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COMPARISON OF INTERLEUKIN-1 BETA (IL-1β) LEVELS IN GINGIVAL CREVICULAR FLUID DURING ORTHODONTIC TOOTH MOVEMENT WITH AND WITHOUT LOW LEVEL LASER THERAPY

By

DR. ALISSA MARIA VARELLA

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Under the guidance of

DR. AMEET V.

ASSOCIATE PROFESSOR

DEPARTMENT OF ORTHODONTICS & DENTOFACIAL ORTHOPEDICS

S.D.M COLLEGE OF DENTAL SCIENCES & HOSPITAL
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ABSTRACT

BACKGROUND AND OBJECTIVES: Optimising mechanotherapy and patient cooperation, the rate limiting step in abbreviating treatment duration is the individuals biological response to mechanical stimuli. Orthodontic force evokes a biochemical and structural response resulting in the local synthesis and release of varied mediators of alveolar bone remodeling. Exceptional emphasis has been directed at the application of low-level laser irradiation with the objective of accentuating cellular biochemical reactions, consequently contributing to an acceleration of orthodontic tooth movement. The aim of this investigation is to evaluate the effects of low-level laser therapy (LLLT) on Interleukin-1β (IL-1β) levels in gingival crevicular fluid (GCF) and its correlation with orthodontic tooth movement (OTM).

METHODOLOGY: A split-mouth design study was conducted in 14 subjects (8 females, 6 males) aged 14-25 years, whose maxillary first premolars were extracted. A Gallium Aluminium Arsenide (GaAlAs) semiconductor diode laser (wavelength: 940 nm, energy density: 8 J/cm^2, power output: 100 mW) delivered LLLT onto the experimental canine undergoing distalization at 10 points. The control canine was subject to distalization without the application of LLLT. The experimental and control canines were distalised using a force of 150 grams, provided by Nickel Titanium (NiTi) closed coil springs. GCF was collected at 5 intervals from the control and experimental sides and the levels of IL-1β were analyzed by Enzyme Linked Immunosorbent Assay (ELISA). The distal movement of the maxillary canine was measured and compared.

RESULTS: Increased levels of IL-1β were observed in the experimental canines as compared to the control canines ($p<0.001$). Cumulative tooth movement over an 8 week

week experimental period, was greater for the experimental canines (Occlusogram, Software: 4.4821mm, 4.4864mm respectively) when compared to the control canines (Occlusogram, Software: 2.2143mm, 2.2054mm respectively). A positive correlation existed between the IL-1β levels and the amount of tooth movement across all time intervals.

CONCLUSION: In combination with light orthodontic force, application of LLLT increased the levels of IL-1β in GCF and accelerated OTM.

KEY WORDS: Tooth movement; Interleukin-1; Gingival Crevicular Fluid; Lasers; Enzyme Linked Immunosorbent Assay