FABRICATION OF NANOLIPOSOMAL CARRIERS CONTAINING POLYPHENOLIC COMPOUNDS

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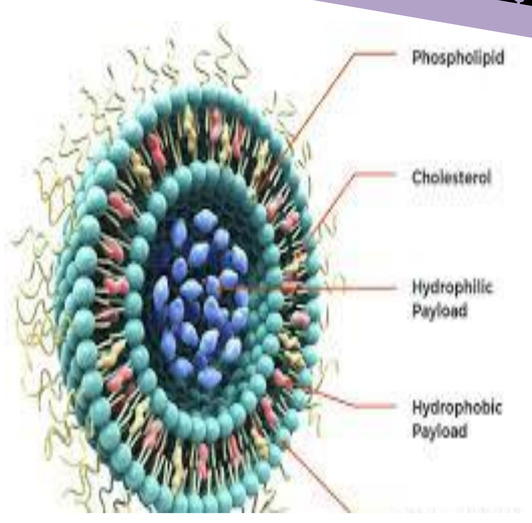
THE METHOD

Nanoliposomal encapsulation

Polyphenolic compounds → 

→ **Encapsulation with nanoliposomes**

Mixing (Lecithin + cholesterol + Tween80 + ethanol) → Solvent evaporation → Thin layer hydration by acetate buffer containing caffeine → Ultra-Turrax digital homogenizer → Sonication → Final nanoliposomes






ABSTRACT

❑ *The main objective of the present study was to encapsulate polyphenols using nanoliposomes in various ratios of lecithin and cholesterol (9:1, 8:2, 7:3 and 6:4 lecithin-cholesterol) to overcome their application challenges in food products, such as low solubility, undesirable sensory attributes, and instability during processing and storage.*

❑ *Then, the effect of lecithin-cholesterol concentrations on particle size, particle size distribution, encapsulation efficiency (EE), physical stability of nano-liposomes and stability of phenolic compounds loaded in nanoliposomes during the storage time were evaluated. The average particle size as Z-Average was in the range of 191.73-553.60 nm. By decreasing the amount of cholesterol in the liposome structure, the particle size also decreased.*

❑ *The particle size distribution was in the acceptable range of 0.3-0.4 (PI≤0.5). Incorporating cholesterol resulted in a shift of the zeta potential from -41.94 to -51.73. Higher zeta potential values indicate a higher and longer-term stability of the particles. The highest efficiency of encapsulation and stability during storage was obtained in the ratio of 1-9 lecithin-cholesterol. Adequate mixing of polyphenol powder and the highest encapsulation efficiency were achieved at low concentrations of lecithin, which is of vital importance in the commercial application of liposomes.*

❑ *All in all, encapsulation can protect the polyphenol from adverse environmental and processing conditions.*

Keywords: Polyphenol, Nanoliposome, Zeta Potential, Encapsulation Efficiency.

THE RESULTS

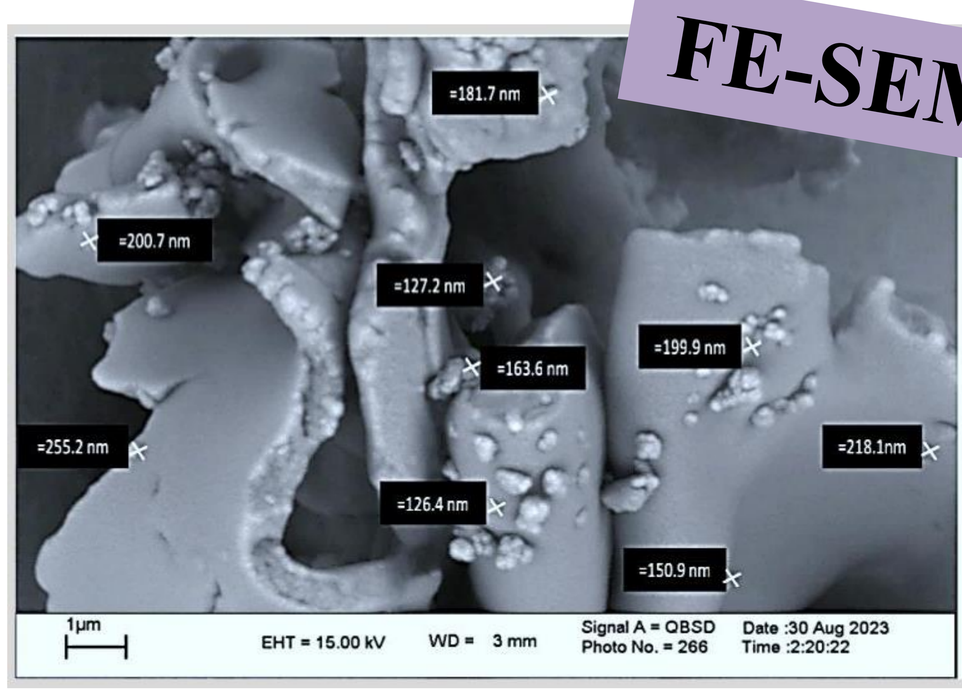
Applications of Nanotechnology in the Food Industry

- ❖Encapsulation of Food Compounds
- ❖Development of antimicrobial materials
- ❖Improving Food Storage
- ❖Shelf life extension
- ❖Detection of Contamination
- ❖Improvement of taste, color, and texture

Nanoliposomes containing polyphenolic compounds with different ratio of cholesterol-lecithin	Z-Average (nm)	Polydispersity Index (PDI)	Zeta Potential (mV)
9:1 Lecitin-Cholestrol	191.73 ± 8.01[d]	0.421 ± 0.004[a]	-51.73 ± 1.56[d]
8:2 Lecitin-Cholestrol	355.77 ± 7.89[c]	0.366 ± 0.004[b]	-48.06 ± 0.32[c]
7:3 Lecitin-Cholestrol	480.67 ± 8.23[b]	0.321 ± 0.004[c]	-45.43 ± 0.40[b]
6:4 Lecitin-Cholestrol	553.60 ± 7.93[a]	0.315 ± 0.003[c]	-41.94 ± 1.61[a]

Table 1. Average particle size and zeta potential of the nanoliposomes containing polyphenolic compounds with different ratio of cholesterol-lecithin.

FE-SEM



CONCLUSION

In the present study, nanoliposomes containing polyphenolic compounds were successfully produced in the particle size range of 191.73-553.60 nm. The addition of cholesterol to the liposomal structure, although increasing the particle size, increased the repulsion and electrostatic stability of nanoliposomes. Polyphenolic loaded nanoliposomes showed good physical and chemical stability within two months of storage at room temperature. The results showed that the problem of instability of phenolic compounds, which leads to their limited commercial application, can be solved by encapsulation.