Development of Self-MicroEmulsifying Drug Delivery Systems containing *trans*-resveratrol

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BACKGROUND

Trans-resveratrol (*t*-RSV) is a polyphenol found in red grapes, red wine, blueberries and other plant-based sources. This stilbenoid exhibits antioxydant, anti-inflammatory, anticancer and cardioprotective properties. However, its therapeutic potential is limited by its low aqueous solubility (0,0688 mg/mL), resulting in poor oral bioavalaibility.(1),(2)

To overcome these challenges, we develop Self-MicroEmulsifying Drug Delivery Systems (SMEDDS).

METHODS(3),(4),(5)

Quantification of t-RSV

t-RSV concentration was measured using a spectrophotometer at 306nm. The calibration curve was established over the range of 0.0015 to 0.0075 mg/mL ($R^2 > 0.99$).

Excipient Screening

Solubility of *t*-RSV in various lipid excipients from Gattefossé was evaluated. Excess *t*-RSV was added to each excipient, incubated at room temperature for 12 hours and centrifuged. The solubilized fraction was quantified by spectrophotometry.

Then, the miscibility at different ratios of the screened excipitients was assessed.

Dispersibility Test

Pseudoternary phase diagrams were constructed without active ingredient to identify excipient mixtures that form a microemulsion in the highest possible amount of water.

Selection of Formulations

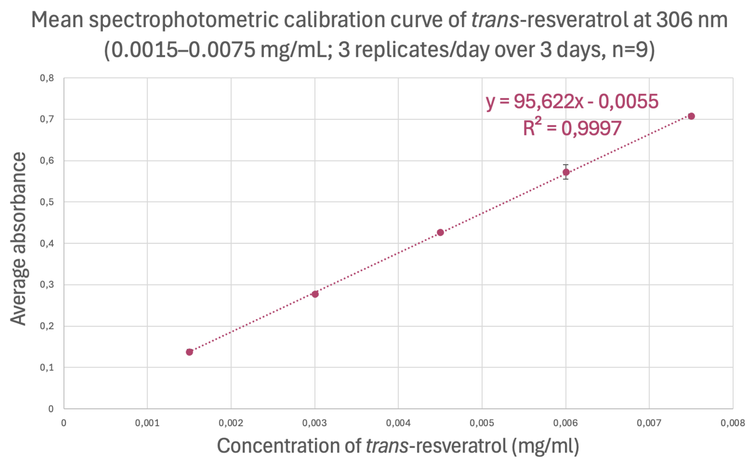
Based on the results of the dispersibility tests, the most promising formulations were selected. Solubility of *t*-RSV in the chosen formulations was then assessed.

