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مركز الشبكات وتكنولوجيا المعلومات

قسم التوثيق الإلكتروني

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قسم

نقسم باللّه العظيم أن المادة التي تم توثيقها وتسجيلها

علي هذه الأقراص المدمجة قد أعدت دون أية تغيرات

Comparative Study on the Effect of Mesenchymal Stem Cells Derived Exosomes Versus Platelets Rich Plasma on Healing of Skin Burn in Albino Rat. A Histological Study

Thesis

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Dedication

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List of Contents

Title Page No.

List of Abbreviations

Abb.	Full-term
ADSCs	Adipose tissue derived stem cells.
AMPs	Antimicrobial peptides.
ANOVA	One-way analysis of variance.
DAB	Diaminobenzidine tetrahydrochloride.
DEPA	Dose, efficiency, purity, activation process of the PRP.
DMEM	Dulbecco's modified Eagles medium.
DNA	Deoxyribonucleic acid.
ECM	Extracellular matrix.
EGF	Epidermal growth factor.
EMT	Epithelium mesenchymal transition.
EPC	Endothelial progenitor cells.
FBS	Fetal bovine serum.
FGF-2	Fibroblast growth factor-2.
FGF-9	Fibroblast growth factor-9.
GFs	Growth factors.
H&E	Haematoxylin and eosin.
H2O2	Hydrogen Peroxide.
HPF	High power field.
HRP	Horse-radish peroxidase.

List of Abbreviations (Cont.)

Abb.	Full-term
IFN-γ	Interferon-γ.
IGF-1	Insulin-like growth factor-1.
IL-1β	Interleukin-1β.
IL-6	Interleukin-6.
IP	Intraperitoneal.
LP-PRF	Leukocyte-poor platelet-rich fibrin.
LP-PRP	Leukocyte-poor PRP.
LR-PRF	Leukocytes-rich platelet rich fibrin.
LR-PRP	Leukocyte-rich PRP.
LSD	least significance difference.
MASRI	Medical Ain Shams Research Center.
mRNA	Messenger Ribonucleic acid.
MSCs	Mesenchymal stem cells.
MVEs	Multivesicular endosomes.
NF-kB	Nuclear factor kappa B.
PAP	Platelet average plasma.
PBS	Phosphate buffer saline.
PCNA	Proliferating cell nuclear antigen.
PDGF	platelets derived growth factor.
PPP	Platelet poor plasma.

List of Abbreviations (Cont.)

Abb.	Full-term

PRF..... Platelet-rich fibrin.

PRP.....Platelet-rich plasma.

RCMB .....Regional Center for Mycology and Biotechnology.

ROS .....Reactive oxygen species.

rpm .....Round per minute.

SD.....Standard deviation.

SKP .....Skin derived precursor.

SPSS.....Statistical Package for the Social Sciences.

TBI .....Traumatic brain injury.

TEM .....Transmission electron microscopy.

TGFα .....Transforming growth factor-α.

TGF-β.....Transforming growth factor-beta.

TNF-α.....Tumor necrosis factor-α.

UV .....Ultraviolet.

VEGF .....Vascular endothelial growth factor.

γ-δ.....Gamma delta.

List of Diagrams

Diagram. No.	Title	Page No.

Diagrams in Review:

List of Tables

List of Histograms

Histo. No. Title Page No.

ABSTRACT

Background:

Burn injury is considered one of the major causes of trauma to the human body that may lead to death and disability. Secondary infections, long healing periods, and healing with scars still appear as the main difficulties in burn wound management. Therefore, new strategies are needed to promote and help in wound healing and repair.

Recent studies have demonstrated that exosomes help tissue repair because of high stability, non-immune rejection and easy control of dosage and concentration.

Platelet-rich plasma (PRP) is an autologous concentration of platelets in concentrated plasma. It has been used to promote soft and hard tissue healing.

Aim of the work: to compare the effect of Mesenchymal stem cells (MSCs) derived exosomes versus platelets rich plasma (PRP) on the promotion of healing of experimentally induced second degree partial thickness burn injury in adult male albino rats.

Materials and methods:

The thirty-two adult male albino rats were divided randomly into 4 groups. **Group I** (control). **Group II** (burn injury group) that will be left for spontaneous healing**. Group III** (burn injury treated with PRP intradermal injection). **Group IV** (burn injury treated with intradermal MSCs derived exosome). All the animals were sacrificed at 7th day (subgroup a) and 21th day (subgroup b). The skin biopsies were obtained and processed for histological and immunohistochemical studies. Morphometrical & statistical analysis was also done.

Results:

H&E stained section of untreated burn **(subgroup IIa)** showed coagulative necrosis of the epidermis and papillary layer of the dermis. Sign of epithelial migration from the edge of the wound appeared. Significant decrease in both area percentage of collagen fibers and CD34 positive cells was detected in the dermis compared to all other subgroups. In **Subgroup IIb** the surface of the wound was covered by an eschar that converted partial thickness burn into complete thickness burn. Absence of epidermis occurred with significant decrease in area percentage of collagen fibers in the dermis. The dermis also showed apparent increase in the inflammatory cells together with significant increase in CD34 positive cells. In **PRP treated group,** the epidermis revealed incomplete differentiation with significant decrease in the epidermal thickness

compared to exosomes treated group. After **1 week** PCNA positive cells showed significant decrease While, area percentage of collagen fibers and CD34 positive cells showed significant increase compared to exosomes treated subgroup. After **3 weeks, PRP treated subgroup** showed significant increase in PCNA positive cells compared to exosomes treated subgroup. However, the area percentage of collagen fibers and CD34 positive cells were similar to control group. **One-week exosomes treated subgroup** revealed well differentiated epidermis with significant increase in the epidermal thickness and PCNA positive cells compared to PRP treated subgroup. However, there was significant decrease in the area percentage of collagen fibers and CD34 positive cells compared to PRP treated subgroup. **Three weeks exosomes treated subgroup** showed statistical results similar to control group.

Conclusion:

The current study revealed that burn treated exosomes group was better than PRP treated group. In addition, PRP treated group revealed hyperplastic changes in epidermis with abnormal remodeling phase of burn healing in 20% of specimens.

Keywords: partial thickness skin burn, MSCs derived exosomes, PRP, male albino rat.