"TO COMPARE THE INTRAOSSEOUS HEAT GENERATION DURING GUIDED SURGICAL IMPLANT SITE PREPARATION IN TWO DIFFERENT BONEDENSITIES WITH COOLED IRRIGATION FLUIDS OF DIFFERENT TEMPERATURES- AN IN VITRO STUDY."

By

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ABSTRACT

Background and objectives:

Osseointegration being a prerequisite for clinical success concerning implant stability is dependent on bone quality, vascularization and iatrogenic factors. During drilling changes in temperature can lead to osteonecrosis. Surgical guide improves the precision in implant placement, however it may act as an obstacle to proper irrigation resulting in increase in bone temperature. Many studies have been conducted to assess the effect of various factors such as drilling speed, drill characteristics, axial force, etc on heat generation during drilling however effect of bone density needs to be explored further. Hence, the purpose of this study was to compare the intraosseous heat generation during guided surgical implant site preparation in two different bone densities with cooled irrigation fluids and different drilling speeds.

Materials and method:

Goat tibias and goat ribs were subjected to DVT to assess the bone density. Goat tibia mimicked D1 bone and goat rib mimicked D3 bone. The specimens were stored in normal saline at a temperature of -10°C and were pre warmed to 37°C before drilling. Drillings were performed using different drill diameters (2.0, 2.8, 3.2 and 3.65 mm) at the drilling speeds (800 and 1200 rpm) and irrigation fluid temperatures (10°C, 15°C and 20°C) in two different bone densities. Each group contained 20 drillings. A surgical guide was fabricated with holes mimicking the diameter of each drill. A measuring cavity was drilled to harbour a digital thermometer with inbuilt K thermocouple. Temperatures were documented before drilling and after drilling. The collected data was subjected to statistical analysis.

Results:

Under the set clinical parameters in the study, the minimum temperature recorded was 35.12°C and maximum temperature recorded was 37.72°C, which is 36.42°C ± 1.30°C.

Conclusion:

It was concluded that in a more dense bone, use of low speed drilling and cooled irrigation fluid is a safe method for implant site preparation in order to control the temperature rise during drilling.

Key words:

Heat generation; Implant site preparation; Surgical guide; Drilling speed; Irrigation fluid; Drill diameter; Bone density