

Potential of Vaccinium spp. berry pomaces for design of novel health promoting products



Kaspars Jekabsons^{1*}, Reinis Rembergs¹, Jana Namniece ¹, Linards Klavins ², Maris Klavins ², Ruta Muceniece ¹

Background

Berry pomaces are insufficiently studied to obtain valuable health products. The processing of berries into juice generally results in approximately 70–80% of target product and 20–30% of by-product. It has been reported that berry pomace yields higher amounts of purified polyphenol extract than whole berries (1).

This study aimed to evaluate chemically characterized five *Vaccinium* spp. berry pomace extract biological properties by using wide range of in vitro assays.

Materials and methods

Extract red-oxy and membrane protective properties were evaluated in multiple cell-free assays such as total antioxidant capacity, free scavenging, radical superoxide anion dismutation. Anti-hyperglycaemic effects were assessed as inhibition of α -amylase and α glucosidase activity. Hepatoprotective activity was estimated in human hepatic cell line HepG2 hepatic steatosis model. Imunofluorescent images were recorded with Nikon C2 fluorescence microscope.

Results

Berries	Yield of polyphenol extract, g 100 g ⁻¹ berry press residues	Polyphenols, g 100 g ⁻¹ polyphenol extract		Anthocyanines, g 100 g ⁻¹ polyphenol extract
American cranberry	2.44 ± 0.14	47.85 ± 2.15	0.43 ± 0.02	3.13 ± 0.14
Bilberry	3.33 ± 0.18	36.45 ± 1.64	4.62 ± 0.21	13.26 ± 0.6
Bog cranberry	3.05 ± 0.17	48.54 ± 2.18	8.61 ± 0.39	5.95 ± 0.27
Blueberry	3.21 ± 0.18	55.98 ± 2.52	1.91 ± 0.09	34.75 ± 1.56
Lingonberry	2.63 ± 0.15	52.46 ± 2.36	2.04 ± 0.09	1.59 ± 0.03

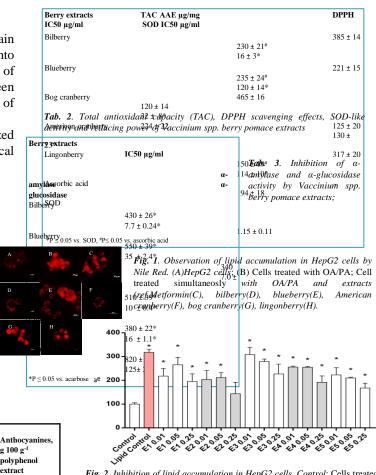


Fig. 2. Inhibition of lipid accumulation in HepG2 cells. Control; Cells treated with OA/PA; Cell treated simultaneosly with OA/PA and extracts, bilberry(E1), blueberry(E2), American cranberry(E3), bog cranberry(E4), lingonberry(E5). P<0.05 vs control

Conclusions

- 1. Billberry, blueberry, cranberry, American cranberry and lingonberry pomace extracts possess strong antioxidant effects.
- 2. All extracts showed stronger inhibition of activities of enzymes involved in carbohydrate digestion than antidiabetic drug acarbose.
- 3. At non-toxic concentration extracts protected hepatic cells from lipid accumulation.
- 4. Action of extracts might be justified by the presence of active polyphenols (anthocyanins, procyanidins, phenolic acids) or their potential synergistic effect.
- Our results support use of berry pomace extracts for design of standardized formulation which in the future could be used for the prevention of chronic diseases associated with oxidative stress and metabolic disturbances.

References

 Klavins L, Kviesis J, Nakurte I, Klavins M. Berry press residues as a valuable source of polyphenolics: Extraction optimisation and analysis. LWT - Food Sci Technol. 2018; 93:583-91.

Acknowledgements

Supported by the European Regional Development Fund within the project No. 1.1.1.1/16/A/047.





¹ Faculty of Medicine, University of Latvia, Str.1 Jelgavas, Riga, LV-1004, Latvia

² Laboratory of Natural Compounds Research, University of Latvia, Str.1 Jelgavas, Riga, LV-1004, Latvia

^{*} Kaspars Jekabsons: Kaspars.Jekabsons@lu.lv