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Abstract

A nanoparticlulate delivery system was prepared for developing a food grade carrier for the major bioactive constituent in green tea; (─)-epigallocatechingallate (EGCG), in order to protect it against degradation during storage and digestion under simulated gastrointestinal pH conditions. EGCG-loaded solid lipid nanoparticles (EGCG-SLNs) were produced by the hot homogenization method. The lipid matrix used in the production consisted of pure cocoa butter. A combination of sodium stearoyl-2-lactylate (SSL) and mono- and diglycerides (MDG) was applied as a surfactant blend. The nanoparticles loaded with different concentrations of EGCG had an average particle size in the range of 108-122 nm. A maximal encapsulation efficiency of 68.5% was obtained. The produced food grade SLNs successfully protected the encapsulated EGCG along the storage period as well as under the adverse conditions at neutral pH values. The developed system offers good potential for enriching food products with EGCG.

1 Introduction

Polyphenols are naturally occurring compounds, which are found abundantly in food plants (Pandey and Rizvi, 2009; Quinones et al., 2012). Due to their potential health benefits in human (Cencic and Chingwaru, 2010; Vauzour et al., 2010), it is of interest to look for novel strategies to introduce polyphenols in functional foods and pharmaceutical products (Bilia et al., 2014; Granja et al., 2016; Grumezescu, 2016b; Manach et al., 2004). (-)-Epigallocatechin-3-gallate (EGCG) is the most abundant and biologically active polyphenol found in green tea. The total amount of catechins in one brewed cup of green tea consists of 50–80% of EGCG, which makes approximately 200–300 mg (Klinski, 2013; Singh et al., 2011). EGCG is known as an antioxidant compound, which exhibits health-promoting and therapeutic properties, and plays an effective role in the prevention of several chronic diseases, especially cancers (Granja et al., 2016; Klinski, 2013). Owing to its strong anti-inflammatory and antioxidant activity, as well as the ability to reduce the level of cholesterol and normalize glucose metabolism and T-cell immunity, EGCG offers a promising therapeutic potential for the treatment of health problems, such as arthritis, neurodegenerative, cardiovascular diseases, obesity, diabetes and autoimmune diseases (Grumezescu, 2016c; Jantan et al., 2015; Upadhyay and Dixit, 2015).