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Effect of Dietary Herbs on Lipid Metabolism and Immune Function in Sprague-Dawley Rats.

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Objectives

Among diseases related to immune functional, the prevention of infectious diseases and allergies is important for the people (Mishra et al. 2000., Bucci et al. 2000., Roth et al. 2004). In this case, stimulation of defensive immunity and suppression of hypersensitivity are essential. In the people, the regression of defensive immunity is a major problem. Thus, the stimulation of immunological activity by these herbal components should be handled. However, information on the immune function and responsiveness to herbal components is limited. We have reported that functional components such as the flavonoids, fish oil and dietary fiber regulate serum immunological (Ig) levels and Ig productivity of spleen and mesenteric lymph node lymphocytes in rats (Lim et al. 2000, 2003a and b). In the present study, we examined the effect of dietary herb on Ig and cytokine production in rat spleen lymphocytes.

Materials and Methods

All animal care techniques were performed within the guidelines approved by the institutional animal care and use committee. Male, 4-wk-old Sprague Dawley rats housed individually in room with controlled temperature and light (20-23ºC and light cycle of 08:00 to 20:00h). After acclimation for 1 week , rats were divided into four groups of ten rats which given free access to experimental diet. The experimental diets were manufactured according to the AIN-93G standard (Reeves et al. 1993) and contained dietary herb(control), 10g/kg Echinacea, 10g/kg Ashwagandha and 10g/kg Brahmi. Herbal extracts get a following company; Extract of *Echinacea purpurea* waspurchased from Api Ltd., Gifu, Japan. Extract of *Withania somnifera* (Ashwagandha) containing 1.1% alkaloids and 3.6% withanoids was received from Gwalior Ltd., India.

Results and Discussion

Serum IgA and IgG concentration of the Brahmi was significantly higher than that of the Echinacea- and Ashwagandha. IgE and IgM concentration did not differ among groups. The effect of dietary herb on Ig level by spleen lymphocytes was examined to evaluate the response of the systemic immune system. IgA, IgG and IgM productivity in

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dietary herb was significantly higher than that in the control. Otherwise, all three dietary herbs were found to stimulate IgA, IgG and IgM production in the presence of LPS or ConA.

Various types of cytokines specifically regulate Ig production by class (Pene et al. 2004). In the absence of lectins, dietary herb significantly augmented IL-2 secretion. In addition, dietary herb did significantly influence the production of IFN-γ. In the presence of LPS, both Echinacea and Brahmi resulted in significantly higher IL-2 secretion related to the control and Ashwaganda. In contrast, Ashwaganda group did not significantly influence the production of IFN-γ and IL-2. ConA-induced IL-2 and IFN-γ production on the dietary herb was significantly higher relative to control. In the absence of LPS and ConA, the TNF-α concentration in the spleen lymphocytes was lower in the rat fed on Echinacea than in those fed on another herb. When the cells were cultured with LPS and ConA, a similar response pattern was observed. Feeding of dietary herb was accompanied by a disturbance in the IL-4 and IL-6 levels. In the absence or presence of LPS, the IL-4 production did not differ among groups. On the other hand, LPS and ConA-induced IL-6 production in the Brahmi group was significantly higher relative to other group.

The administration of Echinacea and Brahmi induced significant decreases in the serum cholesterol and phospholipidslevels, and significant increases in the serum IgG level and all Ig productivity of spleen. These results suggest that dietary herb affected both lipid metabolism and immune system.

Our study suggest the possibility of clinical applications of dietary herb containing Brahmi based on it immunoregulatory effects. Although the mechanism by which the herbal components modify immune indices is not apparent at present, the current observations opened a new aspect of the pharmacological role of dietary herb.