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**Comparative Evaluation of Physical Properties Of CAD-CAM and 3D
Printed Implant Provisional Restorations Before and After Ageing:
An In-Vitro Study**

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Abstract:

The aim of the study was to compare the physical properties such as marginal gap, and flexural strength of CAD-CAM and 3D printed implant provisional restorations before and after artificial ageing.


Material and Methods: Implant provisional restorations of polymethylmethacrylate were fabricated at maxillary lateral incisor site on titanium interim abutment. A cement retained single unit crown was designed with the parameters in Exocad. Restorations were milled by the five axis CAD/CAM system (n=20) and 3D printed (n=20). They were tested for marginal gap using micro-computed tomography at eight predetermined locations and flexural strength by universal testing machine. 500 thermocycles were carried out at temperature of 5° and 55°C with dwell time 30 sec. Measurements were taken before and after thermocycling. Statistical analysis was done using Shapiro–Wilk’s test and Independent T-test.

Results: The marginal gap values were 186.57 and 319.52 µm at labial, 276.8 and 377.38 µm at palatal, 293.22 and 345.05 µm at mesial and 75.37 and 273.44 µm at distal for milled restorations before and after thermocycling respectively. Flexural strength was 100.34 and 64.28 MPa for milled restorations before and after thermocycling respectively. For printed restorations, marginal gap values were 114.44 and 230.15 µm at labial, 188.51 and 276.67 µm at palatal, 31.90 and 87.88 µm at mesial and 78.22 and 166.82 µm at distal location before and after thermocycling respectively. Flexural strength was 118.34 and 60.87 MPa before and after thermocycling respectively. Statistically significant difference observed for marginal gap between milled and 3D printed restorations before and after thermocycling and non- statistically significant difference for flexural strength ($\alpha >$

0.05).

Conclusions: The difference in marginal gap before and after thermocycling in CAD-CAM and 3D printed group was statistically significant. The difference in flexural strength before and after thermocycling for CAD-CAM and 3D printed group was statistically non-significant.

Key-words: Implant provisional restoration, interim abutment, micro-computed tomography

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