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Comparative evaluation of antioxidant activities of flours from durum wheat varieties, online https://foods2023.sciforum.net/

Ioanna S. kosma[1], Afroditi Michalaki[2], Ioannis Geraris Kartelias[2] and Haralabos C. Karantonis[2,*]
[1]Laboratory of Food Chemistry, Department of Chemistry, University of Ioannina, 45110 Ioannina, Greece.
[2]Laboratory of Food Chemistry and of Technology and Quality of Animal Origin Food, Department of Food Science and Nutrition, School of the Environment, University of the Aegean, 81400 Myrina, Lemnos, Greece.

Introduction

There is a growing focus on the link between modern diets and lifestyles and chronic diseases. Due to consumer awareness and health concerns, nourishing food consumption has increased.

By 2024, global wheat production is expected to hit 770 million tons. Greece produces a lot of wheat. A reliable source predicts that Greek wheat production will exceed one million tons by 2024 [1]. One of the Greece's main crop is durum wheat (Triticum turgidum L. var. durum).

Due to their calorie and nutritious content, durum wheat bakery products are often considered essential. This is due to their high carbohydrate and protein content. In addition, wheat produces secondary metabolites like polyphenols [2-4].

Previous study has shown polyphenols to be antioxidant, anti-inflammatory, antimutagenic, and anticarcinogenic [4,5].Oxidative stress, inflammation, and thrombosis have been linked to cancer, atherosclerosis, rheumatoid arthritis, and neurological problems [6,7]. It is well known that antioxidants neutralize free radicals and prevent oxidative damage [6]. Thus, antioxidant-rich foods should be eaten more.

Aim of the study

The aim of the study was to comparatively evaluate the antioxidant and antiplatelet potential of flours from 22 selected durum wheat varieties (Triticum turgidum L. var. du-rum) cultivated in Greece so that it is possible to be selected flours from those varieties that are with the greatest possible antioxidant and antiplatelet activities.

Methodology

- **Extraction:** Flour samples were extracted with aquas methanol 80% (v/v) according to Armelin et al [8] with some modifications. Briefly, samples were agitated in an orbital shaker (GFL 3017, GFL; Burgwedel, Germany) at 200 rpm for 2 h at room temperature and then centri-fuged at 1200×g force for 10 min (OrtoAlresa, Digicen 21R, Spain). The supernatant was stored at -40oC until further analyzed for total phenolics, antioxidant activities and an-tiplatelet activity.
- **Phenolic content:** TTotal phenolics were measured in triplicate by using the Folin–Ciocalteu's method as previously described [9] using a spectrophotometer Lambda 25 (Perkin Elmer, Norwalk, CT, USA). Results were expressed as equivalent concentrations of gallic acid (mg GAE per g flour).
- **Antioxidant activities:** The antioxidant activities were evaluated by the DPPH and FRAP assays as previ-ously described [9]. Each sample was examined in triplicate. Trolox solutions were pre-pared in appropriate concentrations for quantitation purposes and the results expressed as Trolox equivalents in μmol per g of flour.
- **Antiplatelet activity:** The in vitro antiplatelet activity was evaluated on an aggregometer (Chrono-log Cor-poration, 500CA, Havertown, PA, USA) by the ability of samples to inhibit lipid mediator of Platelet Activating Factor (PAF) towards human platelet rich plasma (PRP) as describe previously [10]. The in vitro antiplatelet activity was expressed as mg-1 required for 50% inhibition of PAF activity towards human PRP.
- **Statistics:** Statistical analysis was performed with the SPSS software (IBM© SPSS® ver 28.0 , IBM UK Ltd, Portsmouth, England). Data were analyzed for normality using the Shapiro-Wilk test. Homogeneity of variance was checked by Levene's test. Data between the flours from different cultivars were compared statistically using one-way analysis of variance with post-hoc Bonferroni test for $p<0.05$.

Results and Discussion

- Total phenolic content for the flour samples range from as low as 0.620 ± 0.003 mg gallic acid/g (Thraki) to as high as 0.950 ± 0.005 mg gallic acid/g (Zeta E) **(Figure 1)**. This variation of phenolic compounds among the different samplse indicate possible differences in their antioxidant potential.
- Indeed DPPH and FRAP assays showed variation in antioxidant activities of the samples with values ranging from 0.56 ± 0.02 to 2.26 ± 0.08 and 2.12 ± 0.03 to 3.65 ± 0.02 respectively **(Figure 2)**.

