

Abstract

Introduction: Maceration is one of the common methods for extraction. This method is affected by many factors such as temperature, type of solvent, and extraction time. *Echium amoenum* is one of the valuable medicinal plants in Iran, which has been used as a decoction since ancient times. In this thesis, by using the response surface method, the extraction conditions of *E. amoenum* have been optimized to get the most effective ingredients, such as rosmarinic acid.

Method: After drying, *E. amoenum* flowers were powdered and extracted by maceration method in different conditions, and finally 17 extracts were obtained. Effective substances such as total phenol and flavonoid, caffeic acid and rosmarinic acid in the dried extracts were investigated and analyzed by Folin-Ciocalto method, colorimetry and HPLC, respectively. Finally, the optimal conditions for extracting from *E. amoenum* were obtained using the response surface method.

Results: The results showed that for total phenol and flavonoid, the optimal conditions are 50:50 ratio of water to methanol, extraction temperature is 35 35°C and extraction time is 24 hours. For rosmarinic acid, the optimal conditions are at 35°C, extraction time is 6 hours and solvent ratio is 50:50 water to methanol. For caffeic acid, the optimal conditions were obtained at a temperature of 50°C, the extraction time of 24 hours, and a solvent ratio of 25:75 water to methanol.

Conclusion: The extraction conditions of total phenol and rosmarinic acid were optimized by maceration method using response surface methodology. In these conditions, the amount of total phenol in optimal conditions was based on 66.28 mg gallic acid/g extract and the amount of rosmarinic acid was 120 mg in one gram of dry extract.

Key words: *Echium amoenum*, Rosmarinic acid, Maceration, Response surface methodology