

**The effect of arch wire size and material on
load deflection by the use of a new test
apparatus**

(In Vitro study)

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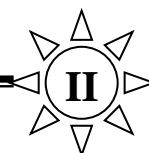
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Abstract

Various sizes and types of arch wire sizes and alloys are present in the market nowadays. Each one has its characteristic load deflection curve, from which we can know the clinical usefulness of that wire as alignment, sliding arch wires or others. But the problem is the shortage of the data concerning the arch wires which make it difficult for the clinician to choose the perfect wire and alternative wire for the specific case.

So, in this study, a new test apparatus was developed to test the arch wire deflection. The test apparatus was developed to simulate the whole maxillary teeth from right maxillary permanent first molar to the other left maxillary permanent first molar.

First of all, the test apparatus was designed using Mechanical AutoCad computer program to have a theoretical background for the test apparatus and to help in accurate constructing of it, then the test apparatus was drawn theoretically using another computer program 3D max to have a theoretical three dimensional model of the test apparatus to help in accurate designing of the apparatus. Finally, the test apparatus was designed according to these data.



The study was conducted by testing four groups of arch wire materials (Thermal wire, Beta- Titanium, Nickel Titanium and Stainless Steel), for each group four different arch wire sizes were used (0.016 ", 0.018 ", 0.017 X 0.025 " and 0.019 X 0.025 ").

The results show the followings:

1. When the arch wire size increase, the amount of arch wire deflection will be decreased.
2. Thermal wires have the highest amount of arch wire deflection, followed by Nickel Titanium, Beta- Titanium and lastly Stainless Steel arch wires.