

RP-HPLC METHOD FOR SIMULTANEOUS QUANTIFICATION OF BERBERINE CHLORIDE AND GALANGIN IN *TINOSPORA CORDIFOLIA* M. AND *ALPINIA GALANGA* L. AND THEIR FORMULATIONS

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ABSTRACT

Berberine chloride is a quaternary ammonium compound obtained from *Tinospora cordifolia* M. and galangin is a member of the flavonol class of flavonoids from *Alpinia galanga* L. They are reported to have various pharmacological activities. The separation was carried out by using Hypersil BDS 100 RP C18 (5 μ m, 250 $\times$ 4.6 mm i.d.) column using an isocratic mobile phase comprising acetonitrile: 10 mM phosphate buffer (45:55 V/V) pH 4.5 adjusted with orthophosphoric acid. The flow rate was maintained at 1.50 mL min⁻¹. The detection was carried out at 365 nm. The method was validated according to ICH guidelines. The retention times of berberine chloride and galangin were found to be 3.41 and 14.13 min, respectively. The developed RP-HPLC method was found to be simple, accurate, precise, sensitive and specific for the simultaneous quantification of berberine chloride and galangin in *T. cordifolia* M. and *A. galanga* L., respectively, and their herbal formulations.

Keywords: Berberine chloride, Galangin, *Tinospora cordifolia*, *Alpinia galanga*

INTRODUCTION

T. cordifolia M. is called a Gaduchi in Sanskrit and Amrita or Giloya in Hindi¹. The stem of *T. cordifolia* is an important herb in folk medicine and ayurvedic system of medicine². It has been used for many years as antidiabetic, anti-inflammatory, antiarthritic, antioxidant, antistress, hepatoprotective and antineoplastic. It contains various chemical constituents of different classes, such as alkaloids, diterpenoids lactone, glycoside and steroids. Berberine chloride (BER-H) is an isoquinoline alkaloid, which is a common constituent of gaduchi and many medicinal herbs and plants³. Berberine chloride is a quaternary ammonium salt and is categorized as an isoquinoline alkaloid. Berberine chloride is widely used as an antibacterial, antifungal and anti-inflammatory drug and has been used as a gastrointestinal remedy for thousands of years in China⁴.

The rhizome of *A. galanga* L., commonly called greater galanga, is distributed in various parts of India and throughout Southeast Asia. It is commonly known as Rasna in Sanskrit, Kulanjan in Hindi and Galanga

in English⁵. It exhibits various activities like anti-inflammatory, hypoglycaemic, antiallergic, antimicrobial and gastro protective. It contains various chemical constituents which belongs to different classes, such as flavanoids and essential oils⁶⁻⁸. Galangin (GAL), a member of the flavonol class of flavanoids, is the active pharmacological ingredient from *A. galanga* and is reported to have a variety of anti-inflammatory properties *in vitro* via negative regulation of NF- κ B⁹.

The quantification of various constituents is a very important part of standardization. It is needed to produce more and more standardized products for good health and overall well being of people globally as well as to promote herbal heritage for their benefit. Most of these herbal drugs are not included in the Pharmacopoeias. Hence, there is ample scope for the development of proper analytical methods. To date, some analytical methods have been reported for analysis of BER-H and GAL in various plants and formulations by HPTLC¹⁰⁻¹², HPLC¹³⁻¹⁷, UV visible spectroscopy¹⁸⁻¹⁹, spectrofluorimetry²⁰⁻²¹ and LC-MS²²⁻²⁵. However, no method is available for the simultaneous quantification of BER-H and GAL in *T. cordifolia* and *A. galanga*, respectively, and their polyherbal formulations. Therefore, need for analytical method for the quantification of these active constituents

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