



COMPARATIVE STUDY OF CONVENTIONAL EXTRACTION AND MICROWAVE ASSISTED EXTRACTION OF *CODIAEUM VARIEGATUM* STEM BARK

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ABSTRACT

Microwave extraction of components from plant material has generated a great deal of scientific interest and promise in recent years. Traditional extraction procedures for active components are time and solvent demanding, thermally hazardous, and the extraction process limits the examination of several elements in plant material. Some of the appealing aspects of this new potential microwave assisted extraction (MAE) approach include high and quick extraction performance capability with minimal solvent consumption and protection afforded to thermolabile compounds. In the present study, a microwave-assisted extraction method was developed to extract natural phytochemicals from the stem bark of *Codiaeum variegatum* using various solvents such as Pet. ether, Chloroform, Ethyl acetate, Ethanol, and Water, and the percent yield and consistency of extracts, as well as extraction time, were compared to the extract prepared using the conventional method. Carbohydrates, Tannins, Saponins, Phenol, Alkaloids, Flavonoids and Steroids were found in *Codiaeum variegatum* extracts.

KEYWORDS: Microwave assisted extraction (MAE), Conventional, Phytochemical, *Codiaeum variegatum*.

INTRODUCTION

Secondary metabolites produced by plants or animals are referred to as natural products. Natural products are chemical substances found in nature that have pharmacological and biological properties. Natural products are frequently used in drug research and development.^[1] When compared to traditional techniques, MAE offers several advantages, including a greater extraction rate, a shorter extraction time, the use of less solvent, improved productivity, and superior product quality. It is a popular method for extracting important bioactive components from plant sources.^[2]

Codiaeum variegatum, also known as Croton and Joseph's Coat, is a member of the Euphorbiaceae family and is one of the most popular decorative plants due to its vibrant foliage colours and diverse leaf forms. Crotons are widely recognised for their therapeutic value in addition to their cosmetic value as an indoor plant. Crotons' leaf extracts are said to offer a variety of therapeutic effects, including purgative, sedative, antifungal, antiamoebic, and anticancer characteristics.^[3] Pharmacological studies on the effectiveness of croton plants revealed that the plant's extract is abortifacient, antiamoebic, antibacterial, anticancer, antifungal, and antioxidant.^[4]

MATERIALS AND METHODS

Collection of plant material: *Codiaeum variegatum* plant has been collected from Tirunelveli.

Identification: The plant material collected was identified and authenticated by V. Chelladurai.

Extraction of plant material

Extracts of the *Codiaeum variegatum* 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 2450 MHz 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. 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

Powder of *Codiaeum variegatum* has been subjected to the extraction process by conventional method as well as

Microwave assisted extraction and the % yield and color and consistency 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 *Codiaeum variegatum*.

S.No	Solvent	<i>Codiaeum variegatum</i>					
		Conventional Extraction			Microwave Assisted Extraction		
		Color And Consistency	% yiled W/W	Time (Hrs)	Color and Consistency	% Yiled W/W	Time (Hrs)
1.	Pet. ether	Green Sticky solid	0.5%	2 Hrs	Green Semi-solid	1%	10 Mins
2.	Chloroform	Dark green Semi-solid & oily	0.3%	3 Hrs	Dark green Semi-solid & Sticky	1.5%	15 Mins
3.	Ethyl acetate	Dark green Semi-solid & oily	0.5%	3.5 Hrs	Dark green Semi-solid & Oily	1%	15 Mins
4.	Ethanol	Dark brown Sticky & Oily	0.8%	2.5 Hrs	Dark brown Semi-solid & Sticky	2.5%	15 Mins
5.	Water	Brown Semi-solid & Sticky	2.1%	2 Hrs	Brown Sticky solid	3%	15 Min

Table 2: Preliminary phytochemical Screening of *Codiaeum variegatum* stem bark extract prepared by Conventional extraction and Microwave assisted extraction.

S.No.	Chemical Constituents	Conventional Extraction	Microwave Assisted Extraction
1.	Carbohydrates	+	+
2.	Glycosides	+	+
3.	Alkaloids	+	+
4.	Steroids	+	+
5.	Protein	-	-
6.	Amino acids	-	-
7.	Saponins	+	+
8.	Flavonoids	+	+
9.	Tannins	+	+
10.	Phenolics compound	+	+

DISCUSSION

The color and consistency obtained in both conventional and microwave assisted methods of extractions were same. The yield obtained from the extract was more in some of the cases in microwave assisted extraction than conventional extraction but time required for microwave assisted extraction was much less. The yield of the extract of *Codiaeum variegatum* was found to be Pet. Ether extract 0.5% W/W, Chloroform extract 0.3% W/W, Ethyl acetate extract 0.5% W/W, Ethanolic Extract 0.8% W/W and Aqueous extract 2.1% W/W from soxhlation and in MAE it was found to be Pet. Ether extract 1% W/W, Chloroform extract 1.5% W/W, Ethyl acetate extract 1% W/W, Ethanolic Extract 2.5% W/W and Aqueous extract 3% W/W.

CONCLUSION

Based on the results obtained from comparing the conventional and microwave assisted method, it can be concluded that microwave assisted method produced better results than conventional method. This shows that the extraction method using microwave (Assisted extraction) has higher percentage yield than conventional

method. Hence, it is necessary to carry out further study to evaluate completion of the process.

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