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Chokeberry (*Aronia melanocarpa*) fruit extract modulates mouse immune response *in vivo* and *in vitro*

Dragica Gajić[*1], Tamara Saksida[1], Ivan Koprivica[1], Milica Vujičić[1], Sanja Despotović[2], Katarina Savikin[3], Teodora Janković[3], Ivana Stojanović[1]

[1]*Department of Immunology, Institute for Biological Research "Sinisa Stankovic", University of Belgrade, Belgrade, Serbia*
[2]*Institute of Histology and Embryology "Aleksandar Dj. Kostic", School of Medicine, University of Belgrade*
[3]*Institute for medicinal plants research "Dr Josif Pancic", Belgrade, Serbia*

[*]*e-mail: gajic_dragica@yahoo.com*

Chokeberry (*Aronia melanocarpa*) is known for its strong anti-oxidant properties. Anti-inflammatory, anti-hypertensive and anti-diabetogenic activities of orally consumed chokeberry extracts have also been reported. The effects of chokeberry extract on the immune response parameters have been only sporadically assessed. Therefore, the aim of our study was to investigate the effects of orally consumed chokeberry extract on the immune response *in vivo* and *in vitro* in healthy and in diabetic C57BL/6 mice, in which diabetes was induced by multiple low doses of streptozotocin (MLDS). Chokeberry extract administered to healthy mice (50 mg/kg body weight) exerted immunomodulatory effects as evidenced by decreased proportion of $F4/80^+$ macrophages, $CD11c^+$ dendritic cells, $CD4^+$ T helper cells, $CD8^+$ T cytotoxic lymphocytes and $CD4^+CD25^-$ activated T lymphocytes within the gut-associated lymphoid tissue. Surprisingly, oral consumption of chokeberry extract in doses of either 200 mg/kg bw or 50 mg/kg bw in diabetic mice resulted in the increase of blood glucose levels. In an attempt to decipher the underlying mechanisms of chokeberry extract effects in the context of autoimmune/inflammatory disease, we have evaluated its effects *in vitro* on purified immune cells. Seemingly, the chokeberry extract exerted pro-inflammatory effects *in vitro* through the up-regulation of nitric oxide and IL-1β production in macrophages and dendritic cells, increased macrophage CD86-related activation and promotion of type 1 T helper cells ($IFN\text{-}\gamma^+$) differentiation. In addition, an increased proportion of $CD4^+$, $CD8^+$ and B lymphocytes within the spleen was observed. Collectively, the obtained results imply that our particular chokeberry extract displays pro-inflammatory characteristics and that care should be taken when chokeberry is to be included in the human diet.

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