Comparative Histological Analysis: Exploring Exosomes and P.R.P in Tissue Regeneration

Review Article

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ABSTRACT

Background and Objectives: Alkali damage to the cornea can be catastrophic and frequently results in lifelong pain and visual loss. The investigation and comparison of the potential therapeutic effects of PRP, ADSCs, and MSCs-EX in experimentally caused corneal alkali burn in rats was the goal of this work.

Materials and Methods: 60 adult male albino rats were used in this study. Ten rats were used for PRP preparation. Ten rats served as control group (I). A single sub-conjunctival injection of PBS in the amount of 0.2 ml was given to 10 seemingly healthy rats. Rats were sacrificed 3 weeks later. The remaining 40 rats were subjected to corneal alkali burn in right eyes only by round filter paper which was rinsed by (1N) NaOH then covering the rat corneal surface for 45 seconds, then rats were divided into: Group II (Alkali burn group): 10 rats were left untreated, and then were sacrificed 3 weeks later. Group III (PRP group): 10 rats were injected by a single sub-conjunctival dose of 0.5 ml of platelet-rich plasma (PRP) 2 hours after the alkali burn in right eyes, and then were sacrificed 3 weeks later. Group IV (ADSCs group): 10 rats each received a single dose of 1.3 × 105 cultured and PKH26 labelled AMSCs suspended in 0.2 ml PBS 1 hour after the alkali burn in right eyes sub-conjunctively, and then rats were sacrificed 3 weeks later. Group V (MSCs-EX group):10 rats were injected sub-conjunctively with a single dose of 100 μg protein/mL PKH26 labelled MSCs-EX diluted with 0.2 ml PBS 1 hour after the alkali burn in right eyes, and then rats were sacrificed 3 weeks later. Morphometric and statistical studies were done.

Results: Deterioration of histological architecture of the cornea was detected in alkali burn group, desquamation, separation and even complete shedding of the epithelium with degeneration of superficial cells & flat basal cells, degenerated keratocytes, widely separated irregularly arranged collagen bundles, with dilated, congested blood vessels & inflammatory cellular infiltration in between. Treatment with either PRP, stem cells and exosomes resulted in different degrees of improvement, in the form of regeneration of corneal epithelial cells and reduction of apoptotic cells. In addition, less separation of collagen bundles and disappearance of neovascularization and cellular infiltration were detected. There is regression of neovascularization and apoptotic cells as well as the area of collagen fibers. All these parameters were confirmed morphometrically, in comparison to control group.

Conclusion: It could be concluded that treatment with MSCs-EXs appeared to be more effective than PRP and ADSCs in improving corneal injury induced by alkali burn in rat model.

ISSN: 1110-0559, June 2024, Vol. 8, No. 1.

 DOI: 10.21608/JMH.2024.392631