

ANTIOXIDANT CAPACITY AND POLYPHENOLS CONTENT FOR GARLIC AND BASIL FLAVORED BREAD

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Abstracts

Seven bread samples of which 3 have been flavored with garlic in proportion of 0.5%, 1% and 1.5%, 3 with sweet basil in proportion of 5%, 10% and 15% and a witness sample, obtained in our own lab, were analyzed for antioxidant activities (using FRAP method and total polyphenols amount) by Folin-Ciocalteu method. The antioxidant capacity varied between 0.053-0.197 mM Fe²⁺/100g for bread flavored with garlic and between 0.059-0.368 mM Fe²⁺/100g for bread flavored with basil, mean while, antioxidant capacity was 0.036 mM Fe²⁺/100g . The polyphenols content was situated between 0.179-0.221 mM acid gallic/100g for bread flavored with garlic and between 0.194-0.278 mM acid gallic/100g for bread flavored with basil, the polyphenols content determined for standard sample was 0.177mM acid gallic/100g .

Keywords: *antioxidant capacity, polyphenols, bread, garlic, basil, flavored*

Introduction

The increase of the population propensity for heart and blood vessel diseases generated the apparition of the food producers concern for creating antioxidant products. In this context and after the literature study that pointed the fact that a consume of bread enriched with olive oil, garlic, basil goes to the decrease of these diseases impact over the society, we guided our attention on obtaining and studying the antioxidant capacity of the garlic and basil flavored bread in different proportions, reported to a witness sample (Moldoveanu, 1992).

Without demonstrating its curative qualities, the garlic bread is used today by the Italians as a garnish to the pastas or other food specialties. It is presented as bread covered with an olive oil, garlic and butter paste, and then grilled or toasted.

The modern recipes combine the garlic with different types of cheese, the most frequently used being mozzarella, cedar or feta.

The frozen garlic bread has been produced for the first time in 1970 by Cole's Quality Foods in Michigan. Over the years, the garlic bread has been produced also for satisfying the western population tastes.

The basil bread represents a recent product. It contains this flavor both in the dough and at the surface in the shape of a basil and olive oil pure. The secret for obtaining a quality bread is baking the dough in an oven with powerful moisture (Costin, 1999).

After baking them in our own lab, the breads have been sensorial and physicochemical analyzed, after which we studied their antioxidant capacity and the polyphenols content.

This method is proper in the case of total antioxidant capacity determination for different natural products.

For polyphenols determination (expressed such as mM/L acid galic) there will be used the spectroscopic method with the Folin Ciocalteu reactive (Benzie, 1996; Facino, 1999; Dragsted, 2003; Gergen, 2004).

Experimental

Reagent and equipment: All chemicals and reagents were analytically graded or purest quality purchased from Merck, Fluka, Sigma. We used distilled water. Absorption determination for FRAP and total phenol content was made using Spectrophotometer Specord 205 by Analytik Jena.

Bread samples: In the present research, we used a total of seven breads: white bread like standard, 3 breads flavored with garlic in 0.5%, 1% and 1.5% percent, and 3 breads flavored with basil in 5%, 10% and 15% percentages. These breads were processed in Laboratory for Bakery Products Technology, from Faculty of Food Processing Technology

Determination of Total Antioxidant Capacity (Adaptation of FRAP method): Reagents: acetate buffer, 300 mM/L, pH = 3.6 (3.1 g sodium acetate 3H₂O and 16 mL conc. Acetic acid per 1L of buffer solution); TPTZ (2,4,6-tripyridyl-s-triazine) solution 10 mM/L (0.31 g TPTZ in 100 mL HCl). Always used prepared freshly; FeCl₃ solution 20mM/L (0.54 g FeCl₃·6H₂O in 100 mL distilled water). Prepared freshly always used; FRAP working solution (25 mL acetate buffer, 2.5 mL TPTZ solution, 2.5 mL FeCl₃ solution). Prepared freshly always used; Standard solution - Mohr salt 1mM/L.

