

Title *Effect of cigarette smoke on micro-architecture of respiratory organs with and without dietary probiotic*
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Abstract:

Respiratory changes induced by cigarette smoke exposure included goblet cell hyperplasia and regional distention of airspaces. Probiotics generally promoted mucosal tolerance but they needed to be evaluated for maintenance of respiratory micro architecture integrity upon exposure to cigarette smoke. Prophylactic use of probiotics was performed to observe reduction of respiratory damage induced by cigarette smoke exposure. Adult mice (n=24) were randomly divided into three groups (cigarette-smoke exposed group, Lactobacillus+ cigarette-smoke exposed group, air- exposed group), each having 8 mice. Mice were exposed to cigarette-smoke for 28 days (6 cigarettes/ day for 6 days/week). Thereafter, 3 mice per group were selected for bronchoalveolar lavage. Wright-Giemsa staining of BALF was performed. Tissue samples of trachea and lungs of 7 mice from each group were collected for histology. Samples were processed by paraffin embedding technique for H & E (lungs, trachea) and AB-PAS (trachea) staining. The effect of cigarette smoke with and without dietary Lactobacillus was studied on trachea (goblet cell number, ratio and loss of cilia), lungs (airspace distention) and composition of BALF. The results were analyzed through One-way ANOVA and statistical differences among groups were compared using Duncan's Multiple Range Test ($P < 0.05$). The results obtained from PAS-AB stained trachea showed that the number of goblet cells was increased in CS group. After cigarette smoke exposure, the goblet cells having acidic glycoprotein were found to be higher in quantity as compared to all other types of goblet cells. In other two groups (CS+P and Cn) all type of cells were found to be lower than that of CS group. Goblet cell index showed that cigarette smoke resulted in goblet cell hyperplasia even on short-term exposure. This result was significant and resembled with the previous observations. In Cn group, epithelial cells were more than goblet cells. It showed that cigarette smoke caused increase mucous production by increasing number of goblet cells and probiotics resulted in reduction of mucous production by preventing irritation produced by smoke. The observation of H & E stained tracheas under light microscope showed significant loss in cilia in CS group but little or no loss in CS+P group and Cn group respectively. In lungs, distended airspaces were found in CS group, especially at 150µm radius. The composition of BAL fluid showed increase in inflammatory cells especially in cigarette smoke exposed animals while the use of probiotic reduced their number. All results were found to be very significant. Conclusion: Prophylactic use of probiotic reduces respiratory changes induced by cigarette smoke.