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Wound healing by topical application of antioxidant Iron chelators: kojic acid and deferiprone

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Background and Aims: Among factors which potentially disturb wound healing process, oxidative stress are the major causes of delayed healing. Fenton reaction and Iron-catalysed formation of reactive oxygen species(ROS) is proposed to be a critical mechanism related to the accelerated apoptosis in injured tissues with poor rate of wound healing. Role of vitamins C and E in wound healing has been clearly discussed. There are also reports of iron chelating agents with wound healing properties. Promoted neovascularisation and enhanced wound healing by deferoxamine, a potent iron chelator, has been reported. As iron chelation and free radical scavenging are principal factors for wound healing, hypothesized that deferiprone and kojic acid potentially meet mentioned criteria for effective wound healing by possessing both antioxidant and iron chelation capabilities.
Methods: Circular incisions(diameter of 1cm) over skin of the back of rats were used as standard in-vivo wound model. Ointments of 3%, 6% and 9%of deferiprone and kojic acid were prepared and topical treatment was performed on wound models for 12 days twice in day for test and control groups. For determination of wound healing, animals anaesthetized and photos were taken from their wounds in same conditions in days 4, 8 and 12 after surgery. ImageJ software was used for calculation of wound's area. DPPH scavenging assay was also performed to compare antioxidant potencies of kojic acid and deferiprone.
Results: Topical treatment with 3%, 6% and 9% deferiprone showed significant wound healing after 4 days. Topical application of 3% and 6% deferiprone enhanced wound healing after 8 days. Accelerated wound healing was seen using 3% and 6% deferiprone after 12 days. Deferiprone had more free radical scavenging power than kojic acid.
Conclusions: Generally, deferiprone topical treatment, accelerated wound healing more than kojic acid because of its higher antioxidant and iron chelation abilities.

Keywords: Antioxidant; Deferiprone; Iron chelator; Kojic acid; Wound healing