

# Ultrasonication: A Unique Extraction Method of Crude Drugs

Dongre D. Sushma, Jadhav A. Jaimala, Bhagat P. Priya



### Abstract:

Most of the Ayurvedic medicines are quite costly as compare to modern medicine. This is due to scarcity of raw drugs and high processing cost, which leads to difficulty for pharmaceutical company to control the cost of finish product. Conventional decoction techniques are quite time and fuel consuming hence Ayurved pharmaceutical industries are looking for cost effective techniques that do not compromise with the quality of finish product. Hence there is need to adapt new techniques which are easy, requires less raw drugs and can give quality assurance in terms of active principles. Ultrasonic extraction technique is one of the modern technologies, which has benefits such as fast extraction of active constituents, low costly, and environment friendly and selective extraction of valuable compounds. Due to its acoustic cavitations phenomenon it saves thermo sensitive constituents of crude drugs. Its application may be beneficial for Ayurved pharmacy industries, which are struggling for cost factor of finish products.

**Keywords** Kwatha, Decoction, Ultrasonic extraction, Thermo Sensitive

### Introduction

Standardization of Ayurvedic formulations is an important step for the establishment of a consistent biological activity, a consistent chemical profile, or simply a quality assurance program for production and manufacturing of herbal drugs [1]. Due to changing environmental climate, deforestation and commercialization factor availability of authentic raw drug is being more and more quite difficult. New technologies can be adapted to control Pharmaceutical procedures.

Decoction (*Kwatha*) is the most frequently used Ayurvedic medicinal dosage form but has short shelf life [2]. Various preservatives are in use to enhance shelf life of decoctions. Method of decoction preparation requires coarse powder of crude drug, drinkable water and heating for specific duration with specific intensity of heat. There is difficulty in maintaining uniqueness of previously mentioned factors while repeated, large scale manufacturing of various decoctions. Hence, there is need of proper pharmaceutical control to achieve standard finish product. The conventional methods of decoctions are promising, but they are impractical for industry due to more requirements of time and fuel. It is the need of time to search out for new procedures of decoction, which are easy, economical as well as time saving. Extraction is a term use in modern pharmacy in which means separation of medically active constituents of plants or animal material by using suitable solvent with standard extraction procedures [3].

**Joinsysmed ID:** JID15063CT

**Submitted Date:** 02-11-2014

**Approved Date:** 29-12-2015

**Corresponding Author:**

Dongre D. Sushma, Associate professor, RS&BK dept., SST Ayurved College. Sangamner, dist. Ahmednagar, Maharashtra.

**Email:**

vd.sushmadongre@rediffmail.com

**Co-author (s):**

Jadhav A. Jaimala, Associate professor, DG dept., Pusad Ayurved College. Yavatmal dist, Maharashtra

Bhagat P. Priya, Asso. professor, Sanskrit Samhita dept, Shree Ayurved College, Nagpur Dist Nagpur Maharashtra,

**Conflict of Interest:** NIL

**Source of Support:** NA

**Ethical Clearance:** NA

**Registered to:** NA

**Acknowledgment:** NIL

**How to cite the article:**

Dongre D. Sushma. et. al.

*Ultrasonication: A Unique*

*Extraction Method of Crude Drugs.*

*Joinsysmed 2015, vol 3(4), pp 203-205*

Decoction is quite different from extraction. In preparative process of decoction, one part raw drug with four times or eight times or sixteen times of water added and boiled until specified proportion of water remains which depends on the consistency of raw drugs. After filtration, remaining quantity of water is decoction. Most of the time it is difficult to decide the proportion of water to be added due to poly herbal content of decoction as it may contain some thermo sensitive and volatile components[4].

The content of active compounds in the crude extract depends on the quantity of water used, method of extraction, extraction time and temperature. Therefore, it is very important to select proper extraction techniques to save thermo labile constituent of crude drugs. In modern conventional methods of extraction by using water crude extract is obtain like *Kwath* by proper temperature regulation.

