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Raw and processed celery, a possible source of antioxidants

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Abstract Celery is an important source of antioxidants, vitamins and minerals.The aim of this study was to evaluate the total antioxidant capacity (TAC) and total polyphenols content (TPC) of raw and processed celery. Two types of celery from local market were analysed using CUPRAC and Folin Ciocalteau methods in order to quantify TAC and TPC. Regarding total antioxidant capacity, celery-leaves registered the highest value (expressed in g Trolox equivalent /L extract), over nine times higher than those recorded by peel, raw, baked and boiled celery. Total polyphenols content (expressed in µmoli gallic acid equivalent/mL extract) for raw and processed celery registered close values. Our results show that celery–leaves represent a considerable source of antioxidants in human nutrition.

Key words

antioxidant capacity, polyphenols, CUPRAC, Folin Ciocalteau

Antioxidants are chemical compounds that slow the rate of lipid oxidation reaction in the food system, and are generally plant compounds or transition metal ions that can initiate and sustain antioxidant processes and can donate electrons to counteract free radicals [3]. These substances come mainly from the fresh fruits and vegetables we consume and which prevent the oxidation of other molecules in the body [10].

Polyphenols are aromatic chemical compounds with several hydroxyl groups inserted on the aromatic ring. Due to this structure they have redox properties and can be oxidized by the Folin Ciocalteau reagent with the formation of a blue color with the maximum absorption at 750 nm [4].

The aim of this study was to evaluate the total antioxidant capacity (TAC) and total polyphenols content (TPC) of raw and processed celery.

Celery leaves are rich in vitamin A, while strains are an excellent source of vitamin B1, B2, B6 and C to which potassium, folic acid, calcium, magnesium, iron, phosphorus, sodium and essential amino acids are added. Although most of the foods lose nutrients during cooking, most celery compounds resist high temperatures. Consumption of celery helps to lower blood pressure [8].

Celery is an important source of antioxidants, vitamins and minerals (Na, Ca, K, Mg, Fe, Zn [5]. Consumption of celery brings many health benefits: excellent hypotensive, attenuates digestive tract spasms and is a good anti-inflammatory and anti-bacterial agent [9]. Studies have shown that celery has a protective effect against colorectal cancer [6].

Yao, Yang et al., 2010 [7], identified in the extracts of celeries the folowing phenolic acids: caffeic acid, ferulic acid, and p-coumaric acid, while the identified flavonoids were luteolin, apigenin, kaempferol [7].

Material and Methods

The celery samples used for analysis were acquired from the local market. The celery roots were washed with tap water and the peels were removed manually. The samples were chopped and used for analysis. The reagents used were of analytical grade.

Extraction of antioxidants. The extracts were prepared using 5.00 g of thin chopped samples in 50.0 mL of 50% ethanolic solution under magnetic stirring. After filtration, the extracts were used to determine their antioxidant capacity by the CUPRAC assays and their TPC by Folin Ciocalteu method.

Total antioxidant capacity using CUPRAC assay. TACs of the samples were analyzed utilizing a chromogenic oxidant, as described by Apak et al, 2008 [1]. After 30 minutes the absorbance was read on a spectrophotometer at 450 nm. The results were expressed as g Trolox equivalent /L extract [1].

Total phenolic content (TPC). TPCs of the samples extracts were analyzed using Folin-Ciocalteu reagent as described by Bordean, 2016 [2]. After 2 hours the absorbance was read on a spectrophotometer at 750 nm. The results were expressed as µmoli gallic acid equivalent /mL extract.

Results and Discussions

Regarding total antioxidant capacity, celery-leaves registered the highest value (expressed in g Trolox equivalent /L extract.), over nine times higher

than those recorded by peel, raw, baked and boiled – celery (figure1).

Total polyphenols content (μmoli gallic acid equivalent /mL extract) for raw and processed celery registered close values.

However celery-leaves registered the highest polyphenols content, for both types of celery (figure 2).

