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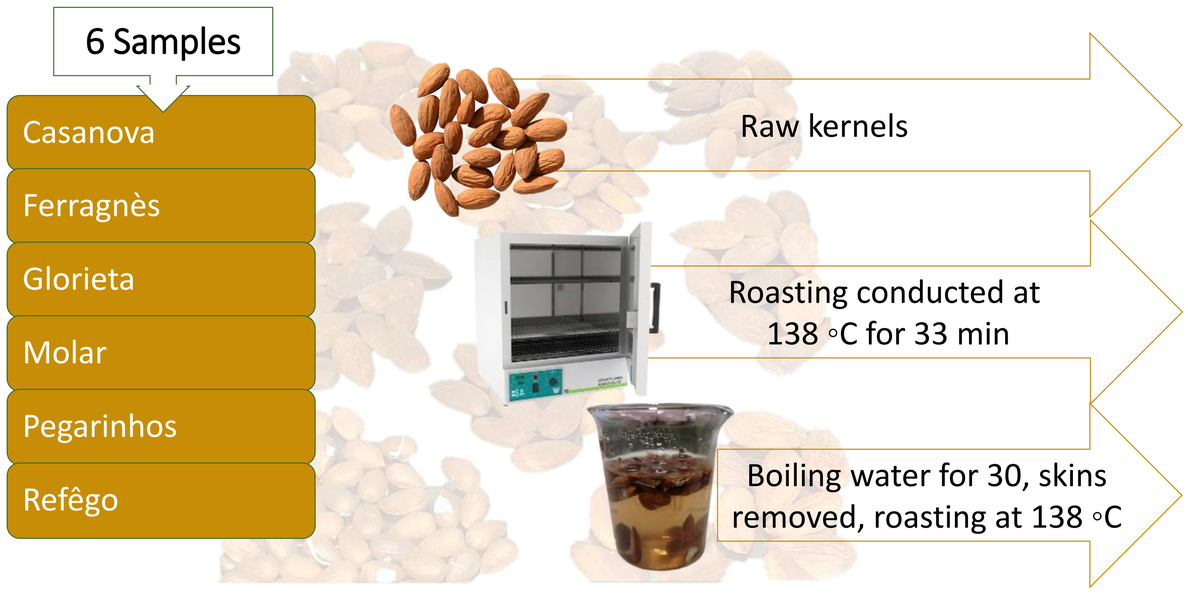
Content of bioactive compounds and antioxidant activities of Portuguese almonds (*Prunus dulcis*) after roasting and blanching

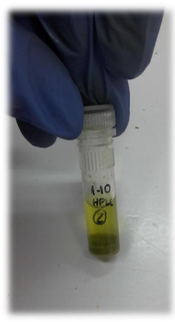
THE QUESTION

Almond is one of the major nuts worldwide, mainly due to the recognized health benefits provided by their ingestion. Almond is often eaten raw or after undergoing some processing procedures that can change chemical attributes. The present work was carried out to provide information on the effects of roasting and blanching on the contents of bioactive compounds and antioxidant activities of Portuguese almond cultivars (Casanova, Molar, Pegarinhos and Refêgo), comparing them to two foreign cultivars (French cultivar Ferragnès and Spanish cultivar Glorieta).

THE STRATEGY



An "antioxidant extract" was prepared by vortex-mixing 40 mg of the sample with 1 mL of 70 % methanol, heating for 30 min at 70 ◦C, and then centrifuged at 11000 rpm's for 15 min at 1 ◦C.
The supernatant which constituted the "antioxidant extract" was filtered and used.



96-well microplate

Total phenolics and flavonoids
ABTS, DPPH and B-carotene

THE OUTCOMES

Total phenolic content

The **total phenolic (Figure 1)** content in raw samples **ranged** from **0.048** in Glorieta to **0.189 mg** gallic acid equivalent (GAE)/g in Pegarinhos.

Roasting resulted in an higher levels of **phenolics** relative to raw kernels, ranging from 0.49 mGAE/g in cv. Casanova to 2.66 mGAE/g in cv. Refêgo.

Blanching reduced the content of **total phenolics**, that ranged from 0.01 mGAE/g in cvs. Glorite and Molar, to 0.08 mGAE/g in cv. Pegarinhos.

