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**College of Dentistry**



# **Evaluation of the Validity and Reliability of Digital and Rapid Prototyped Models as Compared to the Original Stone Models in Different Conditions**

## **(A Comparative Study)**

*A thesis*

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# ABSTRACT

There are increasing trends toward incorporating modern computer aided design and manufacturing in orthodontic practice. Utilizing digital models and their rapid prototyped replicas are part of these trends. These models have to be accurate to replace the stone models “the original gold standard”. The aims of this study are to assess the validity and reliability of digital and rapid prototyped orthodontic study models and determine if the digital analysis is time effective.

The sample of the study consisted of 90 study models retrieved from 90 patients. They were divided into three groups (well-aligned, crowded and spaced) dentition groups, with 30 models for each group. The models were digitized and prototyped. 24 linear measurements were taken from digital and prototyped models and compared to their original stone models, using the paired sample *t*-test and Bland-Altman plots. The effect of mal-alignment and spacing conditions on the validity of both models was investigated with ANOVA. Time needed to perform manual and digital measurements were also compared. Reliability was tested via interclass correlation coefficient.

Digital orthodontic study models are accurate and reliable and they have the potential to replace conventional stone models. The selected rapid prototyping technique proved to be accurate and reliable in term of diagnosis. Digital orthodontic analysis is time-saving when compared to manual analysis.