Aqueous solution of known Fe concentration was used for calibration, in a range of 0.1-0.8 mM/L. For the preparation of calibration curve 0.5 mL aliquot of 0.1, 0.2, 0.4, 0.6, 0.8 μM Fe²⁺/mL aqueous as Mohr salt solution were mixed with 2.5 mL FRAP working solution. FRAP reagent was used as blank. One mL from diluted 1/10 juices and nectars was mixed with the same reagents as described above, and after 10 min. absorption was read after at λ= 593 nm.

The Total Antioxidant Capacity in bread's samples in Fe (II) equivalents was calculated. Correlation coefficient (r²) for calibration curve was 0.998.

Determination of phenolic compounds: The content of total polyphenolic compounds was determined by Folin-Ciocalteu method. Reagents: Folin-Ciocalteu's phenol reagent solution 1:10; Na₂CO₃ solution 7.5%; Standard solution - Gallic acid 10mM/L. For the preparation of calibration curve 0.5 mL aliquot of 0.2, 0.3, 0.4, 0.8 and 1.2 μM/mL aqueous gallic acid solution were mixed with 2.5 mL Folin-Ciocalteu reagent and 2.0 mL sodium carbonate. One mL from each extract obtained trough dissolving 10g sample in 100ml distilled water was mixed with the same reagents as described above, and absorption was read after 2 h at λ= 750 nm. Total content of polyphenols in bread's standard, bread flavored with garlic and bread flavored with basil, in gallic acid equivalents (GAE) was calculated. Correlation coefficient (r²) for calibration curve was 0.995.

Results and Discussions

The total antioxidant capacity–TAC by FRAP method, and polyphenols are presented in Table 1 for white bread standard's sample

and bread flavored with garlic in 0.5%, 1%, 1.5% percentages and in Table 2 for analyzed bread standard's sample and bread flavored with basil in 5%, 10%, 15% percentages. If we follow the proportions in which the flavors have been added, the bread flavored with garlic presents TAC more than bread flavored with basil. And it increases with flavor's percentage. We explained the different values for this characteristic because; the garlic has more TAC than basil and then the ingredients used at standard's bread preparations. The highest polyphenols amount was found in bread flavored with basil. Also, it increases with flavor's percentage. In both cases the smallest percentage has been detected in the witness sample case. We explained the different values for these characteristics because the basil flavor is intense colored in green.

Table 1. Antioxidant capacity and polyphenols of breads flavored with garlic evaluation in relation with white bread's standard

Name of sample	TAC (mM Fe ²⁺ /100g)	Polyphenols (mM acid gallic/100g)
White bread standard	0.036	0.177
Bread flavored with garlic 0.5%	0.053	0.179
Bread flavored with garlic 1%	0.126	0.190
Bread flavored with garlic 1.5%	0.197	0.221

Table 2. Antioxidant capacity and polyphenols of breads flavored with basil evaluation in relation with white bread's standard

Name of sample	TAC (mM Fe ²⁺ /100g)	Polyphenols (mM acid gallic/100g)
White bread standard	0.036	0.177
Bread flavored with garlic 0.5%	0.059	0.194
Bread flavored with garlic 1%	0.123	0.243
Bread flavored with garlic 1.5%	0.368	0.278

It can be observed that the flavored bread samples presented more total antioxidant activity and polyphenols content than white bread standard's sample.

For bread flavored with garlic, polyphenols content increased four times at maximum concentration, 1.5% that was added developed in relation with standard sample. For bread flavored with basil, TAC increased ten times at maximum concentration, 15% of that increased its evolution in relation with standard sample.

For analyzed bread flavored with garlic and bread flavored with basil, the correlation between polyphenols content is very good correlated with the percentage in flavor, this increased twice at maximum concentration, 1.5% respectively 15% increasing its evolution in relation with standard sample.

Conclusions

The results of this research show that the bread flavored with basil and garlic has an excellent source of natural antioxidants being consumed with pleasure because these are more tasteful than classic white bread.

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