

A comparative analysis of *Coscinium fenestratum* powder in Sri Lanka herbal market

Pathirage Kamal Perera¹, Jeevani Dahanayake¹

Abstract

Coscinium fenestratum (Gaertn.) Colebr. (Menispermaceae) is called "Venival" in Sri Lanka. It is used in traditional medicines for treatment of diabetes and other ailments. The interest in the biological activities of this plant has accelerated in recent years. Its stem powder is now mostly used in traditional medicine and may be subjected to adulteration due to high demand of usage. The present study deals with the comparative analytical studies and chromatographical studies of different market samples from various parts of the country to identify any adulteration liability in *C. fenestratum* powder (n=5). The moisture content, total ash, acid insoluble ash and thin layer chromatography were done as basic standardization methods of these powders. Total moisture content, total ash and acid insoluble ash respectively were in the ranges of 6-10%, 3-6% and 2-4%. TLC fingerprints of each extract showed similar and dissimilar pattern with R_f values of authenticated standard sample. Our findings indicated that some stem powder samples of *C. fenestratum* varied with authenticated standard sample. This indicates that there should be strong drug standardization and quality control methods should be implemented for herbal drugs and their raw materials in Sri Lanka.

Introduction

Coscinium fenestratum Colebr. (Menispermaceae), commonly known as tree turmeric, grows widely in the Western Ghats (India) and Sri Lanka. The plant has been mainly used for treating diabetes mellitus in the traditional, Ayurveda and Siddha systems of medicine [1, 2]. The stem is used for dyspepsia and as a febrifuge [3]. Its hypotensive and hepatoprotective actions have also been reported (4). The stem contains berberine, ceryl alcohol, hentriacontane, sitosterol, palmitic acid, oleic acid and saponin, together with some resinous material [5].

The major compound in the stem extract of *C. fenestratum* is berberine (structure shown in figure 1) [6,7] and it is used as a marker compound for the quality assurance of this plant extract.

The interest in the biological activities of this plant has accelerated in recent years. Its stem powder is now mostly used in traditional medicine in Sri Lanka. Powdered forms of crude drugs are commonly adulterated with other substances for commercial benefits in the market. Hence, the standardization of such herbal drugs is important to establish for quality drug usage according to World Health Organization (WHO) guidelines, 1998 [8]. In the present study the comparative analytical studies, chromatographically study with different market samples from various parts of the country were done to identify adulteration liability of *C. fenestratum* powder (n=5).

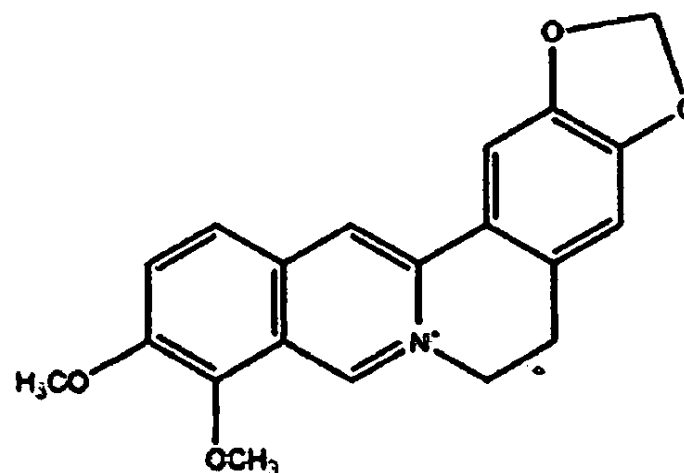


Figure 1 Chemical structure of berberine

Materials and Methods

All solvents and reagents used were standard analytical-reagent grade. Chromatography was performed on silica gel GF254 plates (20.0 cm x10.0 cm, 0.2 mm thickness, E. Merck, Germany). The solvent system consisted of ethyl acetate: butanol: acetic acid: water (50:30:12:10).

Four samples of *C. fenestratum* powder were purchased from several traditional drugstores in random. Authenticated standard sample was made in the Department of Dravyaguna Vignana, Institute of Indigenous Medicine, University of Colombo.

¹ Department of Dravyaguna Vignana, Institute of Indigenous Medicine, University of Colombo, Rajagiriya, Sri Lanka

Correspondence: Dr. Pathirage Kamal Perera, Senior Lecturer, Department of Dravyaguna Vignana Institute of Indigenous Medicine, University of Colombo, Rajagiriya, Sri Lanka, Email: drkamalperera@yahoo.com

Physico-chemical parameters**Total ash**

2.0g of powdered drug was taken in tarred China dish. After that it was kept in muffle furnace at 450°C heat, until it is white, indicating absence of carbon. The heating, cooling and weighing were repeated until the weight of the crucible becomes constant. This was done in triplicates. The content of total ash was calculated in milligrams per gram in comparison to air dried material.

