Nutritional, chemical, and antimicrobial profile of *Apium graveolens* L.

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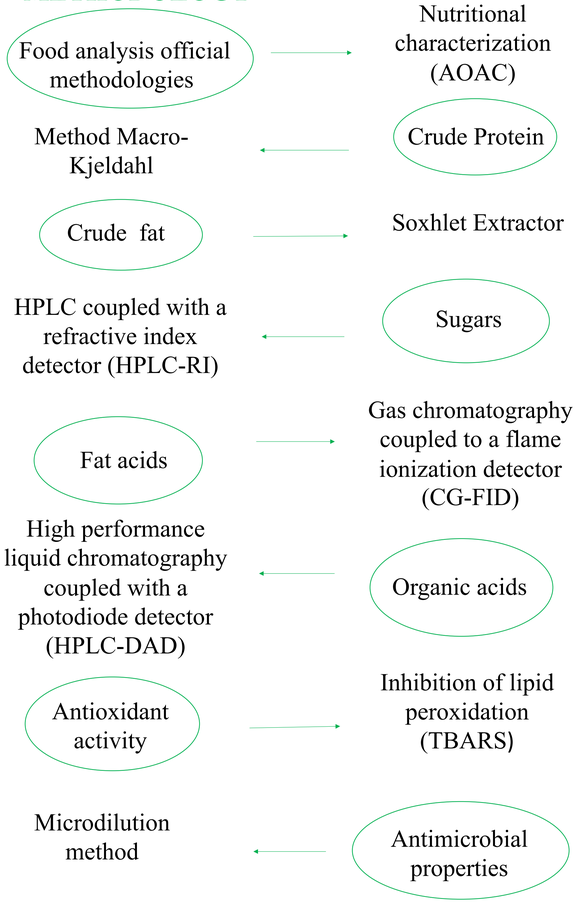
INTRODUCTION

- Celery is a regularly consumed vegetable, also providing strong and distinctive flavours to dishes as well as health benefits to consumers.
- This work aimed to perform a nutritional characterization of celery and some bioactive properties such as antimicrobial properties through the microdilution method and the antioxidant capacity by TBARS (Thiobarbituric acid reactive substances) method.

METHODOLOGY



RESULTS

According to the results of the nutritional analysis, the celery consisted mainly of 95% water, followed by ash, protein and fat content. Glucose was the major sugar.

Table 1. Nutritional parameters in g/100 g of dry weight.

Compounds	Results
a_w	0.996 ± 0.003
Moisture	95.95 ± 0.02
Protein	10.6 ± 0.4
Fat	1.50 ± 0.01
Ash	16.4 ± 0.04
Energy value kcal	341.84± 0.20
Soluble sugar	
Fructose	14.6 ± 0.1
Glucose	42 ± 1
Sucrose	3.20 ± 0.04

Of the 19 fatty acids identified, linoleic (48.0 ± 0.1%), palmitic (24.2 ± 0.2%), linolenic (7.96 ± 0.04%) and cis-docosahexaenoic acids (3, 95 ± 0.05%) were the main molecules. As for organic acids, malic and oxalic acids were the main compounds.

Table 2. Bioactivities.

Organic Acids (g/100 g dry weight)	
Oxalic	5.148 ± 0.086
Malic	6.8 ± 0.3
Fumaric	0,052 ± 0.002
Ascorbic	0.104 ± 0.002
Fatty acid profile (%)	
SFA	34.0 ± 0.1
PUFA	61.01 ± 0.01
MUFA	3.55± 0.01

* For the calculations, the following straight lines were used: oxalic acid: y = 1E+07x + 231891; malic acid: y = 950041x + 6255.6; fumaric acid: y = 1E+08x + 614399; ascorbic acid: y = 4E+07x + 1E+06.

* SFA: Saturated fatty acids; PUFA: Polyunsaturated Fatty Acid; MUFA: Monounsaturated Fatty Acids.

Regarding the bacterial strains, the extract caused higher inhibition against *Salmonella Thyphimurium* (2.5 mg/mL).

For the antifungal activity, both *Aspergillus brasiliensis* and *Aspergillus fumigatus* were inhibited at MIC (minimum inhibitory concentration) value of 10 mg/mL.

Table 3. Antioxidant and antimicrobial activity of *A. graveolens*.

Antioxidant activity (µg/mL)								
TBARS	2315 ± 143							
Antibacterial activity (mg/mL)								
			Positive Control					
	Apium		**Streptomicin 1 mg/mL**		**Methicilin 1 mg/mL**		**Ampicillin 20 mg/mL**	
Antibacterial Activity	MIC	MBC	MIC	MBC	MIC	MBC	MIC	MBC
Gram-negative bacteria								
Enterobacter Cloacae	10	>10	0.007	0.007	n.t.	n.t	0.15	0.15
Escherichia coli	5	>10	0.01	0.01	n.t.	n.t.	0.15	0.15
Pseudomonas aeruginosa	>10	>10	0.06	0.06	n.t.	n.t.	0.63	0.63
Salmonella enterocolitica	2.5	>10	0.007	0.007	n.t.	n.t.	0.15	0.15
Yersinia enterocolitica	10	>10	0.007	0.007	n.t.	n.t.	0.15	0.15
Gram-positive bacteria								
Bacillus cereus	>10	>10	0.007	0.007	n.t.	n.t.	n.t.	n.t.
Listeria monocytogenes	10	>10	0.007	0.007	n.t.	n.t.	0.15	0.15
Staphylococcus aureus	5	>10	0.007	0.007	0.007	0.007	0.15	0.15

Antifungal activity (MIC/MFC, mg/mL)		
	Apium G.	Ketoconazole
Aspergillus brasiliensis	10/>10	0.06/0.125
Aspergillus fumigatus	10/>10	0.5/1

*Maximum concentration tested was 10mg/m for activity antibacterial.

*Maximum tested concentration was 10 mg/mL and 1 mg/mL for the antifungal.

* Positive control TBARS: Trolox = 139 ± 5 µg/mL.

CONCLUSION

- Overall, it can be concluded that celery has a good nutritional profile; thus, exploring this food in terms of nutritional benefits in addition to its good bioactive properties is a valuable research topic.
- Future work will be further conducted regarding its bioactivities testing its anti-proliferative, toxic and anti-inflammatory activity.

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