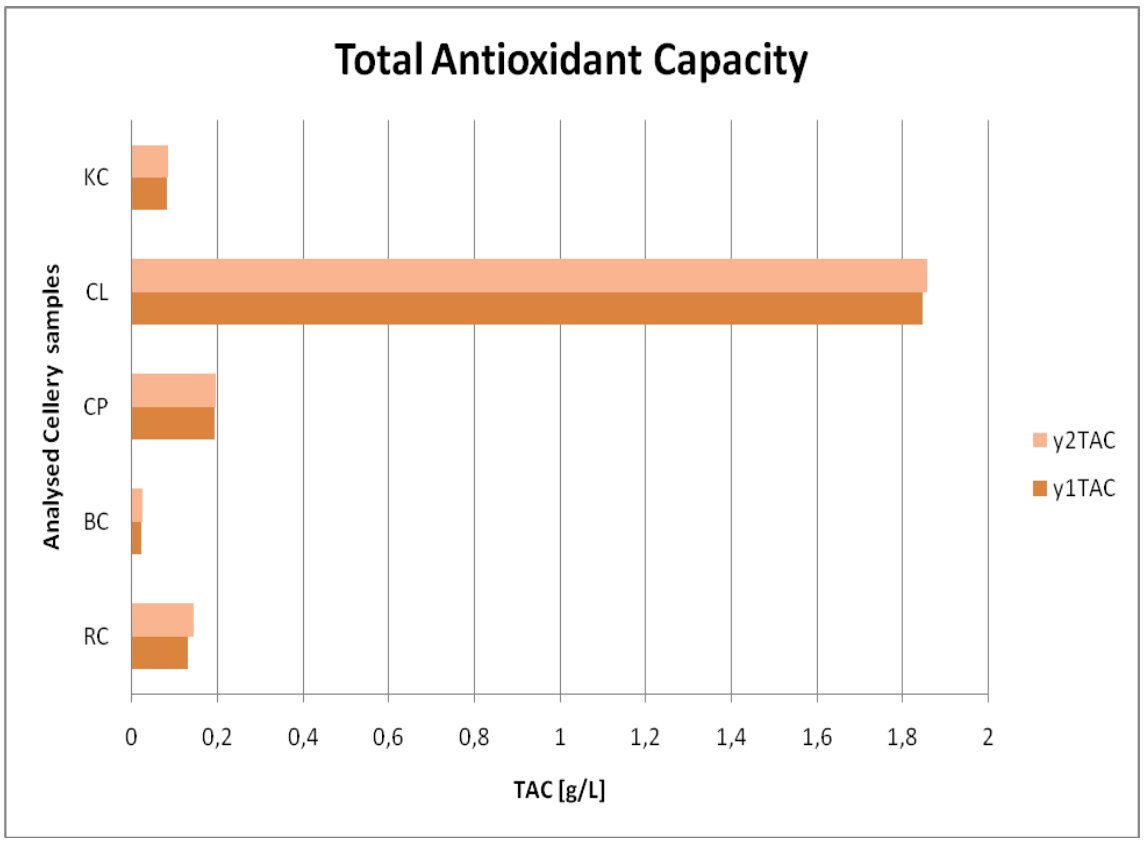

Fig 1. Total antioxidant capacity (g Trolox equivalent/L extract) for celery types

Legend: y1TAC- total antioxidant capacity for type 1 of celery; y2TAC- total antioxidant capacity for type 2 of celery; RC- raw celery; BC- boiled celery; CP- celery – peel; CL -celery- leaves; KC- baked celery;

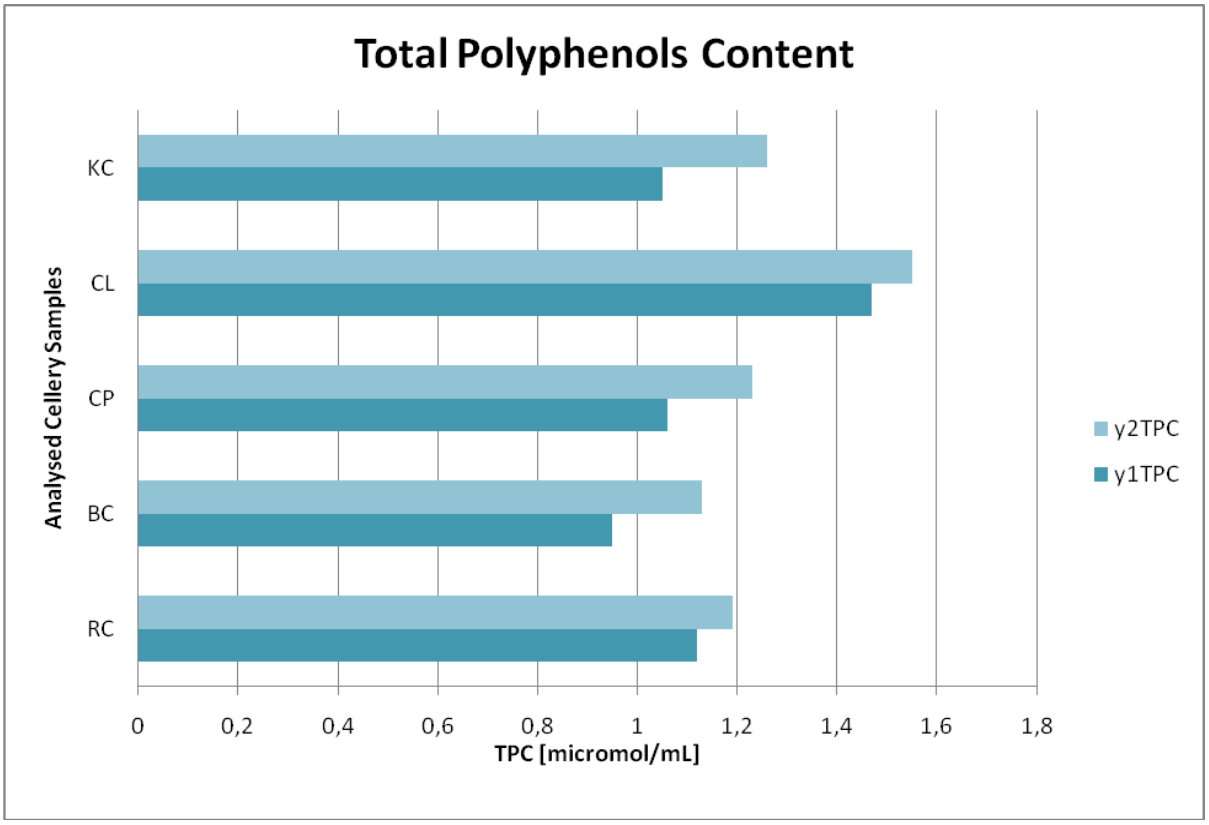

Fig. 2. Total polyphenols content (µmoli gallic acid equivalent /mL extract) for celery types

Legend: y1TPC- total polyphenols content for type 1 of celery; y2TPC- total polyphenols content for type 2 of celery; RC- raw celery; BC- boiled celery; CP- celery–peel; CL-celery-leaves; KC- baked celery;

Conclusions

Consumption of celery brings many health benefits.

Total polyphenols content (µmoli gallic acid equivalent /mL extract) for raw and processed celery registered close values but celery-leaves registered the highest polyphenols content.

Our results show that celery–leaves who registered a total antioxidant capacity over nine times higher than those recorded by peel, raw, baked and boiled – celery represent a considerable source of antioxidants in human nutrition**.**

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