In vitro inhibitory effects of thymol and carvacrol on dendritic cell activation and function

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Abstract

Context: Thyme has been used in traditional medicine for medicinal purposes since ancient times. Objective: The objective of this study was to investigate the effects of thymol and carvacrol as two major constituents of thyme on dendritic cells (DCs) maturation and T cell activation. Materials and methods: Splenic DCs were treated with non-cytotoxic concentrations of the components and then analyzed for MHC II, CD86, and CD40 expression by flow cytometry. The effects of compounds on mitogenic, as well as allogenic T cell responses in mixed lymphocyte culture (MLR) and the release of cytokines were investigated. Results: At 0.1 µg/ml, reduced mean fluorescent intensity (MFI) of CD86 for thymol (80.3 ± 0.2% of untreated control) and CD40 for carvacrol (79.5 ± 0.14%) was observed (p < 0.001). Decreased mitogenic T cell proliferation by thymol [proliferation index (PI) from 0.93 ± 0.11 at 1 µg/ml to 0.42 ± 0.16 at 100 µg/ml (p < 0.01)] and carvacrol [PI from 1.08 ± 0.3 at 1 µg/ml to 0.28 ± 0.1 at 100 µg/ml (p < 0.001)] was seen. Ten micrograms/ml thymol (PI, 0.85 ± 0.04) and carvacrol (PI, 0.89 ± 0.03) inhibited allogenic T cell response (p < 0.05). Decreased IFN-γ level in MLR supernatant from 1441 ± 27.7 pg/ml in untreated cells to 944 ± 32.1 at 10 µg/ml of thymol and of carvacrol (886 ± 31.7 pg/ml) (p < 0.01) was found. IL-4 levels were decreased in the presence of both compounds (p < 0.01). Conclusion: These data showed the suppressive effects of thymol and carvacrol on DCs maturation and function, as well as T cell responses. © 2015 Informa Healthcare USA, Inc.