

## **Abstract:**

### **The Effect of Cryotherapy on Fracture Resistance of NeoNiTi Rotary File**

**Introduction:** NiTi rotary files have been introduced in Endodontic treatments to improve the method of preparation of root canals. Despite many advantages of NiTi instruments, it is possible that Unpredictable failures occur during clinical use which leads to blocking the root canal and the lack of thorough cleaning. This study was done due to Determine the effects of cryogenic treatments in the amount of fracture resistance of NeoNiTi rotary file.

**Materials and Methods:** In this *in vitro* trial, 20 NeoNiTi rotary files (tip size of 25 and 6% taper for NeoNiTi) were selected and prepared with and without cryogenic treatments. The treatments were done by liquid nitrogen at  $-196^{\circ}\text{C}$  and the files remained at this temperature for 24 hours. At cyclic fatigue test; the handpiece were rotated by 500 rpm speed and 2.0-N-cm torque for the NeoNiTi files rotating the instruments until the fracture would occur. The fracture time was recorded and the number of cycles to fracture was measured for each group. Statistical comparison of the two groups of files was performed by independent t-test using SPSS software version 22 and the significance level was considered less than 0.05.

**Results:** The cycles to failure in the NeoNiTi files without and with cryogenic treatments were  $3928.33 \pm 844.15$  NCF and  $4676.67 \pm 382.99$  NCF respectively. The fracture time of NeoNiTi files without and with cryogenic treatments were found to be  $561.20 \pm 45.958$  seconds and  $471.40 \pm 101.298$  seconds respectively. Significant differences were found regarding cryogenic treatments in the NeoNiTi files in terms of number of cycles to failure or fracture times.

**Conclusion:** Therefore; cryogenic treatments showed significant effects to improve fracture resistance and fracture time of NeoNiTi rotary instruments.

**Keywords:** Cryogenic Treatments, Fracture Resistance, NeoNiTi Rotary Files.