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Anticholinesterase, cognition-enhancing, anti-diabetic and antimicrobial effects of wild bilberry (*Vaccinium myrtillus* L.) fruit

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Statement of the Problem: Bilberry leaves decrease blood glucose and triglyceride levels and exert anti-diabetic effect. Here, we isolated new cholinesterase inhibitors (against Alzheimer's disease) and examined anti-diabetic, pro-cognitive, and antimicrobial effect of bilberry fruit.

Methodology: Juice was ultra-filtered (5 kDa) and freeze-dried. Preparative and analytical HPLC was used for isolation of cholinesterase inhibitors, followed by confirmation by FT-IR and NMR spectroscopy and LC-MS. Diabetes mellitus was studied using Wistar male rats (feed enriched with 25% fruit, 2 months). Glucose, fructosamine, cholesterol (total, HDL, LDL), triglycerides, AspAT, AlAT i ALP levels as well as glucose receptors and β -amyloid plaques (in brains) were examined. Cognitive tests (elevated plus maze test, seven months old rats; 2, 5 or 10 g bilberry/kg b.m. for three months) were performed. The effect of selected compounds from bilberry on the growth of lactic acid bacteria was tested (cultivation of strains in micro-plates).

Findings: New cholinesterase inhibitors- derivatives of chlorogenic acid (4-O-caffeoylquinic acid, 5-O-caffeoylquinic acid or 3,5-O-dicaffeoylquinic acid) and benzoic acid (3-(β -D-glucopyranosyloxy)-4-hydroxybenzoic acid or 4-(β -D-glucopyranosyloxy)-3-methoxybenzoic acid) were identified in bilberry. Brain mean weight was increased ($p < 0.05$), alanine transaminase activity was decreased and creatinine levels were increased in animals fed bilberry, but no differences in blood parameters between normal and diabetic rats were observed. The administration of bilberry (5 g/kg b.w./day) to rats (for three months) improved short- and long-term memory ($p < 0.05$).

Conclusion & Significance: Regular consumption of bilberry fruit can enhance the memory. Increased brain weight can be obtained, and liver functions can be normalized, but more biochemical markers should be studied to confirm these results. The hypoglycemic effect of the diet supplemented with bilberry pulp was not proved; therefore, it can be assumed that the consumption of bilberry fruit may not be helpful in the case of diabetes mellitus.

Biography

Dominik Sz wajgier has expertise in Food Analysis and Human Nutrition, especially in the analysis of poly-phenolic compounds. He focused on the role of natural plant extracts and individual phenolic compounds in the prevention of Alzheimer's disease. He tested natural plant extracts using various models of cell lines. In his professional career, he worked for a long time on the elevation of the antioxidant status of various types of beer by the increase of the content of phenolic antioxidants.

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