



Toxicity and antihypertensive activity of brewer's spent grain extracts

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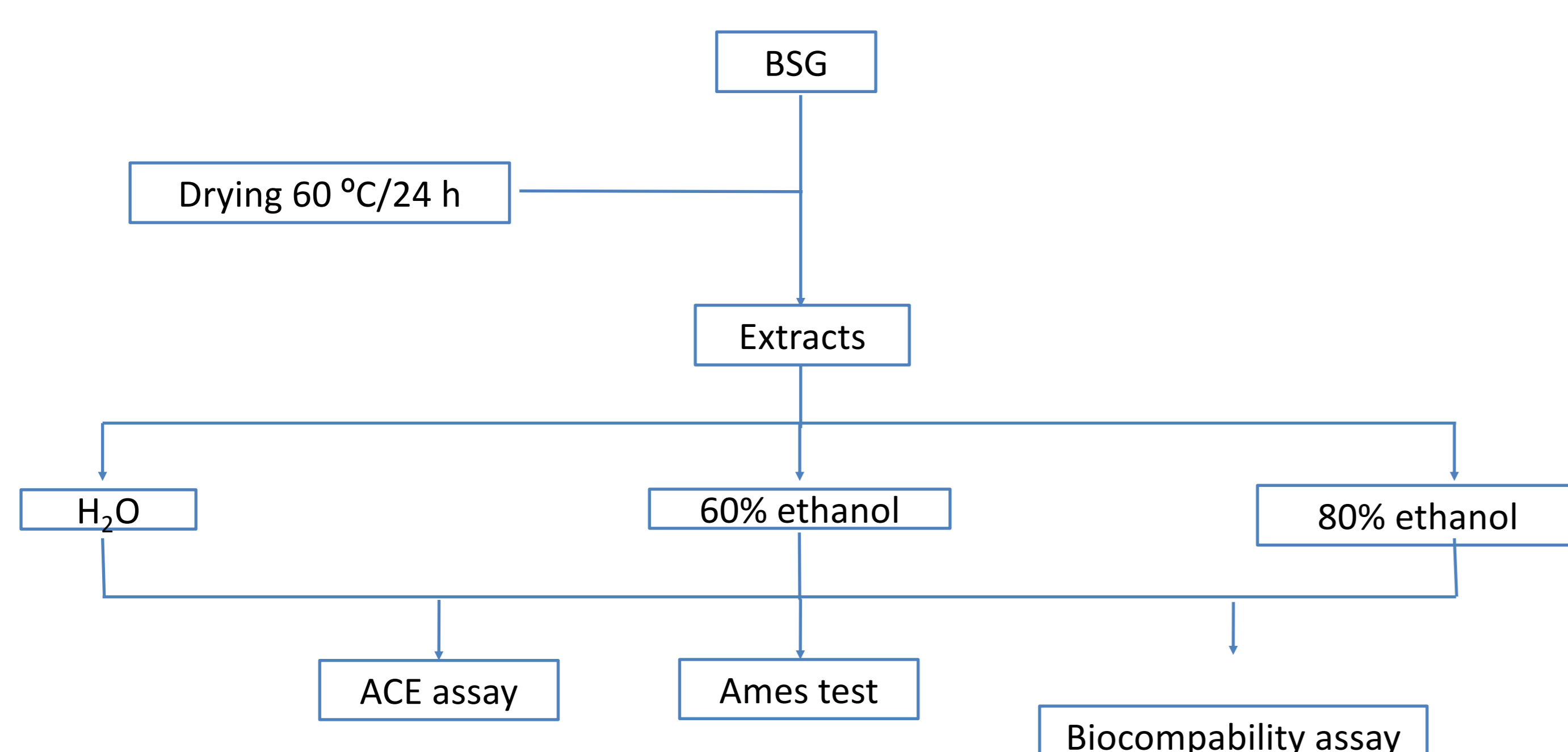
Introduction

Brewer's spent grain (BSG) is one of the most abundant by-products of the brewing industry. BSG has several components with nutritional and functional (e.g. dietary fiber, protein and phenolic compounds) potential, but poorly explored for valuable food applications. While currently used as animal feed, BSG potential makes it an interesting source for added-value compounds/products to be incorporated into foodstuffs.

The aim of this study was to evaluate the anti-hypertensive property and safety through mutagenic and cellular viability tests of BSG's hydroethanolic extracts and foresee their applicability in food.



Methods



Results

1) Anti-hypertensive Activity: Angiotensin-I converting enzyme (ACE)

Table 1 –IC₅₀ of the different BSG extracts.

Extraction solvent	IC ₅₀ (mg gallic acid equivalent/mL BSG extract)
H2O	28.88
80% ethanol:water	>14.82
60% ethanol:water	29.97

All the extracts showed excellent antihypertensive activity with values of IC₅₀ below 30 mg of gallic acid equivalents/ml BSG. Among all the extracts tested, ethanol:water 80% (v/v) was the extract with the lowest value of IC₅₀ (below 14.82 mg of gallic acid equivalents/ml BSG) and ethanol:water 60% (v/v) was the extract with the highest value of IC₅₀ (29.97 mg of gallic acid equivalents/ml BSG).