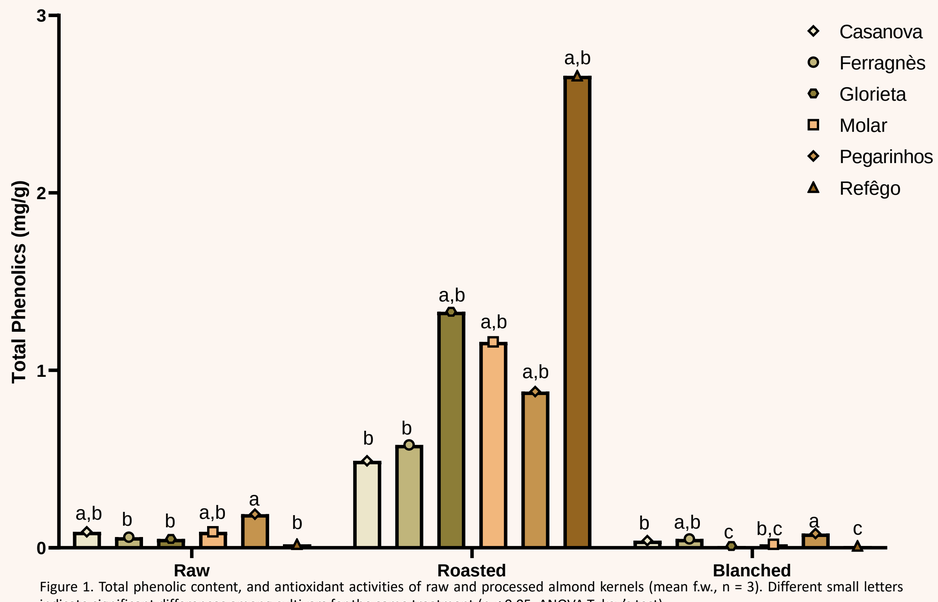


Figure 1. Total phenolic content, and antioxidant activities of raw and processed almond kernels (mean f.w., n = 3). Different small letters indicate significant differences among cultivars for the same treatment ($p < 0.05$, ANOVA Tukey's test).

Total flavonoid content

The **total flavonoid content (Figure 2)** in raw samples **ranged** from **0.35** in Pegarinhos to 1.86 **mg** catechin equivalent (mCE)/g in Refêgo.

In general, roasting had **no effect** on the total flavonoid content of almond cultivars **except** for a **58% decrease** for **Molar** and a **72% decrease** for **Refêgo**.

B**lanching reduced levels** of flavonoids in the kernels, that were similar in all cultivars.

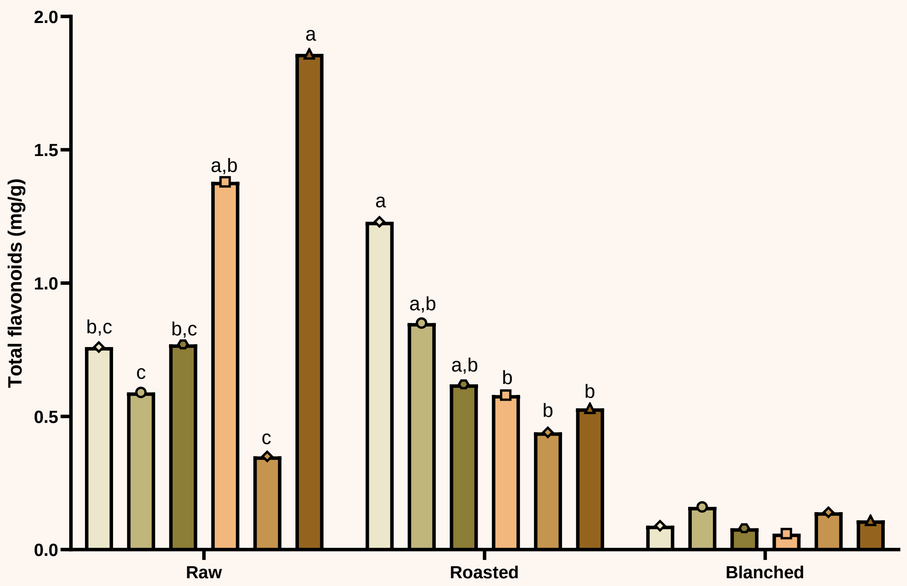


Figure 2. Total flavonoid content, and antioxidant activities of raw and processed almond kernels (mean f.w., n = 3). Different small letters indicate significant differences among cultivars for the same treatment ($p < 0.05$, ANOVA Tukey's test).

Antioxidant activity using DPPH radical

Raw extract show **highest ABTS** activity for **Pegarinhos**, followed by **Casanova** (Figure 4).

ABTS activities of all the extracts increased after roasting.

B**lanching led** to **large drops** in antioxidant activity.

Positive correlations between the **phenolic** content and **ABTS** (R^2=0.7057, y=50.67x + 1.7828), in raw samples.

Negative correlations in **roasted** samples for ABTS (R2 = 0.708, y = −3.76362x + 14.27525) and total phenolics.

Antioxidant activity using DPPH radical

In **raw** samples**, higher antioxidant** activity was recorded in cv**. Pegarinhos (Figure 3).**

Roasting increased antioxidant activity except for cv. Refêgo

B**lanching led** to **large drops** in antioxidant activity.

