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Protective Effect of Diosgenin against Silica-Induced Tuberculosis in Rat Model

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Abstract : Background Silicosis is an occupational disease of the lung that is caused by chronic exposure to silica dust. There is a higher frequency of co-existence of silicosis with tuberculosis (TB), ultimately resulting in lung fibrosis and respiratory failure. Chronic intake of synthetic drugs has resulted in undesirable side effects. Diosgenin is a steroidal saponin that has been shown to exert a therapeutic effect on lung injury. Therefore, we investigated the ability of diosgenin to reduce the susceptibility of silica-induced TB in rats. Method Silicosis was induced by intratracheal instillation of 50 mg/kg crystalline silica in Sprague Dawley rats. Different doses of diosgenin (1, 10, and 100 mg/kg), Mycobacterium smegmatis and saline were administered for 30 days. Afterwards, 5 of the rats from each group were sacrificed, and the 5 remaining rats in each group, except the control, received Mycobacterium smegmatis. Treatment of diosgenin continued until the 50th day, and the rats were sacrificed at the end of the experiment. The result was analysed using a one-way analysis of variance (ANOVA) with a Graph-pad prism Result At a half-maximal inhibition concentration of 48.27 µM, diosgenin inhibited the growth of Mycobacterium smegmatis. There was a marked decline in the levels of immune cell infiltration and cytokines production. Lactate dehydrogenase and total protein levels were significantly reduced compared to control. There was an increase in the survival rate of the treatment group compared to the control. Conclusion Diosgenin ameliorated silica-induced pulmonary tuberculosis by declining the levels of inflammatory and pro-inflammatory cytokines and, in effect, significantly reduced the susceptibility of rats to pulmonary TB.

Keywords : silicosis, tuberculosis, diosgenin, fibrosis, crystalline silica
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