2) Genotoxicity

Regarding genotoxicity (Ames test), results showed that BSG extracts have no mutagenic activity among the different ethanol:water extracts, using different concentrations (0.2, 1, 2.5, 5 and 10 mg/mL), which validates that all the extracts have no genotoxicity.

Results

3) Biocompatibility assay

Cellular viability was determined by PrestoBlue assay using of Caco-2 and HT29-MTX cell cultures.

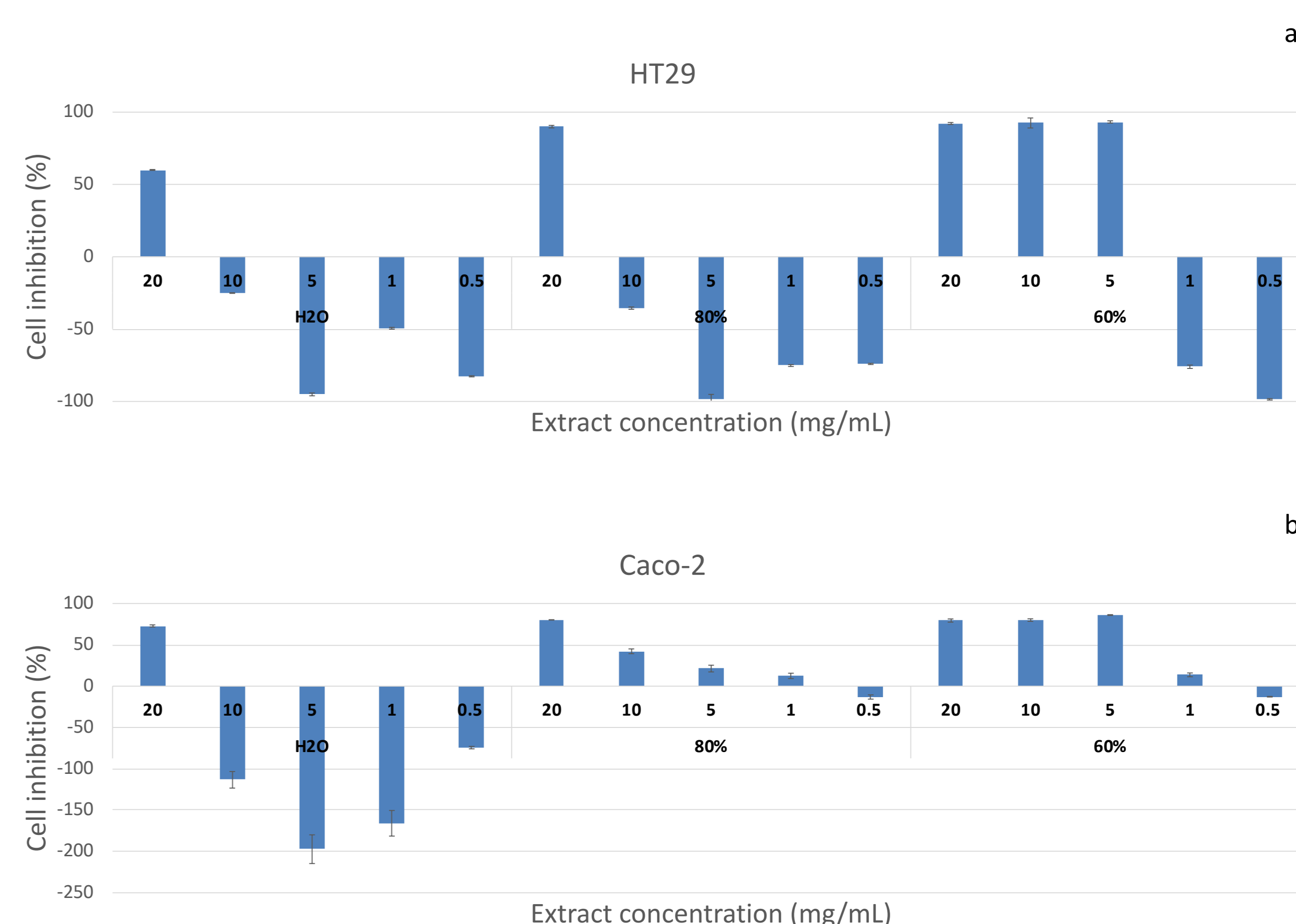


Figure 1 – Presto blue assay results. a – cell line HT29-MTX; b - cell line Caco-2.

Regarding cellular viability all the extracts tested showed cytocompatibility when using lower concentrations. When using HT29-MTX the results were better comparing with the results of Caco-2 cell culture. Extracts 80% ethanol:water (v/v) and only water had better results than the extracts using 60% ethanol:water (v/v).

Conclusion

Analysing the anti-hypertensive activity, the extract with better activity was the hydroethanolic extract 80% ethanol:water (v/v), as less extract is required to inhibit 50% of the enzyme activity. Regarding genotoxicity no extract showed mutagenic activity.

In the biocompatibility assay, HT29-MTX cell culture had better results when compared to Caco-2 cell culture, and 80% ethanol:water (v/v) and water extracts had better results than 60% ethanol:water (v/v).

In sum, hydroethanolic extracts obtained from BSG contain valuable bioactive compounds that can demonstrate BSG as potential source of functional food ingredients.

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