

Venus Diamond ONE/Venus Pearl ONE

Flexural Strength – LMU München, Germany

Impact of aging on the flexural strength of novel single-shade resin-based composite restoratives

A new trend established in direct adhesive restorations to simplify daily routine: Single-shade composites or composites with a very narrow shade range. These materials were developed for easy, stressless and fast basic restorations, mainly in the posterior region.

Composites intended for the posterior area, need to have high flexural strength values to resist heavy masticatory forces. The maximum bite force in the posterior area is doubled to that of the incisor area¹. It is widely known, that resin based restoration materials age under the conditions in the oral cavity². So, also flexural strength as well as the resistance of a composite towards the masticatory load decrease over time. Therefore, it is mandatory that the flexural strength of a composite still remains even after ageing on a high level. This can reduce the risk of chippings and fractures.

The following research by Prof. Nicoleta Ilie at the Ludwig-Maximilians-University in Munich, Germany, confirms the high flexural strength the new ONE shades of Venus Diamond and Venus Pearl have. Both materials remain also on a high flexural strength level after artificial ageing.

Giving a hand to oral health.



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¹ Manns A *et al.* (2020): Comparative study of molar and incisor bite forces regarding deciduous, mixed, and definitive dentition, CRANIO®, DOI: 10.1080/08869634.2020.1732569

² Morresi AL *et al.*: Effects of critical thermal cycling on the flexural strength of resin composites. Journal of Oral Science, Vol. 57, No. 2, 137-143, 2015

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Objectives

The aim of this study was to compare the flexural strength of three different composites following a single-shade concept initially and after artificial ageing.

Methods

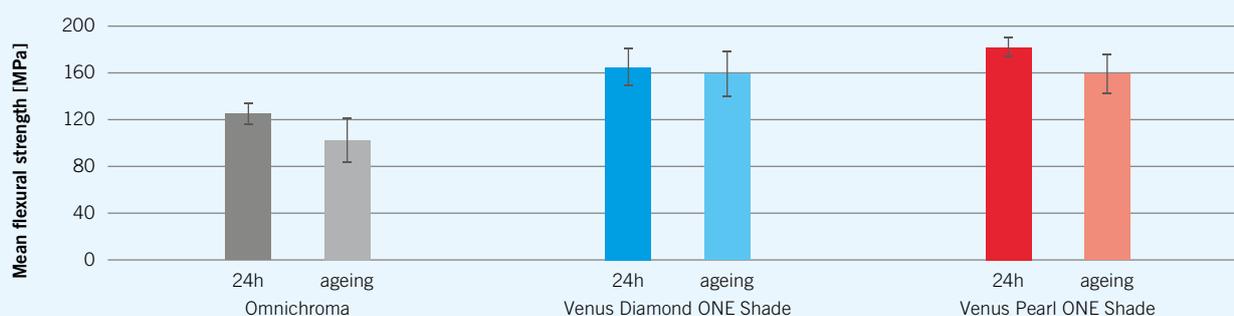
40 bar-shaped specimens (2x2x18 mm) were made for each of the following composites: Venus Diamond ONE shade, Venus Pearl ONE shade (both Kulzer GmbH) and Omnicroma (Tokuyama Dental). The Translux Wave (Kulzer GmbH) was used for light curing (> 1,000 mW/cm²). All specimens were stored in water (37 °C) for 24 h. Half of the specimens of each composite group underwent additionally an artificial ageing by 10,000 cycles of thermocycling (5° and 55 °C).

Afterwards, flexural strength was determined in a three-point-bending test. The samples were placed in a universal testing machine (Z 2.5, Zwick/Roell). During testing, the specimens were immersed in water at room temperature and loaded until fracture at a crosshead speed of 0.5 mm/min.

Statistics were calculated using one- and multiple-way ANOVA and Tukey post-hoc test ($\alpha = 0.05$) to compare the test results.

Results

The ONE shades of Venus Diamond and Venus Pearl show high resistance towards masticatory forces even after ageing



Statistically significant differences were found between the materials after 24 h: Venus Pearl > Venus Diamond > Omnicroma ($p < 0.001$). After artificial ageing no statistically significant differences were found between both Venus composites, but these showed statistically significant higher flexural strength than Omnicroma ($p < 0.001$). The decrease of flexural strength after ageing in Omnicroma and Venus Pearl was statistically significant ($p > 0.001$), whereas Venus Diamond did not show a statistically significant drop in flexural strength ($p = 0.227$).

Conclusion

The Venus Diamond and Venus Pearl ONE shade showed significantly higher flexural strength values than Omnicroma. The effect of aging is manifested differently in the analysed materials.

Comment

The study confirms again the high mechanical resistance Venus Diamond and Venus Pearl already showed in various in vitro and in vivo studies worldwide within the last decade.

Single-shade restorations are mainly indicated for basic restorations in the posterior zone. The masticatory forces here are much higher than in the anterior region. To reduce the risk of restoration fractures and chippings, the material should possess a high flexural strength, which remains also on a high level after ageing under the oral cavity conditions. Venus Diamond and Venus Pearl are real universal composites useable for all cavity classes and aesthetic demands. The new ONE shades complete both composites because the ONE shade can be used for all basic restorations without the need of a shade selection.

Source

Prof. Dr. Dipl. Ing. Nicoleta Ilie, Ludwig-Maximilians-University, Munich, Germany

Ilie, N.: Impact of aging on the flexural strength of novel, experimental resin-based composite restoratives designed for high aesthetics. Test report August 7th, 2020. Unpublished test report. Data on file.

The study was abbreviated, summarised and commented and all diagrams and titles have been established by Kulzer.