Acute effect of ethanol on IgA immunoreactive cells in the intestine-associated immune system

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Abstract:
The purpose of this study was to investigate the acute effect of ethanol on mucosa-associated lymphoid tissue at the level of Peyer’s patches and the intestinal lamina propria in female rats and to determine whether this action of ethanol is modulated during the estrous cycle. Adult female rats showing proestrus or diestrus day 1 were treated intraperitoneally (ip) with ethanol (4 g/kg). Untreated and saline-injected rats were used as controls. The animals were sacrificed by decapitation 0.5 h after ethanol administration. Immunoglobulin A (IgA) immunoreactive cells were analyzed by indirect immunohistochemistry using mouse anti-rat IgA and a Dako LSAB+ kit. The number of IgA-immunoreactive cells in Peyer’s patches was unaltered by ethanol treatment at both phases of the estrous cycle. However, stereological analysis revealed a significant increase in the number of IgA-immunoreactive cells (p < 0.01) in the intestinal lamina propria following acute ethanol administration at proestrus and on diestrus day 1. The results indicate that the intestinal lamina propria, the effector site of the mucosal immune system, can be affected by a single dose of ethanol at both phases of the estrous cycle.

Key words: ethanol, IgA, Peyer’s patches, intestinal lamina propria, estrous cycle

Introduction

Clinical observations in humans and experimental studies in animal models have shown that alcohol, the most commonly abused substance, modulates both innate and acquired immunity [17, 21, 32]. Ethanol-induced changes include loss of lymphoid cells from the thymus, spleen, peripheral blood [16], lymph nodes [28], inhibition of accessory cell function of monocytes and myeloid dendritic cells [33] and of T-cell proliferation [6], suppression of primary antibody response [15] and splenic natural killer activity [36], as well as interference with cytokine networks [7].

It has also been reported that ethanol consumption can affect gut-associated lymphoid tissue (GALT) in mice [18, 19, 29]. Whereas effects of chronic ethanol consumption have been studied by many investigators, less is known about the acute immunomodulatory effects of ethanol.

Previously, we have demonstrated that a single dose of ethanol affects the rat thymus [3, 4], spleen [5] and granulocytopenia [31]. To the best of our knowledge there are no earlier reports on the effect of acute ethanol treatment on the mucosal immune system. Therefore, we considered that it would be interesting to determine whether a single dose of ethanol could alter the mucosa-associated lymphoid tissue at the level of Peyer’s patches and the intestinal lamina propria in female rats. Bearing in mind gender differences in the pharmacokinetics of ethanol in humans...