Results and Discussion

- Higher values in(mg-1) suggest stronger antiplatelet activity **(Figure 3)**. The sample with the highest antiplatelet activity is "Zoi" with a value of 1.38 ± 0.4. On the other hand, the sample with the lowest antiplatelet activity is "Vendeta" with a value of 0.32 ± 0.02

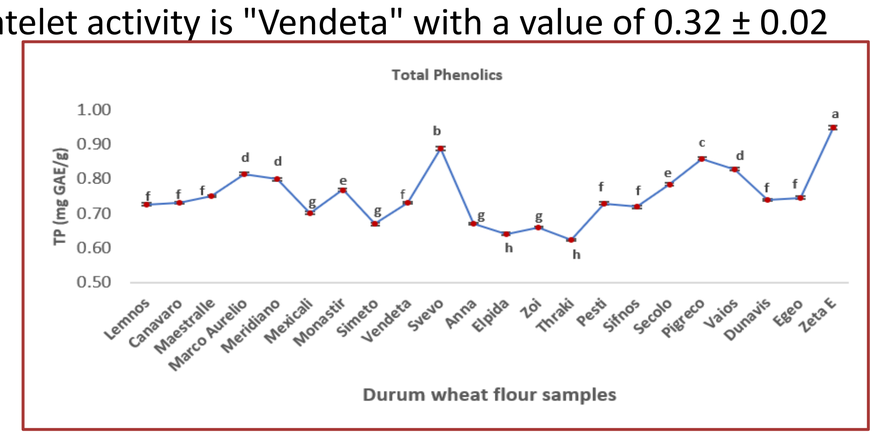

Figure 1. Total phenolics in 22 durum wheat (*Triticum turgidum L. var. durum*) flour samples. Different letters denote statistical difference based on one way ANOVA with with post-hoc Bonferroni test for $p<0.05$.

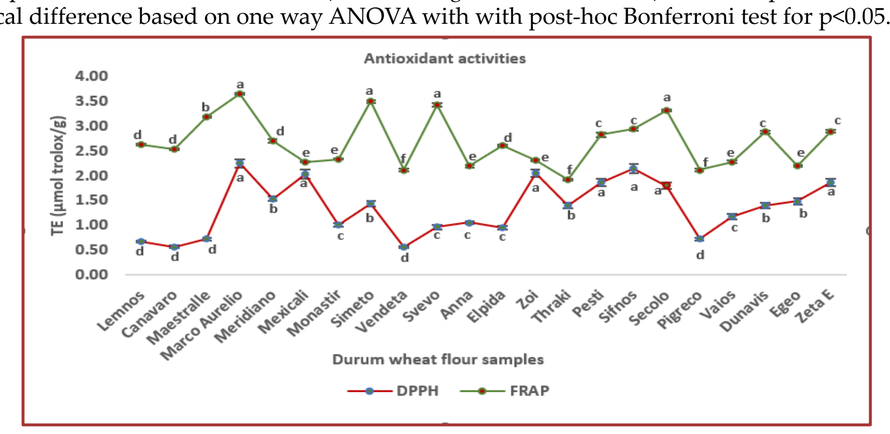

Figure 2. Atnioxidant activities in 22 durum wheat (*Triticum turgidum L. var. durum*) flour samples bazed on DPPH and FRAP assays. The results are expressed as mean ± SD of triplicate measurements and were expressed as trolox equivalents (TE) in μmol trolox per one gram of flour sample. *Different letters denote statistical difference based on one way ANOVA with* with post-hoc Bonferroni test *for p<0.05.*

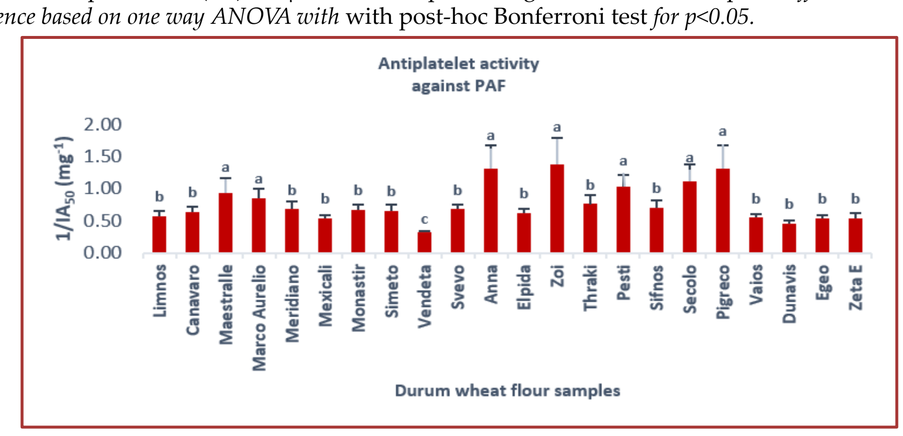

Figure 3. Antiplatelet activity in 22 durum wheat (*Triticum turgidum L. var. durum*) flour samples bazed on in vitro inhibition of Platelet Activating Factor (PAF). The results are expressed as mean ± SD of triplicate measurements and were expressed as the reverse of the amount of flour (mg^{-1}) required fo 50% inhibition of PAF activity ($1/IA_{50}$) in human platelet rich plasma (hPRP). Different letters denote statistical difference based on one way ANOVA with with post-hoc Bonferroni test for $p<0.05$.

Conclusions

The data provide valuable information about the antioxidant and antiplatelet potential of flour samples from different durum wheat (Triticum turgidum L. var. durum) cultivars. Community can use these data to make informed decisions about which samples may of-fer greater health benefits in terms of antioxidant and antiplatelet properties that are im-plicated in the development of various chronic diseases.

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