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MICROWAVE ASSISTED EXTRACTION OF CRUDE DRUGS

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ABSTRACT

In recent years, the use of microwave for extraction of constituents from plant material has shown tremendous research interest and potential. The traditional techniques of solvent extraction of plant materials require long extraction time and have low efficiency. Moreover, many natural products are thermally unstable and may degrade during thermal extraction. Microwave extraction can be the better alternative to conventional extraction. Microwave assisted extraction requires shorter time, less solvents, higher extraction rate and better products with lower loss. There is less risk of decomposition and oxidation of phytoconstituents. In the present study widely used plants were selected on the basis of their phytochemical profile and an attempt has been made to make use of microwave for extraction of four indigenous drugs viz Neem, Clove, Amla and Tea. The powders of these drugs were subjected to percolation using water

KEY WORDS

Microwave, tea, clove, extraction, conventional

INTRODUCTION

In the past few years, microwave heating has been found to be a convenient source of energy not only in kitchen, but also in chemical laboratories.[1] It is one of the simple, fast, clean, eco-friendly and efficient method. It is economic in saving energy, fuel and electricity. A very short response time and better yield of the product are main advantages of microwave heating. The history of plants being used for medicinal purpose is probably as old as the history of mankind. Extraction and characterization of several active phyto-compounds from these green factories have given birth to some high activity profile drugs. Moreover, when microwave radiation can be focused directly onto the sample, heating is more efficient and thus homogeneity and reproducibility improve greatly. Microwave ovens can be operated either under pressure or at atmospheric pressure. Microwave-assisted extraction (MAE) has received increasing attention as a potential alternative to conventional method for the extraction of secondary metabolites from plants. Extraction is one of the crucial points in analytical chain in the effort of achieving a complete recovery of target compounds. Recently, microwave energy is being used for extraction of phytoconstituents from plants. Microwave extraction follows the same principle as

maceration or percolation but the speed of breaking up of the plant cell, plant tissue much higher. This reduced processing time is an economic advantage and also there is less risk of decomposition and oxidation of the valuable plant constituents. Microwave assisted extraction requires shorter time, less solvents, higher extraction rate and better products with lower loss.[2,3] The reduced time is not just of economic advantage but also there is less risk of decomposition and oxidation of phytoconstituents. For heat sensitive materials microwave would be a better option.[4-6] The speed of breaking up of plant cells is much higher. The penetration of microwave into the plant tissues depends on the dielectric properties of the plant. The energy required for dense materials is higher than that for leaves. [7] The energy requirement can be controlled well than with conventional extraction. Extraction of different herbal like Neem, Amla, Clove and Tea has been successfully performed using Microwave technique.

MATERIALS AND METHODS

Crude drugs: Neem, Amla, Clove, Tea
Microwave: Cata scientific microwave synthesis system

EXPRIMENTAL

The experimental procedure was followed by making modifications in the method mentioned in our previous paper.[4] Each crude drug (2 gm) was taken in round bottom flask separately. Water (50 ml) was added and mixed. MAE was done at three different intensities viz 140 W, 210 W and 245 W. The extraction was carried out for 15 minutes by interrupting the process to avoid bumping. For conventional method, 2 gms of each drug was boiled with 50 ml of water for 15 minutes. After the extraction the extracts obtained by both the methods were filtered and concentrated. % yield was calculated.

RESULTS AND DISCUSSION

The color and consistency obtained in both the methods of extractions were same. The yield obtained was more in microwave assisted extraction than conventional extraction. MAE was carried out at three different intensities viz 140 W, 210 W and 245 W. At 140W, only Tea and Amla showed increase in yield by MAE but at 210 W and 245 W, all the crude drugs showed increased yield. More promising results were obtained at 245 W. The % increase at 245 W is from about 18- 55% as compared to conventional method. The increase at 210 W was found to be 9-18%.

Table 1

			Conventional method	Microwave assisted extraction		
				140 W	210 W	245W
No	Crude drug	Colour and consistency	% yield (w/w)	% yield (w/w)	% yield (w/w)	% yield (w/w)
1	Tea powder	Brown semisolid	17	21	18	23.5
2	Clove powder	Dark brown semisolid	22.5	18.5	24.5	26
3	Amla powder	Yellowish semisolid	23	26	27.5	28.5
4	Neem powder	Faint greenish	17.5	15.3	22.5	27

CONCLUSION

In the present study comparison has been made in conventional and microwave assisted extraction method. It has been observed that % yield by microwave assisted extraction method was improved as compared to conventional method. In conclusion MAE can be used successfully for routine extraction in laboratory.

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