Now a day's modern Ayurved pharmacist is using crude extract for preparing different proprietary medicine instead of conventional *Kwath*. Conventional methods of extraction such as soxhlet, reflux in use for many decades are very time consuming and require relatively large quantities of solvent. The large amount of solvent used not only increases operating costs but also causes additional environmental problems [5]. For large scale, industry there is demand for new extraction techniques to reduce the processing time and cost of crude drugs. Various new extraction techniques are under trial now a day's one of which is ultrasonic-assisted extraction (UAE)[6].

#### Ultrasonic Assisted Extraction (UAE)

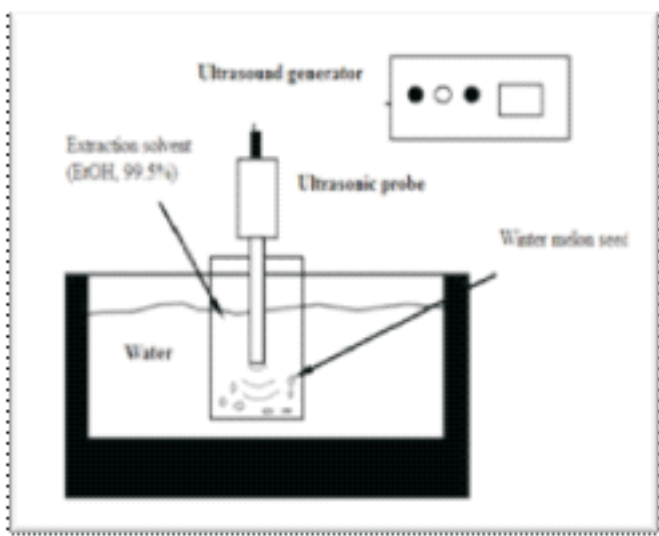


Fig. 1: Experimental set-up for UAE [17]

technique is one such technique, which has been practice since last few years in modern pharmacy. UAE is used on small-scale basis for extraction but looking at its advantages like fast extraction and environmental friendly, it may prove beneficial to Ayurvedic pharmaceutical industries.

#### What is ultrasonic assisted technique (UAE)?

It is simple, convenient and cost effective technique of extraction by using an instrument known as ultrasonicator. sonication is an act of applying sound energy (20kHz to 2000 kHz) to agitate particles in the sample (mixture of solute and solvent)[7]. It increases the permeability of cells by producing cavitations (Acoustic cavitations phenomenon)[8].

Acoustic Cavitations Phenomenon permits better penetration of solvent into the sample, increasing the release of solutes from the matrix to the solvent, temperature could enhance the liberation of solute from cell matrix to through degradation of cell wall. Its main advantage is that it works in ambient temperature thus avoiding thermal over exposure[9].

#### Observations:

##### Fast extraction

UAE has different advantages such as low operating temperature, thus no thermal degradation of most of the compounds and shorter extraction duration leading to saving energy[10]. It reduces the extraction temperature and amount of solvent and shorten the extraction time, which is especially useful for the extraction of thermo sensitive and unstable compounds[11].

##### Extraction of valuable compounds

Ultrasound waves are known to extract active compounds such as saponins, steroids and terpenoids three times faster than conventional extraction techniques[12]. Essential oil and aromatic compounds are volatile when exposed to high temperature. With UAE aromatic and flavored extract can also be obtained[13].

It is also effective and practical method for extraction of phenolic antioxidant compounds[14].

##### Cost effective technique

Conventional extraction technique is time and fuel consuming hence quite expensive for large scale industries. The comparison between

conventional and ultrasonic-assisted extraction is made since conventional method is commonly used in research while ultrasound assisted extraction is cost effective to be used commercially[15].

### Environmental friendly technique

Now a day's attention has been given to the development of Green Chemistry to save environment. The UAE is expeditious, inexpensive, efficient and an environmental protection alternative to conventional extraction techniques, which is also a well-established method in the processing of plant material, and in the extraction of analytes from different parts of plants[16].

