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A Comparative Analytical Study on Two Types of Sharibadi Decoctions: An Ayurveda Preparation

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Authors' contributions

This work was carried out in collaboration among all authors. Author RDHK designed the concept and experimental protocols, wrote the first draft of the manuscript and literature searches. Author EDTPG contributed for the experimental protocols, collection of plants and literature searches. Authors NDNJ, RHSKDS, RLDSR and MHF managed the literature searches and statistical analysis. Author UKAS did the analytical work. Author LDAMA supervised the analytical work and finalized the draft. All authors read and approved the final manuscript.

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ABSTRACT

Aim: The present study aimed to compare the Sharibadi decoction which was prepared in two different ways. Sharibadi decoction A: All the ingredients are available including a local variety of *H. indicus* and Indian variety of *H. indicus*. Sharibadi decoction B: All the ingredients are available except the local variety of *H. indicus* and double the amount of Indian variety of *H. indicus*.
Methodology: Phytochemical (in terms of secondary metabolites and Thin Layer Fingerprint profiles) and Physico-chemical (in terms of ash values and extractable matter) analyses were carried out to compare the Sharibadi decoction A with the Sharibadi decoction B.
Results: Comparison of phytochemicals and Thin Layer Fingerprint profile of Sharibadi decoction A with that of Sharibadi decoction B revealed the differences in phytochemical compound/s

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presence in both decoctions. However, Physico-chemical parameters of Sharibadi decoction A were almost similar to that of Sharibadi decoction B.

Conclusion: Absence of local variety of *H. indicus* gives an impact on phytochemical constituents rather than Physico-chemical parameters of Sharibadi decoction. However, phytochemicals play a major role when a drug exhibits its therapeutic effect/s. Therefore, to get the best therapeutic effect of Sharibadi decoction, both local variety of *H. indicus* and Indian variety of *H. indicus* should be used with other ingredients.

Keywords: Hemidesmus indicus; physico-chemical; phytochemical; sharibadi decoction.

1. INTRODUCTION

The demands for the use of herbal products are increasing rapidly. Majority of the population of developing countries utilize herbal preparations and other traditional medicines for the prevention and cure of diseases [1,2]. Hence, quantitative and qualitative analyses, therapeutic efficacy as well as safety measures are important factors for traditional system of medicine. Sharibadi decoction is a traditional Ayurvedic formulation mentioned in the Sri Lankan Ayurveda Pharmacopeia [3]. It consists of twelve herbal ingredients (Fig. 1) including *Hemidesmus indicus* R.Br (local variety), *Hemidesmus indicus* R.Br (Indian variety), *Adhatoda vasica* L. Nees, *Curcuma longa* L, *Operculina turpethum* L, *Cassia senna* Mill, *Terminalia chebula* Retz, *Coscinium fenestratum* (Goetgh.) Colebr, *Vitis vinifera* L., *Picrorhiza kurroa scrophulariiflora* Royle ex Benth, *Azadirachta indica* A. Juss., *Pedalium murex* L.

Plant	Family	Part Used	Proportion
Hemidesmus indicus R.Br -Sri Lankan variety 	Periplocaceae	Leaves and Root	1
Hemidesmus indicus R.Br – *Indian variety* 	Periplocaceae	Root	1
Adhatoda vasica L. Nees 	Acanthaceae	Root	1
Curcuma longa L 	Zingiberaceae	Rhizome	1

Operculina turpethum L.	Convolvulaceae	Root	1

Cassia senna Mill	Fabaceae	Leaves	1

Terminalia chebula Retz	Combretaceae	Pericarp	1

Coscinium fenestratum (Goetgh.) Colebr	Menispermaceae	Bark	1

Vitis vinifera L.	Vitaceae	Fruit	1

Picrorhiza kurroa scrophulariiflora Royle ex Benth	Schrophulariaceae	Root	1

Azadirachta indica A. Juss	Meliaceae	Stem Bark	1
			
Pedalium murex L.	Pedaliaceae	Seeds	1
			

Fig. 1. Plant ingredients of Sharibadi decoction

Sharibadi decoction is recommended for various skin disorders including inflammatory oedema of the skin, gout and especially for chronic inflammatory kidney diseases. Currently, Sri Lankan Ayurvedic physicians use both Indian variety and Sri Lankan variety of *Hemidesmus indicus* as ingredients for Sharibadi decoction. Drug manufactures and Ayurvedic physicians get medicinal plants via wild collection and/or cultivation. Further, few people involved in providing medicinal plants to the drug manufactures or Ayurvedic physicians due to the limitation of land and manpower, price fluctuation, etc. However, Sri Lankan variety of *H. indicus* is very rare and difficult to find in local market. Therefore, people tend to add only Indian variety of *H. indicus* instead of Sri Lankan variety of *H. indicus*. A physicochemical comparison was carried out for roots of Indian and Sri Lankan varieties of *H. indicus* [4] and found similarities as well as dissimilarities. In the present study, Sharibadi decoction was prepared in two different ways. Sharibadi decoction A (Fig. 2): All the ingredients are available including a local variety of *H. indicus* and Indian variety of *H. indicus*. Sharibadi decoction B (Fig. 2): All the ingredients are available except the local variety of *H. indicus* and double the amount of Indian variety of *H. indicus*. Therefore, the objective of the study was to compare the physicochemical and phytochemical comparison of Sharibadi decoction A and Sharibadi decoction B.

