Effect of Thermal Ageing and Chemical Disinfection on Proprieties of Flexible Resins

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INTRODUCTION

The aesthetic motivations have justified the growing demand for flexible prostheses. These are constructed of nylon, a thermoplastic polymer belonging to the family of polyamides, which gives to the resins great flexibility and resilience. (1-4)

Since brushing is not fully effective in difficult to access areas of the prostheses, it is sought to soak them in chemical solutions in order to increase the effectiveness on the biofilme.(5-12) Ideally, the physical and mechanical properties of the protheses base should remain unchanged after the disinfection process. Likewise, , changes are also not expected to occur during the temperature variations at which the prostheses are subjected. (10,12-20)

Little is known about the **influence of thermal ageing** and **chemical disinfection** on this family of resins, for which reason the study of this **influence on the microhardness** and **flexural strength of this resins is justified**.

MATERIALS AND METHODS

Studied Resins

Figure 1 – Used resins:
a) ProBase Hot;
b) Deflex® Classic SR;
c) Deflex® Supra SF

Preparation of Specimens

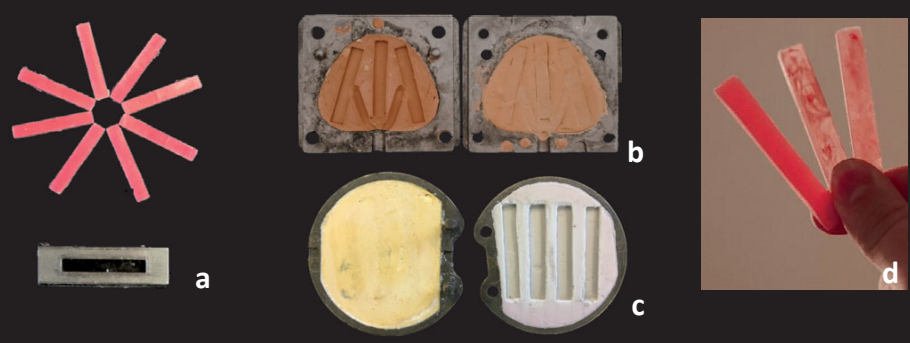


Figure 2 – **a)** Wax patterns(64 x 10 x 3.3 mm; ISO 20795-1:2013); **b)** Flask of flexible resins; **c)** Flask of heat-polymerized resin; **d)** Specimens of the three resins under study

Thermal Ageing

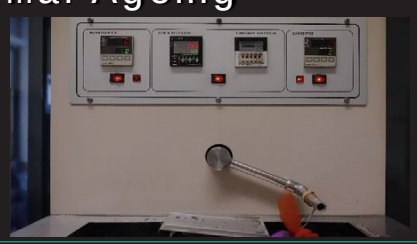


Figure 3 – Thermocycling machine (Refri 200-E). 1000 cycles with alternating baths between 5ºC and 55ºC, 20 seconds in each, with 5 seconds of dwell time

Chemical Disinfection Protocol

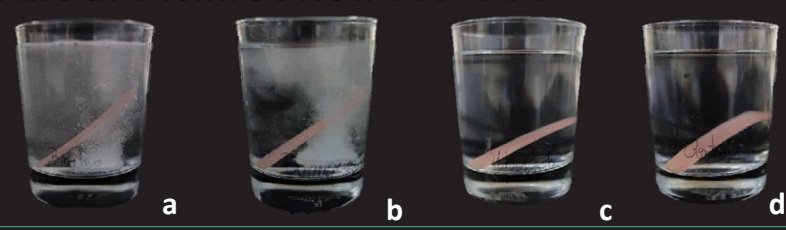


Figure 4 – Experimental subgroups: Specimens immersed in 200 mL of distilled water and:
a) Corega®Oxygen-Bio-Active Tab; **b)** Corega®Whitening Tab;
c) 2,5% Sodium Hypochlorite; **d)** Control (distilled water)

RESULTS

Microhardness

Figure 5 – Microhardness Indentation Machine (*Duramin*) Knoop Diamond Indenter. 98.12 mN load 30 seconds. 12 measurements in each specimen

Significant differences only in Classic SR resin (p=0,001) e Supra SF (p<0,001)

Flexural Strength

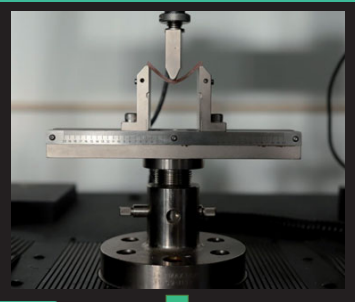
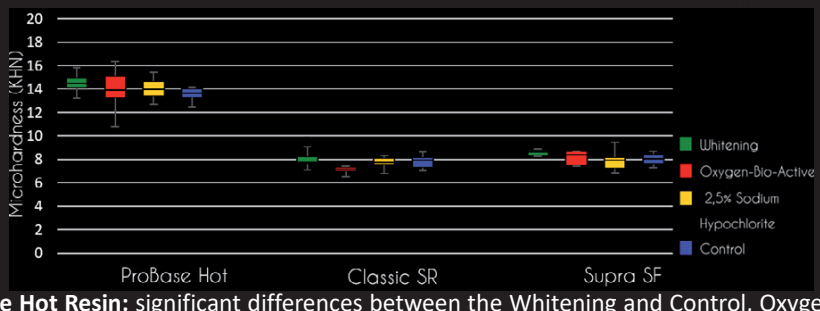


Figure 6 – Universal Testing Machine (*Instron*) 3-point device. 50 mm distance between supports. 5 mm/min crosshead speed

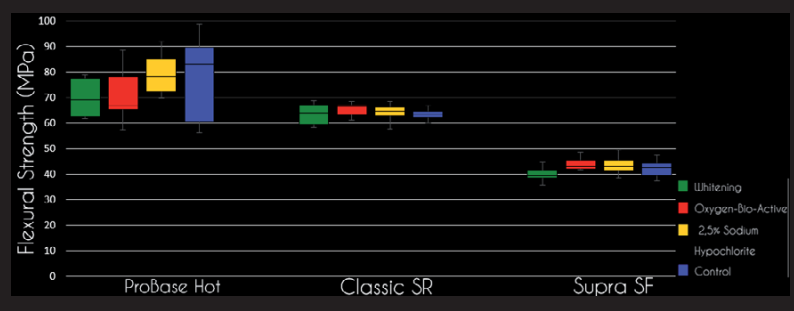
No significant differences were found for any material (p>0,05)

Effect of Thermal Ageing



ProBase Hot Resin: significant differences between the Whitening and Control, Oxygen Bio-active and 2,5% Sodium Hypochlorite (p<0,05). **Classic SR Resin**: significant differences between the Oxygen Bio-active and Control subgroups, the Whitening and 2,5% Sodium Hypochlorite subgroups (p<0,001). **Supra SF Resin**: only significant difference between the Whitening and 2,5% Sodium Hypochlorite subgroups (p=0,025)

Effect of Chemical Disinfection



Significant differences only on **Supra SF** resin between the Whitening and Oxygen Bio-active subgroups and the Whitening and 2,5% Sodium Hypochlorite subgroups (p=0,027)

CONCLUSION

- ✓ The thermal ageing influences the **microhardness** of the Classic SR and Supra SF resins, but does not influence the **flexural strength** of any material.
- ✓ The chemical disinfection procedures only influence the **flexural strength** of the Supra SF resin and influence the **microhardness** of all resins studied.

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