



## **TAILOR-MADE GASTRORETENTIVE CARRIER WITH ENCAPSULATED GENTIAN ROOT EXTRACT**

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Gentian root (*Gentiana lutea* L., Gentianaceae) is used as traditional herbal medicinal product for temporary loss of appetite and mild gastrointestinal complaints. Systemic and local gastrointestinal (GI) effects of gentian root extracts are mainly associated with the presence of secoiridoid compounds, xanthenes and iridoids. Gentiopicroside (GP), the dominant bioactive compound in gentian root extract, has low bioavailability, short elimination half-life and inadequate stability during storage and digestion. Therefore, the aim was to optimize extraction and to develop gastroretentive carriers with encapsulated gentian root extract.

In the first phase of the research, it was shown that the high content of GP, isogentisine and phenolic compounds from gentian roots was extracted with water-ethanol solution (49 %, v/v) at a temperature of 65 °C when the drug/solvent ratio was 1: 40, and extraction time was 129 minutes. In the second phase of the research, a suitable gastroretentive carrier (solid lipid microparticles) with encapsulated gentian root extract was obtained by an innovative method involving a lyophilization of a double (water/oil/water) emulsion. The formulated gastroretentive carriers were characterized by high yield (> 92 %) and encapsulation efficiency (> 95 %) of GP, as well as suitable mechanical properties. The high gentiopicroside content (during 18 months) and antioxidant activity (during one year) were maintained, indicating that the stability of the selected carrier was high. The tablets with the optimal gastroretentive carrier showed mucoadhesive properties, and thus a gastroretention of the tablets was based on a dual mechanism. The results of the *in vitro* release study showed that the dissolution of GP from the selected tablet formulation was biphasic (29.04 % in 45 minutes; 67.95 % in 6 hours).

The results indicate that the extraction of bioactive compounds from gentian root was optimized. In addition, a tailor-made gastroretentive carrier with encapsulated gentian root extract was developed.

**Key Words:** gastroretentive carrier, double emulsion, solid lipid microparticles, quality by design, response surface methodology, artificial neural networks