IN VITRO ANALYSIS OF THE EFFECT OF BIOCERAMIC ROOT CANAL SEALERS ON MINERALIZATION POTENTIAL, CELLULAR MIGRATION AND CELLULAR ATTACHMENT OF HUMAN PERIODONTAL LIGAMENT STEM CELLS

By

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Dissertation Submitted to the
Shri Dharmasthala Manjunatheshwara University, Dharwad, Karnataka,

In partial fulfillment
of the requirements for the degree of

MASTER OF DENTAL SURGERY (M.D.S)

in

CONSERVATIVE DENTISTRY AND ENDODONTICS

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2020-2023

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ABSTRACT

Title: In vitro analysis of the effect of Bioceramic root canal sealers on mineralization potential, cellular migration and cellular attachment of human periodontal ligament stem cells.

Background & Objectives: Endodontic sealers directly or indirectly may get contacted with periodontal cells during obturation. According to literature, biocompatibility of root canal sealers have effect of periapical healing. Newer generation Bioceramic sealers claims to have better biocompatibility and mineralization potential. Bio C Sealer, BioRoot RCS and MTA Fillapex sealers were recently introduced in the field of endodontics. Thus, the objective of the study was to evaluate mineralization potential, cellular migration and cellular attachment of periodontal ligament stem cells (hPDLSCs) when exposed to the above-mentioned sealers.

Materials and Methodology: hPDLSCs were collected from freshly extracted tooth and cultured in Dulbecco's modified eagle media (DMEM). Mineralization potential was evaluated using real time polymerase chain reaction (qRT-PCR) test. Cell migration was evaluated using scratch migration assay. Cell adhesion was evaluated using hanging drop method.

Result: Kruskal Wallis ANOVA test was performed for intergroup comparison, Tukey's post hoc test and Wilcoxon's test was done for group comparison ($p < 0.05$) . Bio C sealer and BioRoot RCS showed significantly more expression of ALP (Alkaline phosphatase) and RUNX2 (Runt related transcription factor 2) compared with MTA Fillapex at 5 day

and 7 day interval ($p < 0.001$). Cell migration assay revealed better wound closure in Bio C Sealer and BioRoot RCS than MTA Fillapex group at all time interval except for MTA Fillapex at 1:4 dilution ($p < 0.001$). In stereomicroscopic examination MTA Fillapex showed poor cell adhesion than Bio C Sealer and BioRoot RCS.

Conclusion: From the result of the study it can be concluded that Bio C sealer and BioRoot RCS is better than MTA Fillapex in terms of mineralization potential, cellular migration and cellular attachment.

Keywords: endodontic sealers; periodontal ligament stem cells; biocompatibility; osteogenic potential; bioactivity