Positive correlations were recorded **in raw** samples between the total **phenolic** content and **DPPH (R2 = 0.7892, y = 0.0298x– 0.0093).**

Negative correlations in **roasted** samples for **DPPH** (R^2=0.545, y=−2.48231x + 16.18607) with total **phenolic** content.

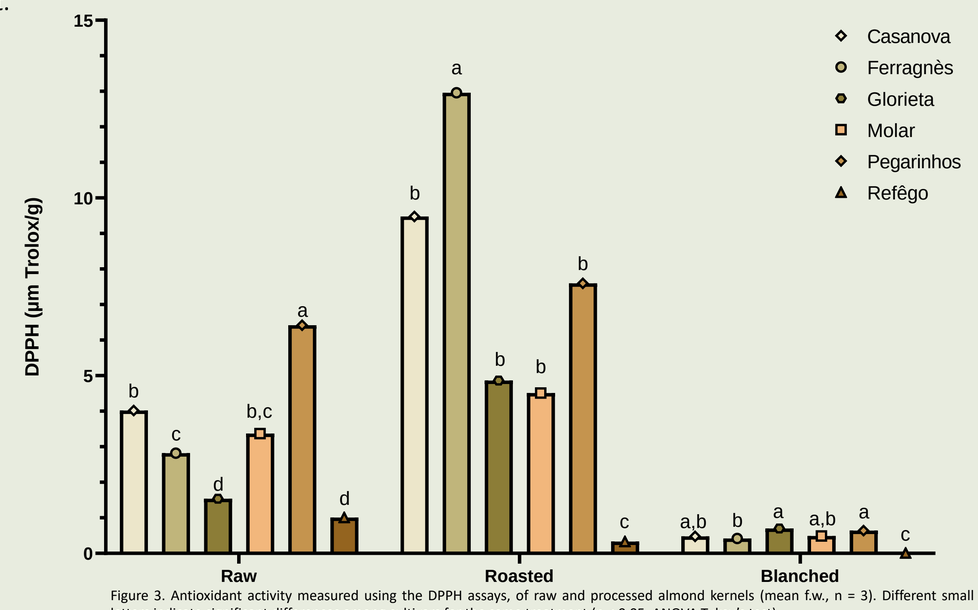


Figure 3. Antioxidant activity measured using the DPPH assays, of raw and processed almond kernels (mean f.w., n = 3). Different small letters indicate significant differences among cultivars for the same treatment ($p < 0.05$, ANOVA Tukey's test).

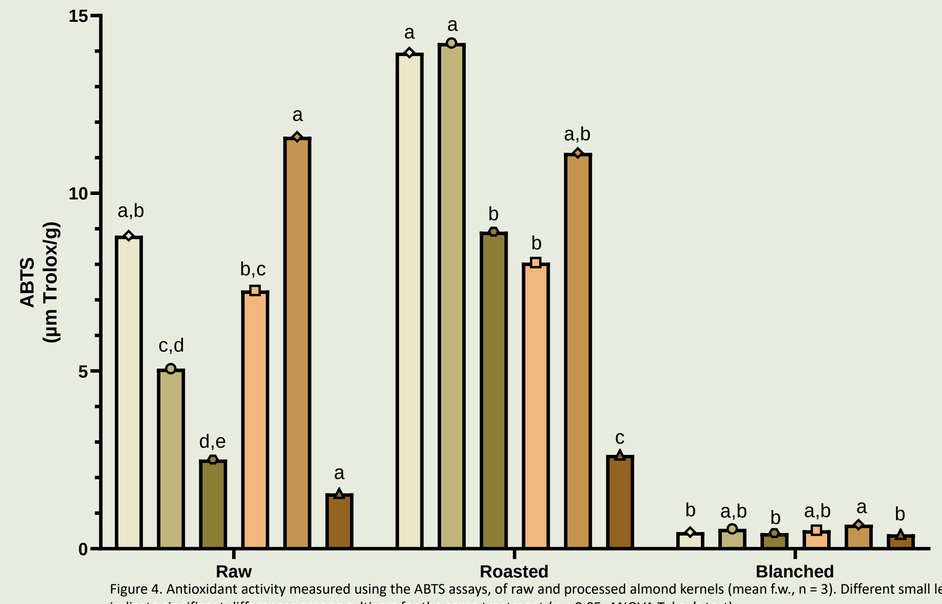


Figure 4. Antioxidant activity measured using the ABTS assays, of raw and processed almond kernels (mean f.w., n = 3). Different small letters indicate significant differences among cultivars for the same treatment ($p < 0.05$, ANOVA Tukey's test).

CONCLUDING REMARKS

Antioxidant activities and bioactive compounds were generally enhanced following roasting but reduced after blanching. The findings of this study shed light on the effect of processing in kernels from neglected Portuguese almond cultivars, important for both consumers and food industries.

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