of the distilled water.

Total solid content

20 ml of Shirisharishta sample was taken in a previously dried and weighed evaporating dish; the moisture part was evaporated on water bath and was dried further in an oven at 105°C till constant weight. From the weight of the residue obtained the percentage of total solid content in the sample was determined and expressed as percentage w/v.

Determination of Alcohol content

The alcohol content was determined by distillation method as described in I.P., 1985. 100 ml of sample was taken into distillation flask of 500 ml capacity, 150 ml water was added to it, few small porcelain pieces were added to it, and it was distilled. About 90 ml distillate was collected in a 100 ml volumetric flask. It was cooled to room temperature, and volume was made up to 100 ml with distilled water. The specific gravity of the distillate was determined at 25°C by using a specific gravity bottle. From the specific gravity obtained, the percentage of ethyl alcohol in the sample was determined from the reference ethyl alcohol table.

HPTLC identity test

Instrument

CAMAG (Switzerland) HPTLC system equipped with Linomat IV sample applicator was used for application of samples. CAMAG TLC Scanner 030618 with CATS V 4.06 Software was used for scanning the plates. CAMAG twin through glass chamber (20 × 10 cm^2) was used for developing the plate.

Reagents and other materials

Methanol [analytical grade (AR)], toluene (AR) and acetone (AR) were obtained from M/s Merck Ltd., Mumbai.

HPTLC method and chromatographic conditions

The Methanolic extract obtained from different batches of Shirisharishta was used as test solution for HPTLC profiling. The aluminium TLC plates precoated with Silica Gel $60F_{254}$ (E. Merck) (10 cm × 10 cm) was used as stationary phase. The TLC plates were pre-washed with methanol; activation was done in oven at $50^{O}C$ for 5 min. The plate was allowed to cool at room temperature. 10 µl of test drug solutions were applied on TLC plates. The band width of spots was 6 mm, space between two bands was 7 mm and spraying rate was 10 s/mcl. The mobile phase used for developing the plate was Toluene : Acetone (8:2)[10]. The chamber saturation time was 30 min. TLC plate was developing up to a distance of 7.5 cm at a temperature of 27 ± $2^{O}C$. The plate was air dried and was scanned under UV at 254 nm using Deuterium lamp. The densitometric area graph of the zones was determined by using single level uniformity test option in CAMAG CATS 4 software. Thin comparison was done for supreme possibility and distinctness within the samples.

RESULTS

The pH of all the four batches of Shirisharishta was around 4. Specific gravity of Shirisharishta (wood) was highest i.e., 1.07 and Shirisharishta (leaf) was lowest i.e., 1.01. The total solid content varied from 6.2% w/v to 15.8% w/v. Shirisharishta (wood) contained highest total solid content and Shirisharishta (leaf) contained lowest total content. There was a huge difference in alcohol content; Shirisharishta (heartwood) contained 6% v/v, Shirisharishta (wood) contained 3% v/v, Shirisharishta (bark) and Shirisharishta (leaf) contained 2% v/v alcohol (Table 1).

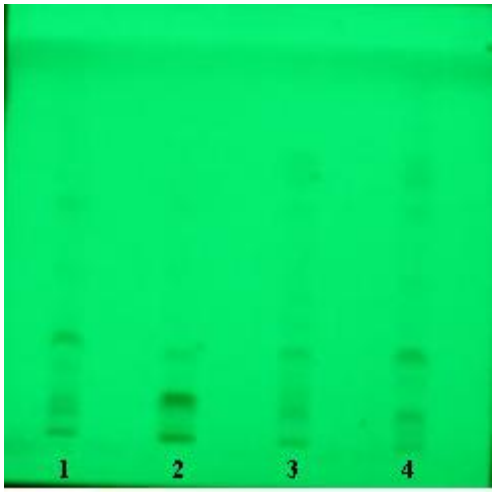
Table 1: Physico-chemical analysis of different batches of Shirisharishta

Parameters	Shirisharishta			
	Leaf	Bark	Wood	Heartwood
pH	3.9	4.0	4.0	3.6
Specific gravity	1.01	1.02	1.07	1.02
Total solid content g%	6.2	9.0	15.8	12.6
Alcohol content %	2.0	2.0	3.0	6.0

Table 2: Rf values and areas of HPTLC fingerprint of different batches of *Shirisharishta*

Track No.	No. of spots (at 254 nm)	Retention factor (Rf value)	Area
1. Shirisharishta (bark)	11	0.01, 0.06, 0.09, 0.17, 0.24, 0.29, 0.40, 0.52, 0.57, 0.78, 0.94	3754.2, 3515.8, 2645.5, 992.1, 5056.2, 345.8, 1496.5, 892.1, 3563.7, 3122.8, 5420.5
2. Shirisharishta (heart wood)	10	0.01, 0.03, 0.10, 0.16, 0.21, 0.41, 0.57, 0.71, 0.91, 0.94	1415.7, 532.7, 12525.6, 240.5, 2082.8, 738.4, 2348.2, 1368.3, 5360.6, 4337.1
3. Shirisharishta (leaf)	10	0.06,0.07, 0.11, 0.16, 0.22, 0.29, 0.45, 0.57, 0.65, 0.69	1446.2, 2362.0, 1416.7, 300.0, 2268.5, 695.7, 1227.0, 2787.3, 3565.3, 3526.7
4. Shirisharishta (wood)	13	0.03, 0.08, 0.16, 0.23, 0.30, 0.34, 0.40, 0.57, 0.65, 0.69, 0.78, 0.92, 0.93	549.0, 3709.1, 822.2, 5031.7, 815.0, 459.1, 1115.0, 2593.2, 3655.8, 2431.5, 2386.7, 8255.7, 3736.8

The HPTLC fingerprints suggest clear difference in all the four batches of Shirisharishta. 13 spots were seen in Shirisharishta (wood), 11 spots were seen in Shirisharishta (bark) and 10 spots were observed in both Shirisharishta (heartwood) and Shirisharishta (leaf). The HPTLC fingerprints of Shirisharishta (heartwood) and Shirisharishta (leaf) are completely different. The highest area of Shirisharishta (heartwood) was seen at Rf 0.10 and highest area of Shirisharishta (leaf) was seen at Rf 0.65 (Table 2) (Fig. 1).



