Nanoencapsulation of bioactive compounds as novel strategy to improve their bioactivity and stability

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Current treatment of several diseases are often associated with drug resistance, side effects and high costs, indicating the need for more effective and less toxic therapies.
Plant bioactives have recently attracted great interest, due to their potential therapeutic effect to humans [1]. However, their therapeutic applications in general are limited since it's proven that they possess poor stability, water solubility and bioavailability, leading to decline/loss of efficiency. In that regard, nano-encapsulation of plant bioactives is a promising approach to overcome these disadvantages. The physicochemical properties of plant bioactive-loaded nanocarriers are based on the type and ratio of the nanocarriers as well as the nature of bioactives [2].
The particle size and surface charge of bioactive-loaded nanocarriers-loaded nanocarriers are critical parameters, as these improve physicochemical properties of bioactives and increase the membrane contact, the cellular absorption, and thereby the biological activity [3,4]. Furthermore, high nanocarrier encapsulation efficiency is crucial for addressing all concerns related to essential oil solubility and chemical stability, as well as for increasing the efficacy of bioactive-loaded nanocarriers, leading to increased therapeutic efficacy. The method of preparation, type of bioactives, vesicle composition, nanocarrier content, and storage stability was shown to impact these characteristics [4,5].
Therefore, our research was focused on development of a suitable nanoformulation for the effective encapsulation of plant bioactives. The antioxidant, antibacterial, and cytotoxic properties of plant-bioactives were significantly maintained and/or improved by their nanoencapsulation in lipid-based nanocarriers. Additionally, it has been shown that lipid-based nanocarriers are appropriate for encapsulating bioactives to increase their stability and bioavailability.

References

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