

ABSTRACT

MECHANISMS OF NICOTINE INHIBITING EFFECT ON OSSEOINTEGRATION IN DENTAL IMPLANT

(Animal laboratory experimental study in New Zealand rabbits)

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Introduction: Smoking is a factors that can interfere the success rate of dental implants. In most smokers, dental implants failure before getting a load are higher than non smokers. Nicotine is the main ingredient in tobacco cigarettes.

Purpose: This study aimed to explore the mechanisms of nicotine inhibiting effect on osseointegration in dental implant.

Methods: This study was performed on New Zealand rabbits through measurement the value of osseointegration by Implant Stability Quotient (*Osstell*), the number of osteoclast and osteoblast by histology test, and the expression of nAChR, NFATc1, PGE2, TNF α , RANKL, BMP2 and osteocalcin by immunohistochemistry test. This study is an animal experimental laboratory research with *separate pre and post test control group design*. The number of rabbits in this study were 20, divided into 5 groups. Group 1 was a control group to determine the initial state, Group 2 was the control group at week-1, Group 3 was a treatment group, Group 4 was the control group at week-8, Group 5 was the treatment group at week-8 . The treatment groups given nicotine injection 1 week before implant placement until the end of the research. The dose of nicotine was 2,5 mg/kg BW/day.

Result: Statistical analysis found significant differences the controls and treatment group ($p < 0,05$). At the first week on the treatment group, it showed that nicotine increase the number of osteoclast and decrease osteoblast. Nicotine increase the expression of nAChR, NFATc1 and PGE2, and lowering the expression of TNF α , RANKL and BMP2. At the eighth week, it also showed the same, except TNF α and PGE2. The expression of TNF α did not significant, meanwhile in PGE2 it is significantly decreasing. Path analysis showed nicotine through nAChR pathway, influence the expression of NFATc1 ($p=0,000$; $B=0,869$), PGE2 ($p=0,001$; $B=-0,512$) and TNF α ($p=0,000$; $B=-0,597$).

Conclusion: The mechanisms of nicotine inhibiting effect on osseointegration dental implant in New Zealand rabbits through increasing nAChR, NFATc1, PGE2 and decreasing RANKL, BMP2 and osteocalcin.

Key words: Dental implant, smoking, nicotine, osseointegration