Development and characterization of oleogel foams based on monoglyceride and lecithin in vegetable oil.

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The low-fat food production, the delivery of pharmaceuticals, or cosmetics development have led to research and innovation in gas-in-oil systems (i.e., oleofoams) based on vegetable-based formulations. The objective of this work was to develop stable foams based on monoglyceride (MG) and lecithin (LC) oleogels in vegetable oil for applications in the above systems. Four formulations were evaluated at a fixed MG concentration of 4% with 0%, 0.25%, 0.5%, and 1% (w/w) of LC. Foaming ability was calculated as the overrun percentage; the thermal and mechanical properties were characterized by DSC and rheology, respectively; PLM identified the microstructure; all determinations were performed during storage at 0, 7, 15, and 30 days at 15°C. The results showed that the foam volume doubled the initial volume of the oleogel (i.e., 10 mL to 20 mL), remaining this way for up to 7 days. During this period, 2.5 to 3 mL of oil volume had been released. The foam remained stable for up to 30 days without collapsing. The melting temperature (TM) of each formulation studied was statistically the same after 7 days until 30 days of storage ($p > 0.05$); the TM was higher when the concentration of LC increased in the formulation. The foam rheology was increasing during storage (e.g., 4%MG+0.25%LC at 0 days: 953 Pa ± 156, 7 days 20240 Pa ± 1386, 30 days: 27580 Pa ± 3167; 4%MG+1%LC at 0 days 288 Pa ± 66, 7 days 14330 Pa ± 156, 30 days 21610 Pa ± 382) as the loss oil was released slowly. The foam consisted of a mixed network of MG-LC crystals and air droplets, which were also stable over time. This allowed us to propose an alternative material based on a stable oleofoam of MG-LC for the structuration and/or formulation of food, cosmetic, or pharmaceutical systems.

Keywords*: foam, oleogel, monoglyceride, lecithin.*