Acid insoluble ash

The total ash was collected and boiled with 25ml of dilute HCL for 5 minutes. This solution was filtered with the Whatman filter paper. Along with the insoluble ash, the filter paper was burnt in a Gooch crucible. The heating, cooling and weighing were repeated until the weight of the crucible becomes constant. This was done in triplicates. The percentage of acid insoluble ash was calculated with reference to the air dried drug.

Determination of moisture content (Loss on Drying):

2.0g of powdered drug was taken in tarred China dish. It was dried in the oven at 100°C or 105°C for 3 hours and cooled in desiccators. The heating, cooling and weighing were repeated till a constant weight was achieved. After that the loss was recorded as moisture. This was done in triplicates.

TLC Fingerprints

Preparation of the extract for Thin Layer Chromatography (TLC) done by the method described in Rojsanga et al [9]. The solution of each extract was prepared to obtain the concentration of 10.0 mg/ml in 80% ethanol. The extract (3 µl) and the standard (0.48 mg/ml, 5 µl) were spotted on a TLC plate. The plate was developed in solvent system, consisting of ethyl acetate: butanol: acetic acid: water (50:30:12:10). The developing distance was 80 mm. After removing from the chamber, the plate was dried in air for 30 minutes, and examined under UV light (254 and 366 nm). The plate was sprayed with Dragendroff spraying reagent heat at 110°C for 10 minutes.

Results

As shown in Table 1, loss on drying, total ash and acid insoluble ash respectively were in the ranges of 6-10%, 3-6% and 2-4%.

As shown in thin layer chromatographic fingerprints of each extract showed similar and dissimilar patterns of retention factor (Rf) values compared with authenticated standard sample (S1).

Table 1: Determination of proximate analysis for various market samples of *Coscinium fenestratum*

Test	Results (%)				
	S1	S2	S3	S4	S5
Total ash content	3	3	6	6	3
Acid Insoluble ash	2	3	4	4	2
Moisture content	6	7	8	10	7

(S1: Standard sample, S2-S5: Different market samples)

Table 2: TLC screening of market samples of *Coscinium fenestratum*

Sample	Rf values
S1	0.51, 0.65, 0.92
S2	0.51, 0.65, 0.92
S3	0.51, 0.65, 0.88, 0.93
S4	0.51, 0.65, 0.75, 0.89
S5	0.51, 0.65, 0.75, 0.87

(S1: Standard sample, S2-S5: Different market samples)

Discussion

Comparative standardization of raw materials should be unchanged of chemical variations in plants by four categories viz environment, ontogeny, genetic of the cultivated population, and post-harvest operations. Therefore we have to focus much more advanced methods in standardization of raw materials. But some physicochemical and chromatographic findings come to play an important role in assessing of plant materials in basic stages.

The residue remaining after incineration is the ash content of a herbal drug, which simply represents inorganic salts, naturally occurring in drugs or adhering added to it as form adulteration [9]. The loss on drying test is designed to measure the amount of water and volatile matters in a sample when the sample is dried under specified conditions. Amount of moisture content is a credibility of a standard herbal powders [10]. In this study we used physicochemical evaluation of ash values and moisture contents and basic chromatographic identifications for finding adulteration liability of different market samples. It can be seen that the ash and moisture levels are dissimilar with authenticated standard sample. Therefore, there may be some adulteration was involved in some market samples.

TLC fingerprint of each sample showed similar and dissimilar patterns of Rf values. That also indicates there may be some adulteration liability of these powders. Further we hope to upgrade TLC methods by introducing marker compound viz berberin of *Coscinium fenestratum* and measuring the quantity of the major compounds appearing in samples in future researches.

Conclusion

findings of this study indicated that some stem powder samples of *C. fenestratum* varied from authenticated standard sample. This indicates that strong drug standardization and quality control methods be implemented for herbal drugs. Further our findings were suggested that standardization of powdered herbal drugs in market are essential before further transformations as herbal products.

