BIO030

Stimulus of chitosan-alginate biomembrane in inflammatory phase and on re-epithelialization of skin wounds in rats

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Introduction: Chronic wounds require a long treatment time, resulting in high-cost medical care. Therefore, the search for new natural therapeutic healing substances, non-toxic and easy access to population has gained importance in recent years. Chitosan and alginate are well-known for healing properties. Chitosan, a natural cationic polymer, is biologically renewable, biodegradable, biocompatible, non-antigenic, non-toxic, biofunctional, and it can accelerate wound healing process enhancing functions of inflammatory cells, macrophages, and fibroblasts. Alginate, an anionic polymer, also is biocompatible, hydrophilic, and biodegradable under normal physiological conditions. It is able to maintain a physiologically moist microenvironment that promotes healing, the formation of granulation tissue and achieves hemostasis. **Objective:** The purpose of this study was to evaluate the influence of chitosan-alginate biomembrane in the inflammatory phase and re-epithelialization on wound healing in rats. **Methods:** 40 Wistar rats (200-220g) were anaesthetized by 4% chloral hydrate (1.0 mL/100g weight). After shaved the dorsal hair, two excisional wounds were performed by punch (1.5 cm diameter). Rats were divided in two groups according to respective wound-treatment: BQA group (both wounds of each rat received chitosan-alginate biomembrane moistened with saline) and SF group (both wounds were treated only with saline). After this, the wounds received occlusive dressing with gauze and tape. All wounds were moistened daily up to the 7th day and biomembranes were not removed. On 2, 7, 14 and 21 days post-injury, five rats of each group were euthanized and evaluated the re-epithelialization by wound healing rate. One biopsy of wound/scar was harvested, fixed on 10% formalin, and stained with hematoxylin-eosin for quantification the inflammatory cells by ImageJ software. Other one was used for myeloperoxidase assay (MPO), to evaluate the neutrophilic infiltrate on injured tissue, and by determining the levels of hydroxyproline (HyP) to evaluate the collagenesis. **Results:** BQA increased the recruitment of inflammatory cells to wound, different from SF ($p=0,0134$) on 2nd day. On 7th day, BQA decreased inflammatory infiltrate relation to 2nd day ($p=0,0038$), whereas SF maintained the similar. Both groups showed similar amount of inflammatory infiltrate on 7th day, and decreasing during the follow-up ($p>0,05$). Regarding to MPO, both groups showed similar neutrophilic infiltrate on 2nd day. On 7th day, BQA showed an important MPO reduction relation to 2nd day ($p=0,0326$), whereas SF showed higher MPO than BQA ($p=0,0043$). All groups showed low level of MPO during the follow-up ($p>0,05$). Thus, BQA seemed to stimulate the inflammatory phase of wound healing increasing inflammatory cells on 2nd day and modulate this stimulus on 7th day. This stimulus seemed be important to accelerate de reepithelialization and collagenesis. By HyP assay, BQA showed higher collagenesis than SF on 2nd ($p=0,0042$) and 21st days ($p=0,0249$), however on 14th day SF showed more collagenesis than BQA ($p=0,0010$). BQA showed more pronounced reepithelialization on 7th day than SF ($p=0,0006$). **Conclusions:** Chitosan-alginate biomembrane regulated the inflammatory phase and stimulated the collagenesis, accelerating the wound healing on rats.

Keywords: wound healing, chitosan, biological dressings, image processing computer-assisted

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