



Microwave Assisted Extraction of phytochemicals from the stem of *Cissus quadrangularis*

Brundha U^{*1}, Akila E¹, Dr. Narayanaswamy V B¹, Pruthvi N¹

¹Department of Pharmacognosy, RR College of Pharmacy, Bangalore, Karnataka.

Address for Corresponding Author

Department of Pharmacognosy,
RR College of Pharmacy, Chikkabanavara,
Bangalore, Karnataka – 560090.

Mail id: brundhaumesh98@gmail.com

Abstract

Microwave assisted extraction (MAE) is a focused and targeted method of extraction of plant metabolites. Compared to conventional method of extraction, MAE has some advantage such as shorter extraction time and lower temperature, which leads to less degradation of thermally labile compounds. In the present study, a microwave-assisted extraction method was established to extract natural phytochemicals from the stem of *Cissus quadrangularis* using various solvents like Pet.ether, Chloroform, Ethyl acetate, Ethanol and Water and the % Yield and consistency of extracts as well extraction time are compared with the extract prepared by conventional method. Extracts of *Cissus quadrangularis* showed the presence of steroids, alkaloids, saponins, carbohydrates, phenolic compounds by preliminary phytochemical analysis.

Key Words: Microwave, conventional method, *Cissus quadrangularis*.

Introduction

Herbal medicines have been evolving side by side of human culture. Plants are considered as natural factories for production of various phytochemicals. A large number of secondary metabolites like alkaloids, phenolics and flavonoids are synthesized by plants in addition to compounds that are needed for the reproduction and growth of plants. Advancements in natural sciences led researchers towards identification and isolation of different bioactive phytochemicals. Depending on physical nature and the properties of phytoconstituents, various methods are in use to obtain the crude extract. Among these various conventional extraction methods including infusion, digestion, decoction, percolation and maceration are commonly practiced in herbal industry for crude extraction. Microwave assisted extraction is one of the advanced techniques under thought now a days.¹ In MAE, microwave vitality is utilized to concentrate plant metabolites with the solvents. This system has demonstrated its wellbeing for the vast majority of the specimens because of the ease to handle and to understand steadiness. Exploration is continuing for functional use of microwaves for business creation of phyto-constituents, yet at the same time in early stages.²

Cissus quadrangularis L. is a succulent plant of family Vitaceae usually found in tropical and subtropical xeric wood. It is a beefy desert plant like liana generally utilized as typical nourishment in India. It finds application in medicine.³ *Cissus quadrangularis* is used for diabetes, obesity, high cholesterol, bone fractures, allergies, cancer, stomach upset, painful menstrual periods, asthma, malaria, wound healing, peptic ulcer disease, weak bones, weak bones (osteoporosis) and as body building supplements as an alternative to anabolic steroids.⁴

Hence considering the medicinal importance of *Cissus quadrangularis*, in the current study an effort was made to extract the phytoconstituents by MAE from the plant extracts.

MATERIALS AND METHODS

Collection and preliminary processing of plant material

Stems of *Cissus quadrangularis* were collected from locality of Chennai. The leaves were washed with water to remove adhering dirt, shade dried and then ground into coarse powder.

Extraction of plant material

Extracts of the *Cissus quadrangularis* stems were prepared separately by conventional method (Soxhlation) and by microwave assisted extraction (MAE) method. Soxhlet Extraction was carried out by subjecting 10 grams of powdered leaf material to soxhlet extraction with various solvents like Pet ether, Chloroform, Ethyl acetate, Ethanol and Water at 50°C. Microwave Assisted Extraction (MAE) was done by using 10 grams of the leaves was in a microwave oven working at an 800W irradiation power and 2450MHz frequency. MAE was done using the same solvents at a temperature of 50°C for a period of 5mins.⁵ After the extraction, solutions were filtered, filtrate was evaporated and concentrated using rotary flash evaporator to get dry extracts. The extracts obtained by soxhlation and MAE compared for the percentage yield and preliminary phytochemical screening of plant extract.

