

University of Macau

Abstract

Quantitative determination of four flavonoids in *Epimedium* by capillary electrophoresis (CE)

by Liu Jingjing

Thesis Supervisor: Dr. Shaoping LI, Prof YiTao WANG

Chinese Medical Science

Modern analytical techniques are playing important roles in quality control of traditional Chinese medicine (TCM). A great progress on the research of TCM has been achieved by using modern analytical techniques including ultraviolet technology (UV), thin layer chromatography (TLC), high performance liquid chromatography (HPLC), gas chromatography-mass spectra (GC-MS), liquid chromatography-mass spectra (LC-MS), capillary electrophoresis (CE) and capillary electrophoresis-mass spectra (CE-MS). *Epimedium*, Yin-Yang-Huo, is a kind of traditional Chinese herbal medicine, which can nourish kidney, cure rheumatism and slower senescence.

In this thesis, the first chapter is a review, which includes the research on *Epimedium* in recent years, especially the analytical methods used to determine the flavonoids in *Epimedium*, as well as the advance of CE and CE-MS.

In the section of experiment, chemical compounds were isolated from *Epimedium* first. However, only little icariin and a red needle crystal, a non-flavonoid, were obtained. Then, the study was focused on developing a method for quantitative determining four flavonoids, including icariin, epimedin A, epimedin B and epimedin C, in *Epimedium* by using CE. Central composite design (CCD) and response surface methodology (RSM) were applied to optimize the conditions. The results showed that the resolution of all four flavonoids was more than 1.5 and well separated in 20 minutes at optimized condition, which suggested the developed method was simple and accurate.

In addition, CE-MS was developed to analyze the four flavonoids in *Epimedium*. However, it was failed because of the limit of running buffer.

At last, the parameters of pressurized solvent extraction (PSE) for extraction of flavonoids in *Epimedium* were optimized, which was also compared with ultrasonic

extraction. The results indicated that the extraction efficiency had no significant difference between them, except the reproducibility of PSE was much better.

Keywords: capillary electrophoresis, *Epimedium*, flavonoid, pressurized solvent extraction (PSE)