### Conclusion:

Day by day reduction in supply of raw drugs in Indian market and increase use of substitute drugs, it is difficult for Ayurvedic pharmacy industries to control quality of finish product. Hence need such extraction techniques which require less raw drugs with maximum yield. Although decoction is not exactly the extraction but extract obtained by various extraction technique can be utilized similar to decoction due various advantages such as it is easy to prepare, has more shelf life, eco friendly and more accuracy for standardization. Application of UAE on large scale production may be useful for easy and cost effective extraction as the technique needs less amount of solvent, higher recovery of targeted compound with less operating temperature and environmental friendly also.

### References

- [1] Bose A, Krishanu D, Saroch V. A review on latest developments in the standardization of Ayurvedic drugs. *Intern J Pharmaceu Rease Biolo Sci*, 2012; 1(3):96-119
- [2] Sashtri L, Yogratnakar, edition 2010, Chaukhambha Bharati Academy, Varanasi, p. 120
- [3] Handa SS, Khanuja SP, Longo G, Devdutt R. Extraction technologies for medicinal and aromatic plants, International centre for science and high technology 2008. chapter1, p. 22
- [4] Sharangadhar, Sharandhar Samhita, Tripathi B (editor), Madhyam Khanda, edition 2001, Chaukhambha Surbharati prakashan, Varanasi, chapter 9/3, p. 218
- [5] Tatke P, Megha R, Comparison of Conventional and Novel Extraction Techniques for the Extraction of Scopoletin from *Convolvulus Pluricaulis*. *Indian J Pharmaceutic Edu Rese* 2014;48(1):27-31
- [6] Devguni M, Nanda A, Ansari SH, Comparison of

conventional and non conventional methods of extraction of heartwood of *Pterocarpus marsupium* Roxb *Acta. Poloniae Pharmace Drug Res*, 2012;69(3):475

[7] Handa SS, Khanuja SP, Longo G, Devdutt R. Extraction technologies for medicinal and aromatic plants, International centre for science and high technology 2008. chapter1, p. 25

[8] Ultrasound assisted Extraction Definition, Glossary, Details Oilgae Digest

[9] Patil AG, Koli SP, Patil DA, Phatak AV. Evaluation of extraction techniques with various solvents to determine extraction efficiency of selected medicinal plants. *IJPSR*, 2012; 3(8): 2607-2612

[10] Bimakar M, Rahman RA, Taip S, Adzahan NM, Islam Sarker Z, Ganjloo A. Ultrasound-assisted extraction of valuable compounds from winter melon (*Benincasa hispida*) seeds in *Interna Food Res J* 2013;20(1): 331-338

[11] Wang J, Zhao YM, Tian YT, Yan CL, Guo CY. Ultrasound assisted extraction of total phenolic compounds from *Inula Helenium*. *Scientific World J* 2013;24(4), P5

[12] Alupului A, Calinescu I, Lavric V. Ultrasonic vs. microwave extraction intensification of active principles from medicinal plants, University Politehnica of Bucharest, Chemical Engineering Department, Bucharest, Romania, RO-011061, Polizu 1-7,

[13] Zaikandar B, Mohd Dikul. Extraction of essential oil from *Murraya koenigii* leaves using Ultrasonic Assisted Solvent Extraction method. A report submitted in April 2009 in University of Malashiya, Pahang.

[14] Lee LS, Lee N, Kim YH, Lee CH, Hong SP, Jeon YW, Kim YE. Optimization of Ultrasonic Extraction of Phenolic Antioxidants from Green Tea Using Response Surface Methodology. *Molecules* 2013, 18, 13530-13545.

[15] Ramli NS, Ismail P, Rahmat A. Influence of Conventional and Ultrasonic-Assisted Extraction on Phenolic Contents, Betacyanin Contents and Antioxidant Capacity of Red Dragon Fruit (*Hylocereus polyrhizus*). *Scientific World J*, 2014;24(4): 2

[16] Ge Zu, Zhang R, Yang L, Ma C, Zu Y, Wenjie, Zhao C. Ultrasound-Assisted Extraction of Carnosic Acid and Rosmarinic Acid Using Ionic Liquid Solution from *Rosmarinus officinalis*. *Int J Mol Sci*. 2012; 13(9):1102711043.