SDM
College of Dental Sciences & Hospital
Dhavalnagar, Sattur, Dharwad - 580009, Karnataka, INDIA
Recognised by Dental Council of India, New Delhi

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SHRI DHARMASTHALA MANJUNATHESHWARA
UNIVERSITY, DHARWAD, KARNATAKA

COMPARATIVE EVALUATION OF BIOACTIVITY, CELL ADHESION AND PROLIFERATION OF HUMAN DENTAL PULP STEM CELLS ON ROOT END FILLING MATERIALS

AN IN VITRO STUDY

By

DR. SHRESHTHA PRAMANIK

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DR. GEETA HIREMATH

ADDITIONAL PROFESSOR

DEPARTMENT OF CONSERVATIVE DENTISTRY & ENDODONTICS

S.D.M COLLEGE OF DENTAL SCIENCES AND HOSPITAL, SATTUR, DHARWAD.

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ABSTRACT

AIM: To evaluate and compare the bioactivity, cell adherence and proliferation of MTA plus, MTA Plus - Chitosan Conjugate and Chitosan Gel on Human Dental Pulp Stem Cells (hDPCs).

METHODOLOGY: The Dental pulp stem cells (hDPSC) was derived from an extracted premolar tooth and was differentiated into odontogenic cells. Alkaline phosphatase assay was done for the odontogenic cells to confirm their differentiation. Materials used were MTA Plus (Group 1), MTA Plus and chitosan conjugate (Group 2) and Chitosan (Group 3). After culturing cells at different time intervals, cells were seeded with the biomaterials for 24, 48 and 72hrs. Cell adhesion was checked using crystal violet assay. Cell proliferation was evaluated using 0.04% Tryphan blue. The cells cultured without cement material served as a control. The cells were counted using Neubauer chamber. The results were obtained in triplicates to maintain reproducibility. The morphology and cell growth were checked under inverted light microscope and the results were recorded. Bioactivity of Group 1 and Group 2 materials were assessed at 7 days and 28 day's time intervals using SEM-EDX analysis. Friedman test and Wilcoxon test were used for statistical analysis. Statistical significance was set at $P \leq 0.05$

RESULTS: Group 2 and 3 had greater amount of cell adhesion and proliferation after 24 and 48 hrs. However, Group 1 showed greater cell proliferation after 72 hrs. The cells were able to adhere on the biomaterial and showed a spindle shaped morphology which was observed under the inverted light microscope. Group 2 had a better ability to form apatite crystal on its surface.

CONCLUSION: Chitosan can be used as a vehicle with MTA plus since the conjugate had greater potential to form apatite crystals on its surface. It does not have any cytotoxic effect in fact it has shown proliferative properties, so further studies need to be done.

KEYWORDS: Apatite, Bioactivity, Cell adhesion, Cell proliferation, Chitosan, Dental pulp stem cells, Mineral Trioxide Aggregate Plus, Scanning electron microscope