References

1. Varier PS. *Coscinium fenestratum*, Indian Medicinal Plants, Compendium of 500 species. Hyderabad, India: Orient Longman Ltd, Vol. 2, 1994; 191–193.
2. Shirwaikar A, Rajendran K, Punitha ISR. Antidiabetic activity of alcoholic stem extract of *C. fenestratum* in streptozotocin nicotinamide induced type 2 diabetic rats. *J Ethnopharmacol* 2005; 97:369–74.
3. Punitha ISR, Rajendran K, Shirwaikar A, Shirwaikar A. Alcoholic Stem Extract of *Coscinium fenestratum* Regulates Carbohydrate Metabolism and Improves Antioxidant Status in Streptozotocin–Nicotinamide Induced Diabetic Rats. *e CAM* 2005; 2(3) : 375–381
4. Venukumar MR, Latha MS. Effect of *Coscinium fenestratum* on hepatotoxicity in rats. *Indian J Exp Biol* 2004; 42:792–7.
5. *Coscinium fenestratum*, The Wealth of India, Publication Information and Directorate. India: CSIR, Vol. 2, 1950 : 360.
6. Datta SC, Mathur RK, Baruah JN. Minor alkaloids of *Coscinium fenestratum* root. *Indian Drugs* 1988; 25:350.
7. Singh GB, Singh S, Bani S, Malhotra S. Hypotensive action of a *Coscinium fenestratum* stem extract. *J Ethnopharmacol* 1990; 38:151–5.
8. World Health Organization. Regulatory Situation of Herbal Medicines. A Worldwide Review. Geneva: World Health Organization; 1998.
9. Rojsanga P, Gritsanapan W. Variation of Berberine Content in *Coscinium fenestratum* Stem in Thailand Market. *Mahidol University Journal of Pharmaceutical Sciences* 2005; 32(3-4): 66-70.
10. Kirtikar KR, Basu BD. Indian medicinal plants, Vol.1 : 503-507.

Guidelines for authors

Sri Lanka Journal of Indigenous Medicine (SLJIM) accepts original research reports in English in all areas of basic scientific and clinical research on Indigenous/ Traditional system of Medicine, Medicinal plants, Ayurvedic Pharmaceutical science etc. Further the editors encourage the submission of papers relevant to multidisciplinary clinical studies on curative and preventive aspects, historical, literal, cultural, and socioeconomic perspectives. The journal also publishes invited review papers, book reviews and short communications. The submission of a manuscript will be taken to imply that the work is original, and it or a similar paper (other than an abstract) has not been, and will not be submitted elsewhere for publication. Sri Lanka Journal of Indigenous Medicine (SLJIM) is a peer reviewed International journal to be published biannually.

Submission of Manuscripts

The original paper including illustrations and tables should be submitted with three copies. The author should keep an extra copy of manuscript. Submission should be accompanied by a covering letter that designated one author as correspondent including his complete postal and e-mail address. The submission has not been previously published, nor is it before another journal for consideration.

The manuscript must be typed in double spacing in English on one side of the paper (preferably A4 size) with a margin not less than 2.5 cm all rounds. The pages must be numbered consecutively, and securely fastened together. The journal will also accept manuscripts in a CD in Word perfect or MS Word format. Manuscripts before submission should be proofread carefully for mistakes and subsequent corrections, if any, made. Upon receipt of the manuscript, the editor will mail a confirmation notification to the sender indicating the title of the manuscript and the publisher's identification number. All the materials in the journal will be subjected to copyright and may not be republished without permission. Authors should follow the following general guidelines.

Authorship

All authors including the co-authors should have been responsible for a significant part of the manuscript. All authors and co-authors should have taken part in writing the manuscript reviewing it, and revising its intellectual and

technical content. Any author whose name appears on a paper assumes responsible for the results.

Length of papers

Original research papers should be written under the following sub headings, Title page, Abstract, Introduction, Materials and methods, Results, Discussion, Acknowledgements, References, Tables and Figures. It should not exceed 4000 words. Review papers should include an abstract, an introduction that outlines the main points, text under brief sub headings and references. Review papers may exceptionally be longer up to 5000 words.

Short communications should contain novel preliminary findings. It should be written under the subheadings similar as for a research paper but should include one figure, a table and only few key references. It should not exceed 2000 words.

Title page

The title of the paper must be as brief as possible. The title of the paper should correctly reflect its contents and must not exceed 100 characters in length. A short running title of up to 40 characters should be provided. The name (s) & initials of the author (s) with the highest academic degree and their affiliation (s) should be given. The name, postal address and e-mail address of the corresponding author should be stated.

Abstract

It must start on a new page carrying the following information; (a) Title (without authors' names or affiliations), (b) Abstract and (c) Running title. It should not exceed 250 words excluding the title. The abstract must be concise, clear and informative rather than indicative.

The abstract must be in a structured form (Introduction, Methods, Results, and Discussion & conclusions) and explain briefly what was intended, done, observed, and concluded. The conclusions and recommendations not found in the text of the article should not be given in the abstract. The abstract should not contain any references.

