Abstract

Cordyceps sinensis (Berk.) Sacc., one of the well-known and valuable traditional Chinese medicines (TCM), is a composite consisting of the stromata of the fungus and the dead caterpillar. It has been traditionally used in the treatment of chronic bronchitis, especially in elderly patients, and asthma, chronic obstructive pulmonary disease (COPD), tuberculosis, cor pulmonale, and other diseases of the respiratory system in China. However, the yield of the wild *C. sinensis* is decreasing because of the deterioration of ecosystem for *Cordyceps* due to over exploration. Therefore, isolation of mycelia strain from *Cordyceps* is a trend of many scientists to achieve a large scale production of *Cordyceps*. Besides cultivation of *Cordyceps*, much effort has also been focus on the discovery of alternative species, and *Cordyceps militaris* is the most popular one. Nowadays, several products of cultured mycelia of *C. sinensis*, *C. militaris* and other species of *Cordyceps* were used and sold in the market. Therefore, it is very important to evaluate the difference among different kinds of *Cordyceps* (natural *Cordyceps spp.*, cultured *Cordyceps* mycelia and *Cordyceps militaris*), which is beneficial to the quality control.

Sample preparation is the first and key step in TCM analysis. Choosing a proper sample preparation method is very important for the quality control. Based on previous study, a significant change of the contents of nucleosides was found in natural *C. sinensis* with different sample preparation methods, but not in commercial *Cordyceps* mycelium. However the reason of this phenomenon need to be further studied. On the other hand, *Cordyceps* mainly contains nucleosides, steroids, carbohydrates, amino acids, fatty acids, protein and polysaccharides, etc. However, the marker for quality control of *Cordyceps sinensis* recorded in China Pharmacopeia (2005) was adenosine alone, which can not effectively control the quality of *Cordyceps*. In order to ensure the safety and efficacy of *C. sinensis*, the simultaneous quantification of multiple components in *Cordyceps* is required.

The dissertation consists of three chapters. **Chapter 1** reviewed the chemical components in *C. sinensis* and the quality control methods. **Chapter 2** showed the preliminary research on the relationship of different sample preparation and nucleosides quantification in natural and cultured *Cordyceps*. Ambient temperature water extraction was chosen as the extraction method to compare the content of

nucleosides in natural and cultured *Cordyceps* using different sample pre-treatment. It is suggested that some enzymes, which were sensitive to high temperature, might be contained in natural and cultured *Cordyceps*. **Chapter 3** focused on simultaneously qualitative and quantitative determination of nucleosides (uracil, cordycepin, adenine, adenosine, uridine, hypoxanthine, inosine and guanosine), carbohydrates (mannitol, glucose and trehalose) and atypic amino acid , myriocin, in natural *Cordyceps* (including *Cordyceps sinensis*, *Cordyceps liangshanensis* and *Cordyceps gunnii*) and cultured *Cordyceps* (including different kinds of *Cordyceps sinensis* mycelia, the fruiting body of *Cordyceps militaris* and the mycelium of *Cordyceps militaris*) using PLE extraction and high performance liquid chromatography- evaporative light scattering detection. SPSS hierarchical clustering analysis based on the contents of 12 investigated compounds showed that 29 tested samples can be grouped into four main clusters, which is in accordance with the clustering result derived from the contents of three carbohydrates, i. e. mannitol, glucose and trehalose. It is suggested that the characteristics of carbohydrates can be used as markers for quality control of *Cordyceps*.

Key words: *Cordyceps*, nucleosides, carbohydrates, myriocin, HPLC-DAD-ELSD, sample preparation