Physical Properties of Herculite XRV Ultra Nano-hybrid Composite

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INTRODUCTION

Herculite XRV Ultra ™ is a nanohybrid upgrade of Herculite XRV ™. Herculite XRV ™ was the first submicron microhybrid composite introduced to dentistry, with an average filler particle size of 0.6 microns. The improved strength and wear resistance made possible universal use of composites, especially in posterior restorations. More recently, advanced nanohybrid composites such as Belleglass NG ™ and Premise ™ have been introduced. These materials have improved handling, polishability, clinical gloss and wear resistance in restorations. Herculite XRV Ultra ™ includes these qualities, while retaining other features of Herculite XRV ™, such as Dentin, Enamel and Incisal translucencies and precise Vita shading. In this study, the physical properties of both of these materials were compared.

OBJECTIVE

The purpose of this study is to investigate and compare the physical properties of Herculite XRV Ultra ™, a novel nanohybrid composite with high aesthetic properties, to that of its microhybrid predecessor.

MATERIALS

Herculite XRV™ A2 Enamel — Kerr
LN: 2858756, 2858757, 2858758, 2846490

Herculite XRV Ultra™ A2 Enamel — Kerr
LN: 504JT068

METHOD

The physical properties including compressive strength (CS), diametral tensile strength (DTS), flexural strength (FS), flexural modulus (FM) and Rockwell hardness (RH) of two dental restorative composites were determined for comparison. Physical properties were measured in accordance with ISO 4049 (FS), ADA Specification No.1 (CS), No. 27 (DTS) and Rockwell 15T instructions. Five flexural strength (FS) samples, six compressive strength (CS), and six diametral tensile strength (DTS) samples and three measurements on one Rockwell hardness sample were made for each composite. Samples were cured according to manufacturer's instructions and stored in 37°C water for >12 hours. Physical properties were measured and means and deviations were calculated. ANOVA ($p<0.05$) was conducted for each physical property to determine differences between the means.

RESULTS

Composite	**FS** (S.D.) MPa	**FM** (S.D.) MPa	**DTS** (S.D.) MPa	**CS** (S.D.) MPa	**RH** (S.D.)
Herculite XRV Ultra	137(14)[a]	8200 (500)[a]	57 (4)[a]	440 (40)[a]	80.4 (0.4)[a]
Herculite XRV	152 (17)[a]	11,000 (900)[b]	52 (4)[b]	380(30)[b]	83.1 (1.2)[b]

Letters in the same column are not statisticaly different ($p<0.05$)

Table 1

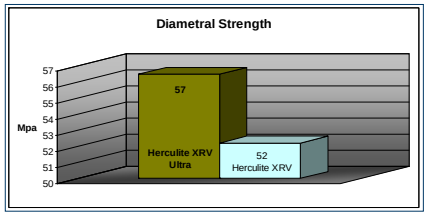

Figure 1: Diametral Strength

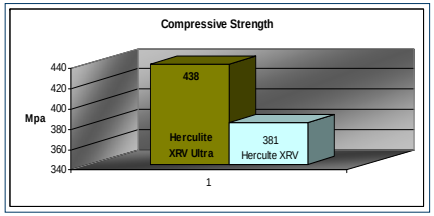

Figure 2: Compressive Strength

DISCUSSION

Herculite XRV Ultra ™ is a nanohybrid composite containing submicron hybrid filler (0.4 microns) and nanoparticle filler (50 nm). It also has prepolymerized filler particles (25 microns) containing the same submicron hybrid and nanoparticle fillers. The result is a trimodal filler distribution that produces excellent handling properties, ease of polish, retention of clinical gloss. Esthetic properties such as opalescence and fluorescence have also been improved. Other features, include Dentin, Enamel and Incisal translucencies as well as precise Vita shading.

In this study, the physical properties Herculite XRV Ultra ™ and Herculite XRV ™ were compared. Physical properties including hardness and strength are important characteristics in dental restorative materials. ANOVA revealed there was no statistical difference ($p<0.05$) in flexural strength (FS) between Herculite XRV ™ and Herculite XRV Ultra ™. ANOVA also revealed that Herculite XRV Ultra ™ has improved compressive strength (CS) and diametral tensile strength (DTS) while producing slightly lower flexural modulus (FM) and Rockwell hardness (RH) values.

CONCLUSION

Overall, physical properties of Herculite XRV Ultra ™ novel nanohybrid composite, are similar to other microhybrid composites and not like the microfills.