F.17. *IN VITRO* ANTIOXIDANT ACTIVITY OF LIPOSOMAL GRAPE POMACE EXTRACTS

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Abstract. This study investigates the antioxidant activity of liposomal formulations containing hydrophilic extracts obtained from grape pomace under simulated gastrointestinal conditions. Grape pomace represents a valuable by-product of the wine industry, rich in polyphenolic compounds with well-documented antioxidant properties. However, the stability and bioaccessibility of these compounds may be affected during digestion, necessitating the development of effective delivery systems such as liposomal encapsulation.

Liposomal formulations were prepared using polyphenol-rich grape pomace extracts and evaluated in comparison with their non-encapsulated counterparts. The antioxidant activity was assessed using the DPPH radical scavenging method during simulated gastric digestion (pH 1.8 ± 0.1) and intestinal digestion (pH 8.2 ± 0.1) over 2 h.

The results demonstrated that, during the gastric phase, all samples exhibited a progressive increase in antioxidant activity. Liposomal formulations showed a higher initial antioxidant activity (90.6 ± 1.8% DPPH inhibition) compared to non-encapsulated extracts (88.11 ± 1.5%), increasing after 2 h to (91.2 ± 2.1%) and (90.48 ± 1.9%), respectively. These findings indicate that liposomal encapsulation enhances the stability of polyphenolic compounds in acidic conditions and protects them against degradation.

In contrast, during the intestinal phase, a decrease in antioxidant activity was observed for all samples. The antioxidant activity of liposomal extracts decreased from (27.3 ± 0.8%) to (21.1 ± 0.8% DPPH inhibition) after 2 h, while non-encapsulated extracts showed higher retention, decreasing from (33.1 ± 0.8%) to (29.00 ± 0.7%). This behavior suggests that liposomal structures may undergo destabilization in alkaline conditions, leading to the release and partial degradation of encapsulated compounds.

This study demonstrates that liposomal encapsulation improves the stability and antioxidant activity of grape pomace extracts under gastric conditions, while further optimization is required to enhance their performance during intestinal digestion. These findings highlight the potential of liposomal systems for the valorization of agro-industrial by-products and the development of functional food ingredients with improved bioactive compound delivery.

Keywords: Grape pomace; liposomes; antioxidants; digestion; polyphenols.

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