Original Article

INFLUENCE OF CONTACT ULTRASONIC WITH DIFFERENT POWER DENSITIES ON FULL-THICKNESS WOUNDS HEALING: AN EXPERIMENTAL STUDY

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ABSTRACT

Effect of ultrasound power density on wound-healing process in rats was investigated. Forty five adult *albino* male albino rats were divided into 3 equal groups (15 rats in each group); one was used as a control group while the others were subjected to ultrasound treatment of power density of 0.5 W/cm^2 and 1 W/cm^2. All rats were anesthetized by inhalation (diethyl ether) and a 2 x 2.5 cm area wound was made on the dorsum. Rats in groups **A** and **B** were treated with pulsed therapeutic ultrasound for 10 min, 3 times a week at a frequency of 1 MHz and at a power density of 0.5 W/cm^2 and 1 W/cm^2, respectively, while rats in group C received sham ultrasound. Subsequently, the wound was captured by digital camera and was measured using transparent film, metric graph paper and flexible ruler 3 times a week until closure was complete**.** Significant reduction of the wound area, and linear dimensions in all three groups of rats was observed. After 14 days of treatment, wound area reduction as well as wound dimensions reduction were more pronounced in group A and to a lesser extent in group B in comparison to group C. Results indicated that ultrasound at 0.5 W/cm^2 and 1 W/cm^2 caused positive changes in the healing process with ultrasound at 0.5 W/cm^2 being more effective.

KEYWORDS: Full thickness Wounds, Rats, Ultrasonic, Power Density, Physiotherapy.

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INTRODUCTION

Wound is a breach formed in the normal continuum of the cellular and molecular structure of the body, thereby creating a disruption in the cellular, anatomic and as well as in their functional continuity. Wound healing or wound repair is an intricate process in which the skin or organ or tissue repairs itself after injury [1]. Wound can be healed as spontaneous process in the organism through a cascade of events, which starts by switching on various chemical signals in the body. While partial thickness wound heals by mere epithelialization, the healing of full thickness wound which extends through the entire dermis involves more complex well-regulated biological events. The healing process begins with the clotting of blood and is completed with remodeling of the cellular layers of the skin. The whole process can broadly be classified into 5 overlapping phases, namely, inflammation, granular tissue formation, re-epithelialization, matrix production and remodeling. [2]

Tissue injury results in local vascular injury. The ensuing bleeding floods the wound with mediators of the coagulation cascade. Factors are released to attract platelets to the site of injury. These include mediators such as platelet-derived growth factor and transforming growth factor beta. Macrophages are attracted to the site of injury by these factors, debride local necrotic tissue and orchestrate the wound healing process by releasing cytokines such as interleu-