Dispersion of Formulations

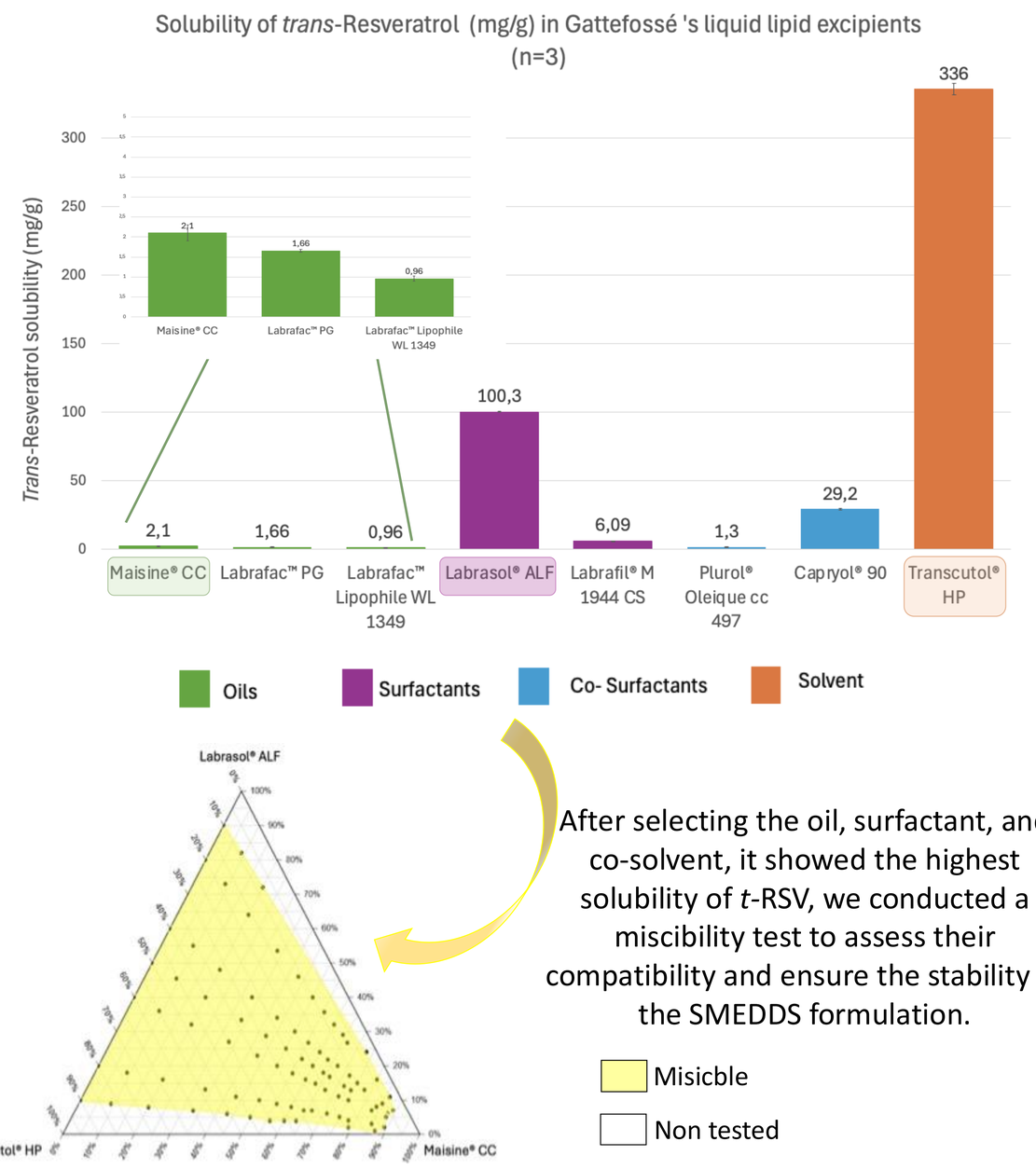
Formulations containing the highest amount of *t*-RSV were dispersed in water and characterized for droplet size using Dynamic Light Scattering (DLS).

