

TITLE: COMPARATIVE EVALUATION OF FRACTURE RESISTANCE OF PRE FABRICATED DENTAL IMPLANT ABUTMENT CONNECTIONS - AN *IN VITRO* STUDY.

Background: Dental Implants are widely used for treating single, partial or total edentulism with high success rate and predictability. There are several designs in the implant abutment connection which aim at better fit to improve mechanical stability and avoid screw loosening or fracture. Internal hex connections were designed to increase the implant abutment contact surface area in order to improve abutment stability. It has been shown that internal hex implants provide better force distribution when compared with external hex implants. However there is no frictional locking between the mating parts of the abutment and the implants and most of these force are resisted by the screw. So, morse taper connections whose implant and abutment mating parts (conical and angulated) are overlapped, represents an alternative to internal or external hexagon connection designs. Another design is triconal connection with mechanical fit which helps in mechanical locking. Hence this in-vitro study was designed to comparatively evaluate the of fracture resistance of different dental implants abutment connections.

Materials and Methods: In the present study, three implant systems were used namely: Adin Implant System with internal hex (IH), Adin Implant System with morse taper connection (MT) and Equinox Implant System with triconal connection (TC). Six Implant –abutment assemblies were used for each system. Installation torques of 35 Ncm for each abutment was given. The implants were embedded in a custom made jig made according to ISO 14801 standards.. An universal testing machine was used to load all the specimens at a cross head speed of 1mm/min. The maximum load was recorded and used as the failure load. The load (N) at which fracture occurred was recorded and statistically analyzed .

Results. One way analysis of variance (ANOVA) was performed as a parametric test to compare different sub groups within each group. Dunnet test was employed as post Hoc tool to compare the Mean value between the three groups with each other of the sub groups. Difference were considered to be significant at  $P < 0.05$ . The internal hexagonal abutment group fractured at a mean (SD) load of  $410.19 \pm 11.98$  N , The morse taper abutment group fractured at a mean load of  $343.12 \pm 16.92$  N and the triconal abutment group fractured at a mean (SD) load of  $503.87 \pm 12.19$  N. The differences between the groups were statistically significant for mean load.

Conclusions. Within the limitations of this in vitro study, triconal connection (TC) exhibited higher fracture resistance when compared to internal hex (IH) and morse taper (MT). Morse taper abutments exhibited a significantly lower fracture resistance than internal hexagonal abutments. The mode of failure is specific to the abutment material and design.