Abstract

In recent years there has been a growing concern about the harmful impact of saturated and trance-fatty acids on consumer's health. Therefore, the importance replacing saturated and trance-fatty acids by unsaturated and essential fatty acids has been asserted. Recently, oleogel was employed as a novel approach to stabilize the vegetable oils as a replacement for fats that exist in foods. The objective of this study was to evaluate the interaction between Carnauba wax and beeswax as gelators (5% w/w) of sunflower oil with different ratios of 0, 20, 40, 50, 60, 80, and 100%. oil binding capacity, solid fat content, rheology and hardness, X-ray diffraction pattern, oxidative stability, and fatty acid profile were assessed to evaluate the physicochemical properties of oleogels. Moreover, for determining the optimum physicochemical properties of oleogels as an alternative for shortening and to reduce saturated fatty acids, oleogels with the ratios of 0, 25, 50, 75, and 100% were added to the cookie formulation. Generally, the results elucidated that the mixture of Carnauba wax and beeswax had a synergistic effect in a way that the oil binding capacity of the mixture was higher than the sample that used Carnauba wax as the only gelator. Once the concentration of Carnauba wax increased up to 100% within the oleogel, solid fat content raised as well. Measurements revealed that the samples with beeswax to Carnauba wax ratios of 4:1 and 3:2 at the level of 5%(w/w) had a greater hardness compared to the samples that used these waxes separately, which showed that these two waxes are compatible. Viscoelastic parameters (G" and G') proved that the above-mentioned ratios had more solid behavior. Evaluation of the peroxide index showed that oxidative stability of the samples prepared with Beeswax and the samples with a ratio of 4:1 Beeswax to Carnuaba were higher than sunflower oil throughout 40 days of storage at room temperature, while the rate of peroxide generation was less than that in the samples with 4:1 Beeswax to Carnuaba ratio. The fatty acid index assay indicated that the oleogels exhibited a solid-state, albeit they possessed a higher degree of unsaturated fatty acids such as sunflower oil. According to the results, provided in the first stage, oleogels with a ratio of 4:1 Beeswax to Carnuaba were used as a desirable substitution for shortening in cookies in the second stage. When 100% oleo gels were replaced with shortening, softer cookies were yielded in comparison with the situations that sunflower oil was utilized. However, these cookies were harder than cookies that contained shortening. Besides, there were no significant difference, between samples when the shortening was replaced by oleogels up to 50%. In conclusion, regarding the obtained results in the current study, it can be inferred that the synergistic effect of Carnauba wax and beeswax provided an opportunity to diminish the wax concentration without influencing oleogel properties, thereby decreasing the mouthfeel of waxes. Furthermore, oleogels with a 4:1 Beeswax to Carnuaba ratio can be used at the level of 50% as a shortening substitution in cookies aiming for a decreased saturated fatty acid content in this products.

Keywords: Oleogel, Cookies, Carnauba wax, Beeswax, Sunflower oil, Synergistic effect