

**Ministry of Higher Education
& Scientific Research
Baghdad University
College of Dentistry**



**The Role of Topical Application of Bone
Morphogenetic Protein 7 (BMP7) on
Bone Healing on Rabbits
(Immunohistochemical Study on TGF- β 3 & IGF-1R)**

A Thesis

Submitted to the Council of College of Dentistry, Baghdad
University, In Partial Fulfillment of Requirements for The
Degree of Master in Oral Histology

Submitted by

Rabab Ikram Ghareeb
B.D.S.

Supervised by

Assist. Prof Dr. Eman Issa Mahdi
B.D.S., M.Sc., Ph.D.
In Oral Histology

1436 A.H

2014 A.D

ABSTRACT

Background:

Bone is essentially a highly vascular, living, constantly changing mineralized connective tissue. It is remarkable for its hardness, resilience and regenerative capacity, as well as its characteristic growth mechanisms. Bone Morphogenetic Proteins (BMPs) form a unique group of proteins within the Transforming Growth Factor beta (TGF- β) superfamily and have pivotal roles in the regulation of bone induction, maintenance and repair. Bone morphogenetic protein type 7 (BMP-7) is a potent local factor, which promotes bone formation and has been used as an osteogenic supplement for mesenchymal stem cells and has demonstrated the ability to stimulate bone regeneration in multiple skeletal sites, including the craniofacial complex. The transforming growth factor beta (TGF- β) are multifunctional cytokines, TGF- β signaling pathway is involved in many cellular processes in both the adult organism and the developing embryo including cell growth, cell differentiation, apoptosis. Insulin growth factor-1 (IGF-1) plays a central role in cellular growth, differentiation, survival, and cell cycle progression.

Aims of the study:

1. To evaluate the effect of bone morphogenetic protein7 (BMP7) on bone healing in artificially created intrabony defect in rabbits upper diestma, histologically.
2. To study the immunohistochemical expression of TGF- β 3 and IGF-1R as bone formation markers in experimental and control groups during bone healing.

Material and method:

Forty male rabbits, was used in this study, 8 rabbits for each healing interval (3 days, 1,2 ,4 and 6 weeks). In each rabbit two bone holes were created on the right and left sides of the maxilla. BMP7 was applied to the bone hole in the left side while bone hole in the right lefted for normal healing. Routine processing and sectioning

technique performed for histological evaluation. Immunohistochemical analysis utilized to localize the expression of TGF- β 3 and IGF-1R in experimental and control groups for all animals.

Results:

1. Histological findings indicated that bone defect coated with BMP7 illustrated an early bone formation, mineralization and maturation in comparison to control group.
2. Immunohistochemical findings revealed high positive expression for TGF-B3 and IGF-1R in experimental in comparison to control group.

Conclusion:

The study concluded that BMP7 protein enhance bone healing and maturation, also it regulate the expression of TGF-B3 and IGF1R in bone.