RESULTS & DISCUSSION

Quantification of *t*-RSV



Excipients Screening

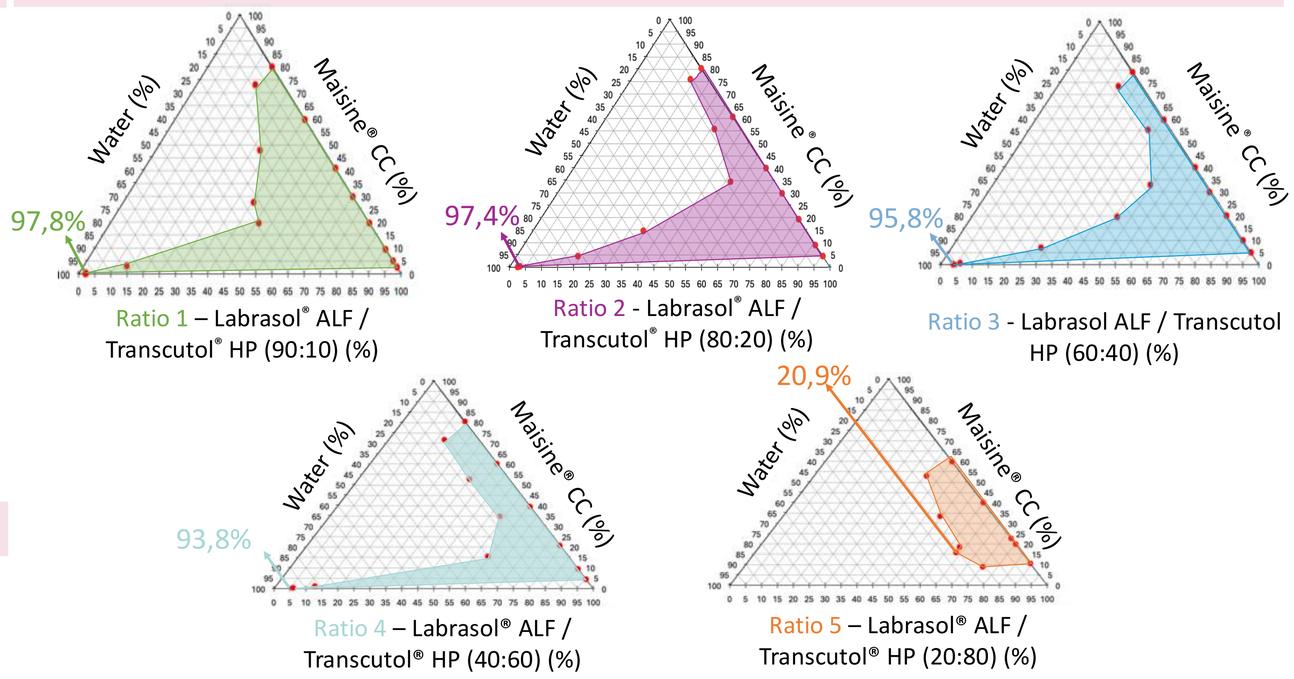


After selecting the oil, surfactant, and co-solvent, it showed the highest solubility of *t*-RSV, we conducted a miscibility test to assess their compatibility and ensure the stability of the SMEDDS formulation.

Misicble

Non tested

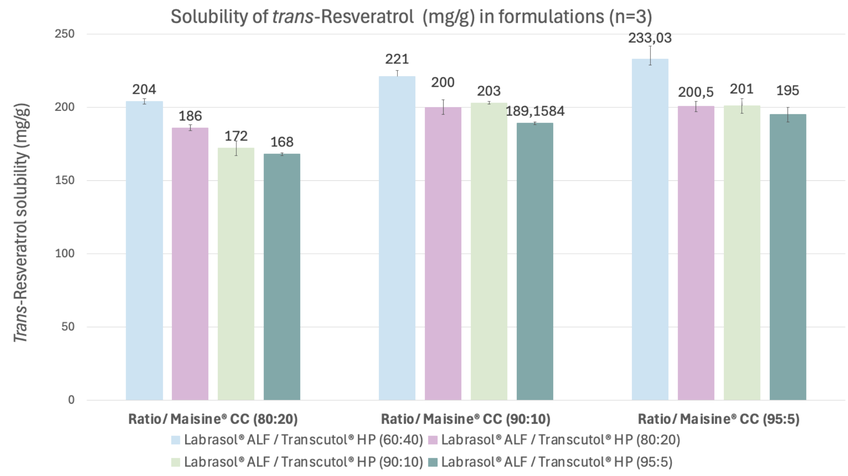
Dispersibility test



Increasing the proportion of Transcutol® HP led to a decrease in the dispersion efficiency of the SMEDDS, and a comparable trend was observed with higher levels of the oil excipient, Maisine® CC.

However, our objective is to develop SMEDDS that can form a microemulsion with the highest possible amount of water.

Therefore, we decided to study the solubility of *t*-RSV at different ratios (1,2,3) and varying oil (Maisine® CC) proportions in order to formulate a SMEDDS which can include the largest amount of *t*-RSV and which can be dispersed in the largest amount of water.



Using the calibration curve equation previously established, the solubility of *t*-RSV in different formulations was determined. Formulations containing at least 10% Transcutol® HP and a maximum of 10% Maisine® CC were selected for dispersibility tests with the active ingredient in this formulation.

Conclusion

The optimized SMEDDS formulations demonstrated a promising ability to solubilize *t*-RSV. Formulations containing at least 10% Transcutol® HP and a maximum of 10% Maisine® CC were selected for future dispersibility tests with the active ingredient. These upcoming tests will help confirm the potential of these formulations to achieve efficient dispersion in water.

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