(a) (b)

Fig. 2. Dry plant ingredient of Sharibadi decoction A and Sharibadi decoction B

2. MATERIALS AND METHODS

2.1 Plant Ingredients

All the raw materials except Indian variety of *H. indicus* were collected from Western Province, Sri Lanka between November -December 2017. Indian variety of *H. indicus* was purchased from a medicinal plant importer. All the raw materials were authenticated by a Senior Scientist, Bandaranayake Memorial Ayurveda Research Institute, Sri Lanka. Voucher specimens were deposited in the Institute of Indigenous Medicine, University of Colombo, Sri Lanka.

2.2 Phytochemical Analysis

Phytochemical analysis was carried out for hot water extract of Sharibadi decoction and Sharibadi decoction B respectively. In brief, 20 g from each Sharibadi decoction A and B were taken into separate round bottoms and refluxed with distilled water (100°C) for 4 h and filtered. Each filtrate was subjected to phytochemical screening using standard protocols [5,6] with some modifications.

2.3 Development of Thin Layer Chromatography (TLC) Fingerprint Profiles

Sharibadi decoction A (20 g) and Sharibadi decoction B (20 g) were taken into separate round bottoms and refluxed with distilled water for 4 h and filtered. Each filtrate was added to a reparatory funnel containing 20 ml of dichloromethane, mixed well and allowed to separate the two solvents. Then, the dichloromethane layer was separated and added to a round bottom. After that, another 20 ml of dichloromethane was added to the remaining water extract, mixed well, allowed to separate the two solvents and dichloromethane layer was separated. This procedure was repeated thrice and the pooled dichloromethane extract was concentrated using a rotary evaporator to get 5 ml of the extract. Five microliters were taken from each extract and spotted on a pre-coated Thin Layer Chromatography (TLC) plate. TLC fingerprint profiles were developed using methanol, ethyl acetate and cyclohexane in a ratio of 0.2: 4: 1.8 (v/v).

2.4 Physico-chemical Analyses

Physico-chemical analyses were carried out for the powders of Sharibadi decoction A and Sharibadi decoction B respectively by using standard methods [7]. Total polyphenol content was determined by the Folin-Ciocalteu method [8] by using gallic acid as the standard. Total flavonoid content was determined by aluminium chloride method [9] by using quercetin as the standard.

2.5 Statistical Analysis

Data were statistically analyzed using Analysis of Variance (ANOVA) and the Duncan's Multiple Range Test (DMRT) was used to determine the differences among treatment means. $P<0.05$ was regarded as significant. IBM Statistical Package for the Social Sciences (SPSS) (2015) was used.

3. RESULTS AND DISCUSSION

In the last decade, there has been a rapid rise in the use of herbal medicines in the world. Therefore, many research studies have been carried out to establish the quality control parameters and evaluate the therapeutic potential of herbal medicines [10-14]. It is well known that the therapeutic effect of a drug mainly depends on its chemical compounds. The chemical composition of the Sri Lankan variety of *H. indicus* was not exactly similar to the Indian variety [4]. Both Sharibadi decoction A and Sharibadi decoction B consist of phytochemicals such as flavonoids, tannins, phenolic compounds, saponins, alkaloids steroid glycosides and terpenoids. However, flavonoids, tannins and phenolic compounds were more prominent in Sharibadi decoction A than that of Sharibadi decoction B (Table 1). According to a previous study, local variety *H. indicus* was rich in flavonoids, tannins and phenolic compounds than that of an Indian variety of *H. indicus* [4]. This may be the reason for the above observations as Sharibadi decoction B contains only the Indian variety of *H. indicus.* Similarly, amount of total phenols (78.5 ± 1.2 mg gallic acid equivalents /g) and flavonoids (43.7 ± 2.3 mg quercetin equivalents /g) contents in Sharibadi decoction A were higher than total phenols (52.6 ± 0.8 mg gallic acid equivalents /g) and flavonoids (32.4 ± 1.8 mg quercetin equivalents /g) contents in Sharibadi decoction B. Furthermore, coumarins were not present in either Sharibadi decoction A or Sharibadi decoction B.

