Anais do Simpósio Latino Americano de Ciências de Alimentos ()
Anais do Simpósio Latino Americano de Ciência dos Alimentos
ISSN: 2447-2840

Alkaline conditions better extract anti-inflammatory polysaccharides from winemaking by-products

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#70549

Winemaking generates a large amount of by-products which are well recognized as sources of phenolic compounds. However, less attention has been paid to their polysaccharidic fraction as a source of bioactive compounds. In this work by-products from Syrah and Tempranillo varieties in the winemaking were used to obtain bioactive polysaccharides. Three different extractions were studied (water, 1% citric acid and 1% KOH) at 80°C. Soluble polysaccharides were screened for their monosaccharide composition (gas chromatography mass spectrometry), uronic acid content (spectrophotometric method), homogeneity and molecular weight (high-pressured size exclusion column chromatography connected to multi-angle laser light scattering and refractive index detection), as well as degrees of acetylation and esterification (infrared spectroscopy). RAW 264.7 cells transfected with p-LUC gene were used as biological models. Anti-inflammatory activity of polysaccharide fractions was evaluated by the MTT (cell viability assay), TNF-α quantification and NF-κB activation (luciferase assay) on stimulated macrophages . Extracts obtained in water or under acidic conditions showed heterogeneous profiles. Conversely, homogeneous profile was detected in extracts procured under alkaline conditions. A high content of uronic acid was found in aqueous extracts indicates the presence of pectin. Pectin and hemicellulose were present in the extract procured under acidic conditions. Alkaline conditions rendered extracts containing mainly xylose and galactose and small amounts of pectin. This later extract was the only one exhibiting anti-inflammatory potential (at 100 µg/mL) by reducing the release of TNF-α and activation of NF-κB in LPS-activated RAW 264.7 macrophages, with no effect on cell viability.

These results demonstrate that, regardless of the grape variety, alkaline extraction provides the best option for obtaining bioactive polysaccharides with a low concentration of high molecular weight compounds, thus influencing their anti-inflammatory effects.

Presentation Type

Pôster

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Track

Biochemistry and Biotechnology - food science (BB)

Keywords

Polysaccharides

winemaking by-products

Biological activity

How to cite this paper?