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(In the field of Food Science and Technology)

The Enrichment of dark chocolate, sugar-free prebiotic chocolate with the presence of polyphenol in olive leaves (Encapsulated with almond gum and gelatin) & zinc oxide for diabetic patients

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Abstract

Due to the fact that diet is an important part of the treatment plan of patients with type 2 diabetes due to the supply of elements needed by the body and since nutritional modification methods are a cost-effective way to reduce the complications of death caused by diabetes and on the other hand, the prohibition of diabetic patients from consuming sweets and their desire for these products. In this research, sugar-free prebiotic dark chocolate with olive leaf polyphenol compounds and zinc oxide enrichment and in order to increase the stability and prevent the aftertaste of these compounds in chocolate, polyphenols were encapsulated with gelatin and almond gum. In this way, olive leaf polyphenols were first prepared and isolated and then the chocolate formulation containing polyphenol capsules of olive leaf and zinc coated with gelatin and almond gum was prepared and finally various tests were performed. The results of SEM images clearly show that in the ratio of gelatin to gum 1:1, uniform microcapsules with a firm and dense structure are formed. The results of the average value of zeta potential indicate that the microcapsule made with gelatin to gum ratios of 2:1 and 1:2 has a higher negative zeta potential value than the 1:1 sample. Investigating the encapsulation efficiency of the manufactured microcapsules showed that polyphenol is the highest in the ratio of gelatin to gum 1:1. FTIR spectra showed that in 1:1 molar ratio of gum: gelatin mixture, better capsules are formed with proportional molar ratio. Also, in this ratio, the maximum amount of polyphenol is loaded inside this capsule. In evaluating the amount of phenolic compounds, it was found that the microcapsule made with a 1:1 ratio of gelatin: gum has the greatest ability to store or load polyphenol. But the enrichment process has caused the ability of the microcapsule made with a 1:2 ratio of gelatin: gum to load polyphenol more than others. Analyzing the tissue profile of the samples showed that the capsule prepared with a ratio of 1:1 has better properties. The results of cutting chocolate showed that the increase in hardness for the capsule prepared with a ratio of 1:1 compared to the other two samples increased reasonably. The process of changes in the degree of crushing of chocolates is exactly the same as the process of changes made for the degree of hardness. Considering all sensory evaluation parameters, the results show that 1:1 chocolate is suitable for all attributes compared to the other two samples. The amount of color change in the sample compared to the control is significant for two capsules 1:1 and 2:1, which can be attributed to the addition of polyphenol.

Keywords: Chocolate, Polyphenol in olive leaves, Zinc oxide, Encapsulation, Almond gum, Gelatin, Diabetic