

Effect of aqueous extract of *Achillea millefolium* on the development of experimental autoimmune encephalomyelitis in C57BL/6 mice

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Objective: *Achillea millefolium* (*A. millefolium*) is widely used as an anti-inflammatory remedy in traditional and herbal medicine. In this study, we investigated the effect of an aqueous extract from *A. millefolium* on experimental autoimmune encephalomyelitis (EAE) and on the serum cytokine levels in C57BL/6 mice.

Materials and Methods: EAE was induced in 63 C57BL/6 mice weighing 20-25 g (8 weeks old). Following immunization, the treatment protocol was initiated by using different doses of an aqueous extract from *A. millefolium* (1, 5, and 10 mg/mouse/day). Histopathologic assessments were performed by hematoxylin and eosin (H and E) and luxol fast blue (LFB) staining. Behavioral disabilities were recorded by a camera. Serum levels of interleukin (IL)-10, IL-12, and transforming growth factor (TGF)- β were measured using enzyme-linked immunosorbent assay (ELISA).

Results: On average, mice developed classical behavioral disabilities of EAE, 13.2 ± 1.9 days following immunization. Treatment of mice with *A. millefolium* led to delay the appearance of behavioral disabilities along with reduced severity of the behavioral disabilities. Treatment with *A. millefolium* prevented weight loss and increased serum levels of TGF- β in immunized mice with MOG35-55. EAE-induced mice, which were treated with *A. millefolium*, had less cerebral infiltration of inflammatory cells.

Conclusion: The results demonstrated that treatment with aqueous extract of *A. millefolium* may attenuate disease severity, inflammatory responses, and demyelinating lesions in EAE-induced mice. In addition, following treatment with *A. millefolium*, serum levels of TGF- β were increased in EAE-induced mice.

Key words: *Achillea millefolium*, cytokines, experimental autoimmune encephalomyelitis, multiple sclerosis