Phenolic Compounds in Selected Oat and Rice Products

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FOOD DEVELOPMENT

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1 Introduction

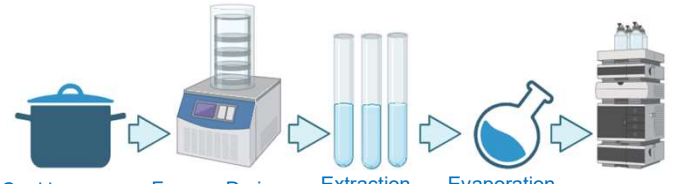
Oat and rice have significant nutritional value by containing high amounts of macro- and micronutrients, dietary fibers, and phenolic compounds. Finland is one of the biggest producers and fourth largest exporter of oat worldwide. The phenolic compounds of these sustainable cereals have been mostly studied in their natural form. Several researchers have shown that food processing has significant effects on phenolic compounds. Therefore, studying the impact of food processing on phenolic compounds in commercial products is important. OAT-GUT-BRAIN (OGB) is a clinical trial that studied the health effects of oat and rice product-based diets. This study aims to identify and quantify the phenolic acids and avenanthramides of selected oat and rice products used in the OGB trial.

2 Materials and Methods

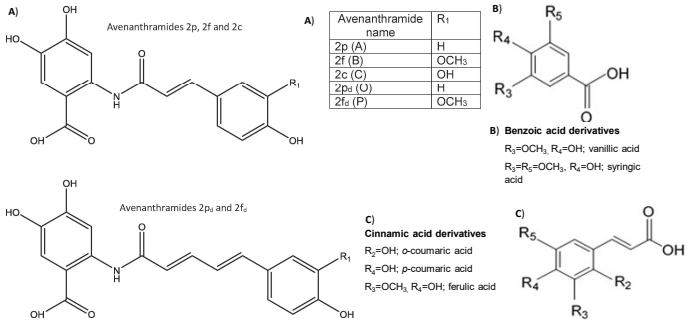
Sample Information

Figure 1. Oat products (*left*) and rice products (*right*). These oat and rice products were divided into six sample sets each. The selected samples were given to volunteers of OGB clinical intervention trial.

Phenolic Content Analysis



Identified compounds



Avenanthramide name	R_1
2p (A)	H
2f (B)	OCH_3
2c (C)	OH
2p$_d$ (O)	H
2f$_d$ (P)	OCH_3

Figure 2. Highest quantified phenolic compounds and their structure; A) Avenanthramides (A,B,C,O,P) (*left side*), B) Benzoic acid derivatives (*right side -up*), C) Cinnamic acid derivatives (*right side-down*)

References

Pridal, A. A., Böttger, W., & Ross, A. B. (2018). Analysis of avenanthramides in oat products and estimation of avenanthramide intake in humans. *Food Chemistry*, *253*, 93–100. https://doi.org/10.1016/j.foodchem.2018.01.138

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3 Results and Discussion

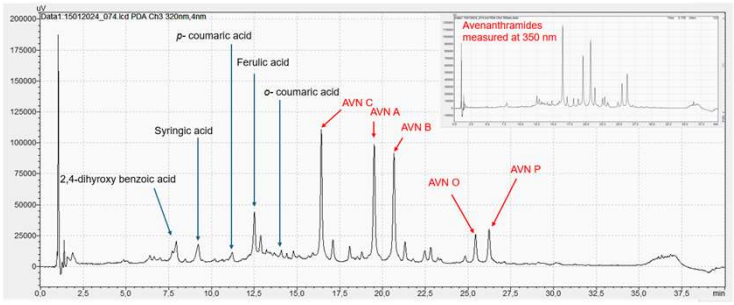

Figure 3. Oat flakes chromatogram at 320 nm for phenolic acids and 350 nm for avenanthramides

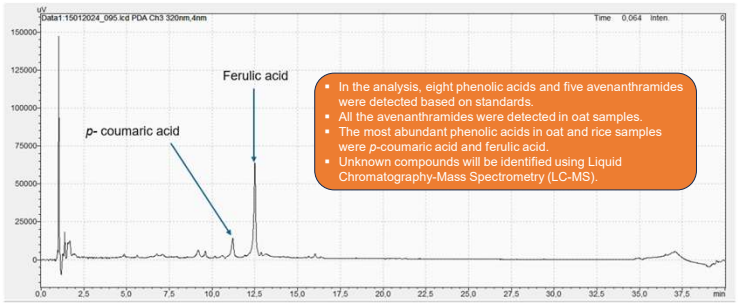

Figure 4. Rice flakes chromatogram at 320 nm for phenolic acids

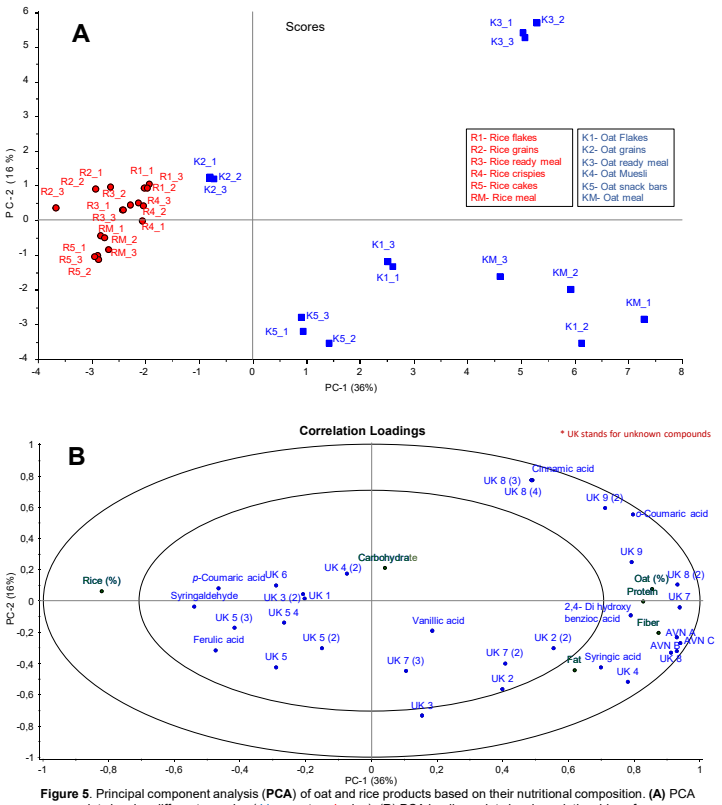

Figure 5. Principal component analysis (**PCA**) of oat and rice products based on their nutritional composition. **(A)** PCA scores plot showing different samples (blue= oat, red= rice). (**B**) PCA loadings plot showing relationships of macronutrients, phenolic compounds, and samples.

4 Conclusions

More phenolic compounds were quantified in oat samples than in rice samples, even after processing. A greater number of phenolic compounds were also identified in oat samples than in rice. Avenanthramides were only present in oat samples. Protein, fat, and fibres were higher in oat samples, whereas carbohydrates were present in almost similar amounts in oat and rice samples.