Preliminary Phytochemical Screening (Qualitative Analysis)

The various extracts prepared by Conventional and MAE were subjected to various phytochemical tests to determine the presence of various Phyto-constituents and compared.⁶

RESULTS

Extraction of plant material and Phytochemical Analysis

Powder of *Cissus quadrangularis* has been subjected to the extraction process by conventional method as well Microwave assisted extraction and the % yield and Color and Consistency of the extracts were compared and tabulated (Table 1). Both extracts are subjected to preliminary phytochemical screening and the results are given below Table.2.

Table 1: Comparative study of Conventional extraction and Microwave assisted extraction of *Cissus quadrangularis*

S.No	Solvent	<i>Cissus Quadrangularis</i>					
		Conventional Extraction			Microwave Assisted Extraction		
		Color And Consistency	% Yield W/W	Time (Hrs)	Color And Consistency	% Yield W/W	Time (Hrs)
1.	Pet. ether	Yellowish green Sticky mass	0.4%	2hrs	Yellowish green Sticky mass	2%	10 Mins
2.	Chloroform	Brownish Black Semisolid oily mass	1.1%	3hrs	Dark green Semisolid oily mass	5%	15 Mins
3.	Ethyl acetate	Greenish black Semisolid mass	0.3%	3.5hrs	Greenish black Semisolid mass	6%	15 Mins
4.	Ethanol	Light green Sticky mass	1.4%	2.5hrs	Greenish black Semisolid mass	6.5%	15 Mins
5.	Water	Light brown Semi Solid mass	4.6%	2hrs	Light brown Solid mass	9.5%	15 Mins

Table 2: Preliminary phytochemical Screening of *Cissus quadrangularis stem* extract prepared by Conventional extraction and Microwave assisted extraction

S.No	Chemical Constituents	Conventional Extraction	Microwave Assisted Extraction
1.	Carbohydrates	-	-
2.	Alkaloids	+	+
3.	Steroids	+	+
4.	Glycosides	+	+
5.	Saponins	+	+
6.	Flavanoids	+	+
7.	Tannins	+	+
8.	Phenolic Compounds	+	+
9.	Proteins	+	+
10.	Amino acids	+	+
11.	Mucilage	+	+

DISCUSSION

The color and consistency obtained in both the methods of extractions were same. The yield obtained was more in some of the cases in microwave assisted extraction than conventional extraction. The yield of the extract of *Cissus quadrangularis* was found to be Pet. Ether extract 0.4% W/W, Chloroform extract 1.1% W/W, Ethyl acetate extract 0.3% W/W, Ethanolic Extract 1.4% W/W and Aqueous extract 4.6% W/W from soxhlation and MAE 2% W/W, 5% W/W, 6% W/W, 6.5% respectively. but time required for microwave assisted extraction was much less. Better results were obtained in microwave assisted extraction.

CONCLUSION

The results were encouraging as better results were obtained with reference to % yield at medium intensity and more time. It has been proved that polarity of the solvent, nature of the extracted compounds and extraction process highly affects therapeutic activities of the plant extracts.⁷ Hence, it is necessary to carry out further study to evaluate completion of the process.

REFERENCES

1. Zhang QW, Lin LG, Ye WC. Techniques for extraction and isolation of natural products: A comprehensive review. *Chinese medicine*. 2018 Dec;13(1):1-26.
2. Routray W, Orsat V. Microwave-assisted extraction of flavonoids: a review. *Food and Bioprocess Technology*. 2012 Feb;5(2):409-24.
3. Reddy BS, et al. *African Journal of Traditional, Complementary and Alternative Medicine*. 2017;14:105.
4. Chopra SS, Patel MR, Gupta LP, Datta IC. Studies on *Cissus quadrangularis* in experimental fracture repair: effect on chemical parameters in blood.
5. Jyothi D, Khanum S, Sultana R. Optimisation of microwave assisted extraction of withanolides from roots of Ashwagandha and its comparison with conventional extraction method. *International Journal of Pharmacy and Pharmaceutical Sciences* 2010;2(4): 46-50.
6. Kokate CK, Purohit AP, Gokhale SB. *Pharmacognosy*. 10th ed. New Delhi: Nirali Prakashan Pvt Ltd; 1998,92-4.
7. Metrouh-Amir H, Duarte CMM, Maiza F. Solvent effect on total phenolic contents, antioxidant, and antibacterial activities of *Matricaria pubescens*. *Ind Crop Prod*. 2015;67:249–56. 20.