1: Shirisharishta (bark); 2: Shirisharishta (heartwood); 3: Shirisharishta (leaf); 4: Shirisharishta (wood)

Figure 1: HPTLC fingerprint of different batches of Shirisharishta

DISCUSSION

Medicinal plants become rare, endangered and threatened (RET) day by day due to unscientific collection and harvesting practices. One of the causes for plant death is collection of used parts like root and heartwood of the plant. The need of the time is thus to find out alternative part of use for saving the plant species. At the same time it should also be taken in account that the prepared formulation should have equal physic-chemical properties and biological activities. The present study was planned to observe the effect of *A. lebbeck* leaves as an alternative for *A. lebbeck* heartwood for preparation of Shirisharishta.

The specific gravity of Shirisharishta (wood) sample is more due to presence of more solid in it. The higher total solid content in Shirisharishta (wood) and Shirisharishta (heartwood) samples indicates solubility of more water and alcohol soluble active principles. The highest alcohol content in Shirisharishta (heartwood) suggests that heartwood is the best part of use for preparation of Shirisharishta, and it is also strengthen the view of Acharya Charaka for including Sara (heartwood) of Shirisha (*A. lebbeck*) as Asava Yoni (source for fermentation)[4].

The highest band area in Shirisharishta (heartwood) sample indicates presence of maximum active principles in this sample. The spots in Shirisharishta (wood) and Shirisharishta (bark) samples resemble with Shirisharishta (heartwood) sample, but the spot areas are more in Shirisharishta (heartwood) sample. The results support the observations reported in a previous study by Jaiswal M et al[11]. Many of the spots in Shirisharishta (leaf) sample are completely different from the spots seen in Shirisharishta (heartwood) sample. It clearly indicates that the extracted active principles are different in Shirisharishta (heartwood) sample from Shirisharishta (leaf) sample.

The results indicate that leaf of A. lebbeck could not be an alternative of heartwood for preparation of Shirisharishta. But only on the basis of physic-chemical and phytochemical analysis, no conclusion might be drawn. To draw a concrete conclusion, more extensive phytochemical analysis, pharmacological and clinical studies should be carried out.

CONCLUSION

The results of the study reveal that heartwood of Shirisha (*A. lebbeck*) is the best part of use for preparation of Shirisharishta, as the ancient scholars of Ayurveda mentioned, and leaf could not be an alternative for heartwood of Shirisha (*A. lebbeck*) for preparation of Shirisharishta.

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CONFLICTS OF INTEREST

No conflicts of interest.

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REFERENCES

1. Anonymous, Wealth of India: A dictionary of Indian Raw Materials and Industrial Products, 1st ed. Vol. I, New Delhi: CSIR; 2006, 126.
2. Acharya J.T., Charaka Samhita, 5th ed. Varanasi: Chaukhambha Sanskrit Sansthan; Sutra Sthana 2/5, 2001, 24.
3. Shashtri A.D., Sushruta Samhita, Varanasi:Chaukhambha Sanskrit

Sansthan; Sutra Sthana 39/14, 2005, 149.
4. Acharya J.T., Charaka Samhita, 5th ed. Varanasi: Chaukhambha Sanskrit Sansthan; Sutra Sthana 25/40, 2001,131.
5. Tripathi R.M., Das P.K., Studies on anti-asthamatic and anti-anaphylectic activity of Albizia lebbeck, Indian J. Pharma. 1977;9(3):189-194.
6. Yadav S.S., Galib, Ravishankar B., Prajapati P.K., Ashok B.K., Varun B. Anti-inflammatory activity of *Shirishavaleha*: An Ayurvedic compound formulation. Int. J. Ayurveda Res. 2010;1(4):205–207.
7. Shastri A.D., Bhaishajya Ratnavali, 15th ed. Varanasi: Chaukhambha Sanskrit Sansthan; 2002;72/72-74:765.
8. Jaiswal M., Prajapati P.K., Patgiri B.J., Ravishankar B. A Comparative Pharmaco - Clinical Study on Anti-Asthmatic Effect of Shirisharishta Prepared by Bark, Sapwood and Heartwood of Albizia Lebbeck. AYU. 2006;27(3):67-74.
9. Kedare B.S., Tendolkar C.S. Destructive Distillation of Some Hardwood Species of Bombay State. J. Sci. Industr. Res. 1953; 12B, 217-21.
10. Wagner H., Bladt S. Plant Drug Analysis- A Thin Layer Chromatography Atlas, Berlin: Springer; 2004.
11. Jaiswal M., Prajapati P.K., Patgiri B.J., Ravishankar B., Dhar J.K., Suri K.A. *et al.* A Comparative Pharmaceutical and Analytical Study of Shirisharishta Prepared by Bark, Sapwood and Heartwood of Albizia Lebbeck Benth. AYU. 2007;28(2):38-46.

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