

ABSTRACT

Mechanism of Immunomodulation and Inhibitory of Pain Conduction in Rat Model of Acute Pulpitis Treated with Topical Epigallocatechin- Gallate

Introduction: Escalation of inflammation and pain conduction are found in patients with acute pulpitis if the lesion is not immediately treated. The aim of this study was to reveal the mechanism of immunomodulation and inhibitory of pain conduction in 6 hour and 24 hour in acute pulpitis using topical Epigallocatechin-Gallate (EGCG). The molecular mechanism of immunomodulation and inhibitory of pain conduction process are still unclear.

Purpose: To investigate the molecular mechanism of topical EGCG therapy to immunomodulation and inhibitory of pain conduction in acute pulpitis in Wistar rat.

Methods: The true experimental laboratory study using completely randomized design. Acute Pulpitis was induced by topical LPS for 6 and 24 hour. Topical EGCG of 500 and 1,000 ppm were applied for 24 hours, and repeated after 24 hours. Six groups were included in this study which each group containing of 7 rats, and one group for control group containing 6 rats. The groups were: O1 : normal rats; O2: 6-hour acute pulpitis; O3: 24-hour acute pulpitis ; O4: group that received topical application of EGCG with 500 ppm in 6- hours of acute pulpitis; O5: group that received topical application of EGCG of 1,000 ppm in 6- hours of acute pulpitis; O6: group that received topical application of EGCG with 500 ppm in 24 hours of acute pulpitis; O7: group that received topical application of EGCG with 1,000 ppm in 24- hours of acute pulpitis. The treated pulp tissues were observed using IHC method on TLR4, TNF- α , IL-10, SOD, Catalase, MDA, PG-E2, TRPV1 and CGRP. The results were statistically analyzed using one-way Anova-test or Brown Forsythe and regression analysis.

Result: The result of these studies showed that application of 500 ppm and 1,000 ppm of topical EGCG in 6 hour and 24 hour acute pulpitis in Wistar rat were significantly inhibit the expression of chemical substances ($p < 0.001$) as: TLR4 (9.00 and 5.83 vs 13.83 and 6.50), TNF- α (5.50 and 3.83 vs 15.17 and 9.67), MDA (6.0 and 5.5 vs 10.67 and 8.67), PG-E2 (8.17 and 5.83 vs 13.67 and 8.83), TRPV1 (8.17 and 4.17 vs 14 and 9.83), CGRP(3 and 2.67 vs 13 and 5.5), and increased of expression in IL-10 (12.83 and 14.00 vs 18.67 and 17.50), SOD (5.50 and 6.50 vs 13.00 and 16.83), Catalase (5.67 and 7.33 vs 11.83 and 15.83).

Conclusion: In 6-hour acute pulpitis, topical EGCG directly inhibit the TLR4, TNF- α expression, directly increases the IL-10, SOD, catalase expression, indirectly inhibit the TRPV1 expression through TNF- α , PG-E2, and indirectly inhibit the CGRP expression through TNF- α . In 24-hour acute pulpitis, topical EGCG directly inhibit the TLR4, TNF- α , MDA expression, directly increases the expression of IL-10, SOD, catalase, indirectly inhibit the CGRP expression through TNF- α and indirectly inhibit the CGRP expression through TNF- α , PG-E2 - TRPV1.

Keywords: topical EGCG, TLR4, TNF- α , PG-E2, TRPV1, CGRP, MDA, IL-10, SOD, catalase, acute pulpitis.