Manuscript layout

Manuscript of articles should be organized as follows. Title page, Abstract, Introduction, materials and Methods Results, Discussion, conclusions, Acknowledgement and Reference.

Introduction

Introduction should supply enough information to allow the reader to understand and evaluate the results and discussion that follows. Justification for research aims and objectives must be clearly mentioned without any ambiguity. It should be restricted to *reason for undertaking the present study* and provide only the most essential background. It should state the problem, consider events and literature up to the present problem, State any assumptions, and give an outline of the work.

Materials and Methods

The nomenclature, the source of materials and equipments used with the manufactures details should clearly mentioned with parenthesis. The procedure adopted should be explicitly stated to enable other workers to reproduce the results.

New methods may be described in detail with an indication of their limitations. Established methods can be mentioned with appropriate references. When reporting experiments on human subjects, it should be indicated whether the procedures followed were in accord with the ethical standards on human experimentation. When reporting experiments on animals, procedures for the care and use of laboratory animals need to be mentioned. They must provide information regarding the source of animals, the strain, age, weight, sex, housing and nutrition. The drugs and chemicals used should be precisely identified, including generic name(s), dosage (s), and route (s) of administration. The statistical significance of the findings when appropriate should be mentioned.

Results

The results are concisely and logically presented. Only data essential for the main conclusion emerging from the study should be included. Interpretations of data should be left to the discussion section. Presentation of the same results in the figures and text should be avoided.

Discussion

Long, rambling discussions should be avoided. The discussion should deal with the interpretation of results without repeating information already presented in results. It should logically related new findings to old ones. Unqualified statements and conclusions not completely supported by data should be avoided. All hypotheses should

be clearly identified as such. Recommendations may be included as part of the discussion, only when considered absolutely necessary and relevant.

Acknowledgement

Acknowledgement should be in brief and made only for specific, technical and financial assistance and not for routine help in preparing manuscripts. If a significant part of the research was performed in an institution other than in those indicated by the author affiliations given in the title page, this fact should be acknowledged.

References

References to the literature must be indicated in the text and tables in serial order in Arabic numerals (in parentheses). The list of references in numerical order must be placed at the end of the manuscript. The "unpublished observations" and "personal communications" may not be listed under reference but mentioned in the text. Accuracy of references is the responsibility of the author(s). As far as possible mentioning names of author(s) for reference should be avoided in the text.

Some examples of typical references are provided below:

Journals articles: Name of author with initials. Title of the paper. Journal name. year of publication; Volume No: page no.

Books: Name of author title of book, publishers, Number of edition, country, year of publication; page No.

Internet: Name of author, title of article, name of journal, year of publication; complete (publication year), web address(Accessed date)

Conference proceedings: Name of the author Name of paper. Name of Conference. Organizers. Country. (year).

Illustrations

Illustrations should be kept to a minimum. All illustrations are considered as figures, graphs, drawings, or photographs should be numbered in the order cited in the text.

Abbreviations and symbols.

Unless common, these should be defined when first used, and not included in the abstract. The SI system of units should be used wherever possible if measurements were made in units, other than SI.

Nomenclature

Scientific names of plants and animals should be italic type in the manuscript. In the following citations, the generic name may be abbreviated. eg. *G.glabra*.

Manuscripts should be submitted to:

Prof. A.P.G.Amarasinghe

Editor in Chief- SLJIM

Institute of Indigenous Medicine

University of Colombo, Rajagiriya, Sri Lanka

Tel:+94112694308; Fax:+94112697175

E-mail : sljim@iim.cmb.ac.lk

National Digitization Project

National Science Foundation

Institute : National Science Foundation

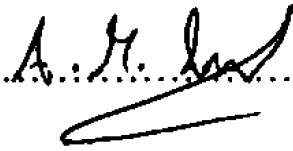
1. Place of Scanning : Sanje (Private) Ltd, Hokandara

2. Date Scanned :02/06/2017.....

3. Name of Digitizing Company : Sanje (Private) Ltd, No 435/16, Kottawa Rd,
Hokandara North, Arangala, Hokandara

4. Scanning Officer

Name :Angelo Melvin Luwis.....

Signature :.....

Certification of Scanning

I hereby certify that the scanning of this document was carried out under my supervision, according to the norms and standards of digital scanning accurately, also keeping with the originality of the original document to be accepted in a court of law.

Certifying Officer

Designation :Information Officer.....

Name :Renuka Sugathadasa.....

Signature :.....

Date :02/06/2017.....

“This document/publication was digitized under National Digitization Project of the National Science Foundation, Sri Lanka”