Modulatory Effects of Zoledronic Acid on Methylprednisolone-Induced Osteoporosis of Alveolar Bone in Albino Rats

(Histomorphometric and Immunohistochemical study)

Thesis

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بسم ا   الرحمن الرحيم

قَالُوا سبحانك لاَ علم لَنَا إِلاّ ما

علّمتَنَا إِنك أَنتَ الْعليم الْحكيم

صـ ـدق ا   العظيـ ـم

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Dedication

To my Family

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List of Abbreviations

AGA	: Arginine-Glycine-Aspartate
BMD	: Bone mineral density
CC	: Cutting cone
DEXA	: Dual energy Xray absorptiometry
FC	: Filling cone
GC	: Glucocorticoids
H&E	: Hematoxylin and Eosin
IAP	: inhibitor of apoptosis protein
IGF-I	: Insulin-like growth factor I
Mpsl	: Methylprednisolone
MT	: Masson Trichrome
NIH	: National Institute of Health
PBS	: Phospate buffer saline
PDL	: Periodontal ligament
TBS	: Tris buffered saline
ZOL	: Zoledronic acid

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Bisphosphonates are drugs that have early beneficial effects as to prolonging the life span of osteoblasts and preventing glucocorticoid-induced osteoblast apoptosis. They are potent analogues of inorganic pyrophosphates that are completely resistant to enzymatic hydrolysis and have a strong affinity for calcium phosphate ***(Weinstein et al., 2002)***.

Glucocorticoids are important drugs in treatment of variety of diseases, but long-term period use can lead to various adverse effects, including osteoporosis. Glucocorticoid-induced osteoporosis is mainly caused by inhibition of osteoblastic bone formation by inhibiting osteoblastogenesis and promoting osteoblast apoptosis, which results not only in decreased bone mineral density, but reduction of bone strength by trabecular thinning in bone microstructures. The evidence suggests that daily oral glucocorticoid doses higher than 5 mg prednisolone or equivalent increase the risk of fracture within 3–6 months after the start of therapy. High-dose inhaled glucocorticoids may also increase fracture risk. Treatment with vitamin D, calcitonin, sex hormone replacement, and bisphosphonates has been shown to be effective ***(Mastaglia et al., 2006)***.

Bisphosphonates have proven to be the most valuable drugs for glucocorticoid-induced osteoporosis. There are several lines of evidence indicating that they are effective in preventing and treating low bone mineral density and in reducing fracture risk ***(Yasuhiro et al., 2004)***.