

## Preparation of Functional Yogurt Fortified with Omega-3 Oils

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This work proposed to prepare multi-functional omega-3 oil based microencapsules enriched with efficient natural antioxidants. Such microcapsules were incorporated into yogurt as a food candidate to increase its bioavailability and functionality. Extraction of the active compounds from selected natural herb (rosemary, *Rosmarinus officianlis* L.) were carried out using traditional extraction with solvents of different polarities (hexane, methanol and distilled water ) as well as ultrasonic-assisted water extraction (UAE) technique. Yield percentage, total phenolic content (TPC) and radical scavenging activity (RSA %) have been determined at a solid to solvent ratio of 1:10 g/ml and ambient temperature. Results demonstrated that although methanol gave the maximum yield percentage, water extract showed the highest total phenolic content as well as highest RSA% followed by methanol extracts while n-hexane revealed the least yield, total phenolic and RSA%. Compared with the antioxidative potentials of the reference synthetic antioxidant (BHT), results showed that the decreasing order of RSA% was water extract > BHT > methanol extract >> hexane extract. However, the potency of ultrasonic-assisted water extract as radical scavenger was greatly enhanced specifically at a temperature of 45°C and 30 min extraction time. (N=484) did not. The sample was 57% The antimicrobial activity of both water and methanol extracts of rosemary leaves were tested against some pathogenic bacteria (Gram negative and Gram positive), some fungi, as well as against some beneficial probiotic bacteria (some Lactobacilli species) to select the extract that will be the proper one to proceed with for preparing the microcapsules that can be used

for preparing yogurt as a functional food. Results indicated that although water extract gave highest total phenolics and highest radical scavenging activity, but, it had no antimicrobial activity against both Gram negative or Gram positive bacteria (at concentration range 0.25 –15 %) while methanol extract revealed inhibitory activity against all tested pathogens at concentration of 5 % or higher. Fortunately, results indicated that the methanol extract had no effect on the survivability of the beneficial bacteria of lactobacilli strains. Finally, microencapsulation of fish and flaxseed oils were prepared by extrusion and spray drying techniques to determine the best methods for encapsulation. Results revealed the superiority and more efficient behavior of the microcapsules prepared by spray drying method either for its oxidative stability or its capability to be incorporated in yogurt. This work let the door open to investigate the effect of different wall materials on the microcapsules.

### Key words:

- Omega-3 Oils –rosemary extract
- Ultrasound assisted Extraction
- Total phenolic- antioxidant activity
- Antimicrobial activity