

Phenolic and antioxidant content of honey coupled with chemometric method for geographical origin classification from Amhara region, Ethiopia

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Abstract

The Amhara region of Ethiopia is endowed with honey of diverse varieties and qualities. However, there is a lack of information on its phenolic content and antioxidant nature. The objective of these study is then to evaluate restorative nature of the honey samples from Amhara region using its phenolic content and antioxidant potential. For these, 47 fresh honey samples were collected from seven administrative zones in Amhara region-Ethiopia. Experimental data were obtained through quantitative determination of phenolics content and antioxidant capabilities using standard colorimetric methods. The finding showed a strong positive correlation between phenolic content and antioxidant properties. The mean values of total polyphenol content using gallic acid equivalent (GAE) ranged from 17.03 to 42.04 mg GAE per 100 g of honey. The mean value of the entire flavonoid content using catechin equivalent (CE) was from 3.20 to 7.40 mg CE, and when using quercetin equivalent (QE), it ranged from 1.67 to 5.08 mg QE, per 100 g sample. The ascorbic acid equivalent antioxidant content (AEAC) ranged from 16.23 to 26.59 mg AEAC per 100 g of the samples. The samples percent antioxidant activities (% AA) also ranged from 23.74 to 40.11%. Amber colored honey enjoyed the highest value on the stated parameters based on the samples' colors, while the white-colored samples registered the least value. Based on the findings, the region's honey has a magnificent therapeutic nature. Using the principal component analysis (PCA) model, the top three principal components described 96.63% of the total variations. The linear discriminant analysis (LDA) model has an average of 70.21% discriminant power. The LDA model was cross-validated by the leave-one-out cross-validation approach, and 70.21% of it clustered adequately. In the biplot analysis, honey sample distribution based on their color clustered better than the geographic origin and climate factors.

Keywords: Polyphenols; antioxidants; therapeutic nature; chemometric analysis; honey;