

***The Effects of Bisphosphonate  
Administration on Teeth Development and  
Growth of the Jaw Bones in Neonatal Rats  
(Histological and Immunohistochemical  
Study)***

*Thesis*

*Submitted To The Council Of The College Of Dentistry At  
The University Of Baghdad, In Partial Fulfillment Of The  
Requirement For The Degree Of Master Of Science In  
Oral Histology And Biology*

*By*

***Suhail Labeeb Hasoon***

*(B.D.S.)*

*SUPERVISED BY:*

***Ass .Prof. Dr. Nada M. H. AL-Ghaban***

*(B.D.S., M.Sc., Ph.D. Oral histology and Biology)*

*2013-1434*

# Abstract

## **Background:**

Alendronate is a potent nitrogen-containing bisphosphonate that become the primary therapy for managing skeletal conditions characterized by increased osteoclast-mediated bone resorption. Although the mode of action of alendronate is mainly being investigated in bone, little is known about its effects on the formation of dental hard tissues.

## **Aims of the study:**

To evaluate the effects of alendronate administration histologically, immunohistochemically on the first molar teeth development, and growth of the jaw bones in neonatal rats.

## **Materials and methods:**

The present study includes 65 neonatal rats during lactation period from 15 Albino Wister rats mother which were taken from the animal house of the National Center of Drug Control and Research in Baghdad. The neonatal rat's mothers were dividing into two groups: experimental group contain 10 mothers which administrate oral dose (15 mg/kg) of sodium alendronate twice a week with three days intervals. The administration is start from first day of gestation to sacrifice day of neonatal rats, while control group contain 5 mothers which administrate with normal saline twice a week.

The neonatal rat were sacrificed by using general anesthesia at age (1, 6, 11, 16, 21) postnatal days, the head separated from the body, blocked, and then processed to sectioned. Blood samples were obtained from age group (11, 16 and 21) before sacrifice to find the alkaline phosphatase and calcium levels in both groups. The sections were histologically

studied by (H&E) stain and Immunohistochemical study for amelogenin expression by (Anti amelix anti body).

## **Results:**

The histological result of this study illustrate retardation in tooth development and impairment in calcification and maturation of enamel of the first molar tooth germ in alendronate treated neonatal rats when compared with their controls especially in 6 and 11days old. Also this examination illustrates retardation of root formation and tooth eruption of the first molar tooth in alendronate treated neonatal rats in comparison with their controls.

The immunohistochemical examination of this study revealed that the administration of sodium alendronate increased the amelogenin expression by ameloblasts and this may elucidate some aspects of the amelogenin function during amelogenesis. On the other hand, the immunoreactivity for amelogenin at early stages of tooth development was somewhat more intense in alendronate-treated than that observed in the control specimens.

There are positive amelogenin expressions in osteoblast, osteocyte and bone matrix of both controls and experimental. In general the bone section of control rats express amelogenin more than that of alendronate treated rats.

The biochemical serum analysis revealed that the level of calcium and alkaline phosphatase in alendronate-treated neonatal rats are lesser than that of control rats.

## **Conclusion:**

This study concludes that treatment with alendronate during tooth development has the potential to inhibit tooth eruption, impair tooth formation, may induce some types of dental abnormalities, and increase the bone trabecule thickness by decreasing osteoclast activity.