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Protective Effect of Essential Oil from Chamaecyparis obtusa on Anxiety-Related Behaviors and Cytokine Abnormalities Induced by Early Life Stress

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Abstract : In this study, the effect of essential oil from Chamaecyparis obtuse (EOCO) on early life stress using maternal separation (MS) rats was investigated. Anxiety-related behaviors were examined in MS rats using the elevated plus-maze (EPM) test. The changes of gene expressions by EOCO in the hippocampus of MS rats were analyzed using a microarray method. Rats in the MS groups were separated from their respective mothers from postnatal day (pnd) 14 to 28. Rats in the EOCO-treated groups were exposed to EOCO for 1 h or 2 h by inhalation from pnd 21 to 28. The EOCO-treated MS rats showed decreased anxiety-related behaviors compared to the MS rats in the EPM test. In the microarray analysis, EOCO downregulated the expressions of cytokine genes such as Ccl2, Il6, Cxcl10, Ccl19, and Il1rl in the hippocampus of MS rats, and it was also confirmed through RT-PCR. In particular, the expressions of Ccl2 and Il6 were predominantly decreased by EOCO in the hippocampus of MS rats. Interestingly, their protein expressions were also reduced by EOCO in MS rats. These results indicate that EOCO decreases MS-induced anxiety-related behaviors, and modulate cytokines, particularly Ccl2 and Il6, in the hippocampus of MS rats.

Keywords : anxiety-related behavior, Chamaecyparis obtuse, cytokine gene, early-life stress, maternal separation
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