Note

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Phytochemical profiling of rosemary extract products distributed as food additives in the Japanese market

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Abstract

Rosemary extract is one of the natural food additives on the List of Existing Food Additives used in Japan. There are two types of rosemary extract products on the Japanese market: water-soluble type and water-insoluble type. Since the two types are thought to have different chemical compositions, investigation of their compositions is essential in order to ensure the safety and efficacy of the products. In this study, LC/MS and GC/MS analyses were performed on products distributed as rosemary extract on the Japanese market. The results showed that carnosol and carnosic acid, which are thought to be main components of rosemary extract, were only present in the water-insoluble-type products. Many kinds of volatile compounds were also detected in the water-insoluble-type products, and the ratios of these compounds varied even among the products having similar amounts of carnosol and its relatives. In the water-soluble-type products, rosmarinic acid and flavonoids were observed instead of carnosol, carnosic acid and volatile compounds.

Keywords : rosemary extract, existing food additive, *Rosmarinus officinalis* L.

I Introduction

Rosemary extract is a natural antioxidant used as a food additive, and was listed on the List of Existing Food Additives[1] published by the Japanese Ministry of Health and Welfare in 1996. In the Notification Related to the List of Existing Food Additives[2], the following explanation is given for rosemary extract: "Rosemary extract is obtained from the leaves and flowers of rosemary (*Rosmarinus officinalis* LINNE (Lamiaceae)) using CO_2, hydrous ethanol, ethanol, hexane, hydrous methanol or methanol, followed by solvent evaporation and drying. The main components of rosemary extract are phenolic diterpenes such as carnosic acid, carnosol and rosemanol, which are all active constituents". According to the commentary accompanying the List of Existing Food Additives[3], the market products labeled as rosemary extract can be classified into two types, water-soluble type and water-insoluble type. The water solubility of these products is thought to vary due to the solvents and temperatures used for the extraction from rosemary. Therefore, the Japan Food Additives Association has adopted its own set of standards for rosemary extract[4], with separate levels set for each of the characteristic compounds differentiating the water-soluble and water-insoluble types. Although rosemary extract is listed as one item in the List of Existing Food Additives, it seems likely that there are many different compositions of rosemary extract products distributed in the Japanese market.

The 82nd meeting of the Joint FAO/WHO Expert Committee on Food Additives (JECFA) proposed a quantitative test for five volatile compounds—namely, (-)-borneol, (-)-bornyl acetate, (-)-camphor, eucalyptol, and verbenone—as well as for antioxidant compounds (i.e., carnosol and carnosic acid) in order to standardize rosemary extract[*1]. Since rosemary originates in the Mediterranean, there are many kinds of rosemary extract products around the world, and some of them are imported and distributed in the Japanese market. Volatile compounds proposed as characteristic compounds in the JECFA draft are thought to also be important for Japanese market products. In fact, the commentary accompanying the List of Existing Food Additives[3] describes that rosemary

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