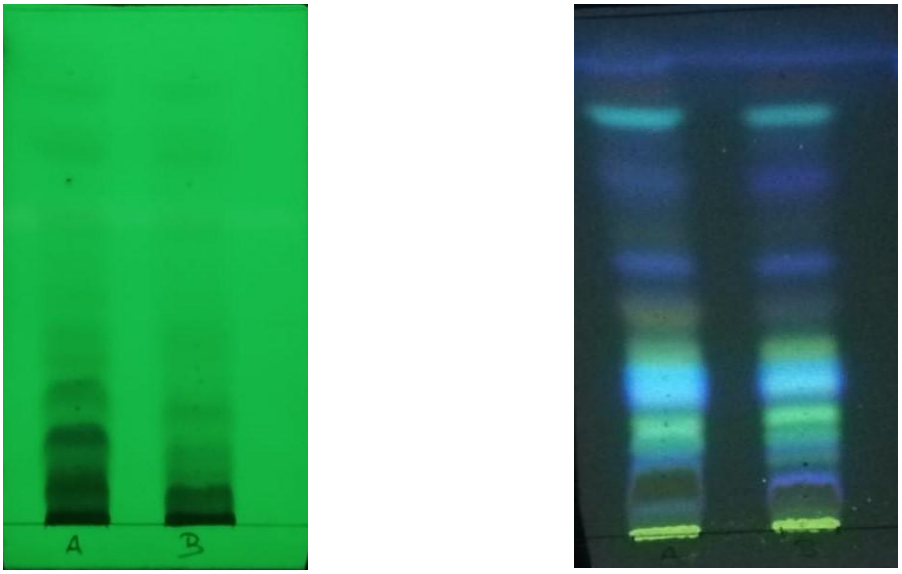
TLC is one of the simple and cheap techniques available to detect phytochemical profiles in herbal drugs [6,13] or plants [4,15,16]. Differences in phytochemical constituents were revealed when compared the TLC fingerprint

profile of Sharibadi decoction A with that of Sharibadi decoction B (Table 2 and Fig. 3). Phytochemical constituents observed under 366 nm were almost similar in both decoctions. However, marked phytochemical differences were observed under 254 nm.

Physico-chemical parameters such as ash values, extractable matter are important characteristics used to standardize herbal drugs. However, Physico-chemical parameters of Sharibadi decoction A were almost similar to that of Sharibadi decoction B (Table 3). Therefore,

Table 1. Phytochemical constituents of Sharibadi decoction A and Sharibadi decoction B

Phytochemicals	Sharibadi decoction A	Sharibadi decoction B
Saponins:		
1. Foam test	Present	Present
2. Froth test	Present	Present
Phytosteroids:		
Burchard's test	Present	Present
Alkaloids:		
1. Dragendorff's test	Present	Present
2. Wagner's test	Present	Present
Tannins:		
1. Ferric chloride test	Present	Present
2. Vanillin test	Present	Present
3. Lead acetate test	Present	Present
Phenols:		
1. Vanillin test	Present	Present
2. Lead acetate test	Present	Present
Flavonoids:		
1. Ammonia solution + Conc. H_2SO_4	Present	Present
2. Mg + Conc. HCl	Present	Present
Terpinoids:		
Salkowski test	Present	Present



a. Sharibadi decoction A and Sharibadi decoction B

b. Sharibadi decoction A and Sharibadi decoction B

Fig. 3. Thin layer fingerprint profiles of Sharibadi decoction A and Sharibadi decoction B under (a) 254 nm and (b) 366 nm

Table 2. Retardation factors (R_f) of Sharibadi decoction A and Sharibadi decoction B

Retardation factors (R_f) of Sharibadi decoction A (At 254 nm and 366 nm)	Retardation factors (R_f) of Sharibadi decoction B (At 254 nm and 366 nm)
0.06	0.06
0.15	0.19
0.19	0.30
0.20	0.33
0.25	0.41
0.27	0.53
0.29	0.58
0.33	0.65
0.41	0.70
0.53	0.82
0.58	
0.65	
0.70	
0.82	

Table 3. Physico-chemical properties of Sharibadi decoction A and Sharibadi decoction B

Physico-chemical properties % (dry weight basis)	Sharibadi decoction A	Sharibadi decoction B
Total ash	6.4 ± 0.1	5.7 ± 0.1
Water soluble ash	1.8 ± 0.0	2.1 ± 0.1
Acid insoluble ash	0.2 ± 0.0	0.3 ± 0.1
Hot water extractable matter	6.6 ± 0.1	6.7 ± 0.3
Hot ethanol extractable matter	13.9 ± 0.1	15.2 ± 0.2

Values are expressed as mean ± S.E.M., n = 3
Not significant when compared to the values of Sharibadi decoction A with values of Sharibadi decoction B; P ≥ 0.05

the difference of one plant ingredient does not give significant (p≥0.05) impact on physicochemical parameters of Sharibadi decoction.

4. CONCLUSION

In the present study, the local variety of *H. indicus* collected only from Western Province of Sri Lanka and maturity of local and Indian varieties of *H. indicus* were not in the same stage. Further, the absence of a local variety of *H. indicus* gives an impact on phytochemical constituents rather than Physico-chemical parameters of Sharibadi decoction. However, phytochemicals play a major role when a drug exhibits its therapeutic effect/s. Therefore, to get the best therapeutic effect of Sharibadi decoction, both local variety of *H. indicus* and Indian variety of *H. indicus* should be used with other ingredients.

DISCLAIMER

The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge.

CONSENT

It is not applicable.

ETHICAL APPROVAL

It is not applicable.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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