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Effects of Oligoelements Se, Zn, and Mn plus Lachesis Muta Venom in Experimental Scleroderma

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Abstract Scleroderma, sclerosis of the skin, is a severe autoimmune disease refractant to all kind of treatments. To study the in vivo effects of a combination of three oligoelements selenium (Se), zinc (Zn), and manganese (Mn) plus Lachesis muta venom (O-LM) on the bleomycin (BLM)-induced scleroderma mouse experimental model. C3H mice were randomly divided into four groups: control (phosphate-buffered saline (PBS)), O-LM, BLM, and BLM+O-LM. All administrations were performed subcutaneously into the back of mice. BLM was injected 5 days per week for three consecutive weeks and O-LM was administered simultaneously with BLM from the beginning of the experiments and lasted for 3 weeks after the final BLM or PBS injection (for O-LM and BLM+O-LM groups), when animals were sacrificed and histopathological, immunohistochemical, thiobarbituric acid reactive species (TBARS) evaluation, and autoantibodies detection were determined. O-LM significantly reduced BLM-induced enhanced dermal thickness (605±47 vs. 956±59 μm, $P<0.01$), collagen deposition, and mast cells infiltration (43.1±1.0 vs. 102±14.1 mast cells, $P<0.05$). O-LM administration significantly blocked BLM-induced oxidative damage and the enhanced immunoreactive fibroblasts for α-smooth muscle actin while reduced BLM-induced autoantibodies that strongly react mainly with skin and spleen. O-LM significantly reduced BLM-induced scleroderma through the modulation of antioxidant and immunological pathways.

Keywords Scleroderma · Skin · Bleomycin · Oligoelements · Mouse

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Introduction

Systemic sclerosis (SSc) is a severe clinically heterogeneous disorder considered an autoimmune disease that displays a progressive accumulation of extracellular matrix components (ECM), which affects the connective tissue of the skin and internal organs such as gastrointestinal tract, lung, heart, and kidney with fibroblast activation [1, 2].

Cutaneous symptoms often associated with Reynaud's phenomenon and arthralgias of the fingers are usually early signs in the course of this disease. Patients with larger amount of cutaneous involvement are more likely to have problems in several organs. SSc can also affect any part of the gastrointestinal tract with severe consequences on nutritional status of patients. In this sense, the most common manifestation occurs in the esophagus [3]. Scleroderma, sclerosis of the skin, is the

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