



Time-dependent Morphological and Biochemical Changes following Cutaneous Thermal Burn Injury and Their Modulation by Copper Nicotinate Complex: An Animal Model

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Abstract:

Background: Thermal tissue injury is partly mediated by reactive oxygen metabolites. Oxygen free radicals are contributory to local tissue damage following thermal injury and accordingly an interventional therapy using antioxidants may be beneficial. Copper nicotinate complex can scavenge reactive oxygen species (i.e., has antioxidant activity). **Objectives:** To examine time-related morphological and biochemical changes following skin thermal injury and their modulation by copper nicotinate complex. **Materials and Methods:** An animal model composed of 80 albino rats was established. Ten rats (nonburn group) served as a control group. Seventy rats (burn group) were anesthetized, given a 10% total body surface area, full-thickness burn. Ten rats (from the postburn group) were sacrificed after 24 h (without treatment, i.e., untreated-burn group). The remaining rats were divided into three subgroups (20 rats, each) and were treated topically either with soft paraffin, moist exposed burn ointment (MEBO, a standard therapeutic treatment for burns), or copper nicotinate complex. Five animals from each subgroup were sacrificed every week over a period of 4 weeks. The morphological and biochemical changes were evaluated and compared among the different groups. **Results:** High levels of the plasma and skin nitric oxide (marker of oxidative stress) were observed in the untreated-burn group. These levels were significantly low following the application of copper nicotinate complex. Low levels of plasma and skin superoxide dismutase (marker of oxidative stress) and plasma ceruloplasmin were observed in the untreated-burn group. These levels were significantly high following copper nicotinate complex treatment. The total and differential leukocyte counts were low following the onset of the thermal injury. They gradually returned to normal levels over a 4-week period following the application of MEBO or copper nicotinate complex. Compared to untreated-burn group, postburn-healing changes (resolution of the inflammatory reaction, reepithelization of the epidermis, angiogenesis, deposition of collagen fibers, and recovery of the subcellular organelles) were significantly accelerated following the application of either MEBO or copper nicotinate complex. **Conclusions:** Application of copper nicotinate complex was associated with improved healing of the thermal burns of the skin. The underlying molecular changes underlying these effects await further investigations.

Keywords:

Angiogenesis, copper nicotinic complex, MEBO, thermal burn

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