# EXPERIMENTAL STUDY ON SOME CHARACTERISTICS OF DENTAL RESTORATION FILLINGS USED IN CORONARY THERAPEUTIC MANAGEMENT OF FIRST PERMANENT MOLAR

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## ABSTRACT

**Introduction** Many modern materials used by modern medicine are in close contact or interact with tissues or body fluids, therefore their selection must take into consideration not only the physical and long-term stability but also biological compatibility. Modern coronal restorative materials such as composites, glass ionomer cements and compomers have many of the characteristics of bioactive materials. The interface of such material and dental hard tissues involves not only extremely close physical contact but also the establishment of chemical bonds. This is why biocompatibility of modern materials to tissue subjacent and in particular to the pulp organ is of the most importance. **Aim of the study** The aim of our study is to determine how the physicochemical characteristics of modern restorative materials are passed on to their clinical and functional characteristics. **Material and methods** In compression tests were tested the following restorative materials : (1) universal hybrid light-cured composite Charisma; (2) ( Composite Curing consistency controlled fluid Flow – line.those materials were applied according to the manufacturer to recent extracted teeth that were maintained in the physiological saline until processed.After the application of restoration, the root of the tooth crowns were sectioned and included in the epoxy resin in the tubes 8 mm height and 12 mm diameter. Before introduction into the liquid media, surface of samples were processed, maintaining constantly the hydration of the tooth, on abrasive paper with different grain sizes, till we achieved a planar surface. Compression test was carried out with a specific installation provided with the equipment computer-aided acquisition of experimental data. The research was conducted in the Department of Unconventional Technologies of the Polytechnic Institute of Iasi, following the resistance of material compression. **Results and discussion** Statistical analysis of experimental data relating to the values of the compressive strength, in experimental conditions used for the compressions tests, have not shown a significant difference between the mean values. However, we observed a higher value of compressive strength for the composite flow, which is consistent with the microhardness measurements. Tougher materials are brittle and tend to crack more. Although compressive strength values not significantly different from the corresponding experiments, a slight difference is observed values, however, from the literature data they are still different.The results of the statistical analysis shows that to achieve the best results, the materials must be prepared according to the manufacturer, otherwise there is a chance that sustainability fillings to become highly reduced. **Conclusions** As expected, the studies carried out have shown that the properties of the dental materials studied are dependent on the nature of the investigation, of the chemical composition and of the method of preparation used. Compressive strength of the composites differ, a greater value being obtained for the composite flow. The durability of dental restorations, judged by wear resistance, which is measured by the amount of material microhardness is higher for light-cured composite restorations than composite flow.

**Keywords:** dental fillings, compressive strength, the durability

## INTRODUCTION

Many modern materials used by modern medicine is in close contact or interact with tissues or body fluids, therefore their selection must take into consideration not only by the physical and long-term stability but also by biological compatibility [1,2].

Coronal restoration treatment is performed even today by replacing the loss of dental hard substance with prosthetic substitutes that differ profoundly compared with dental tissues.

Unlike traditional plastic filling materials, modern adhesive materials limit excessive preparing healthy of dental substructure, adhering micromechanical and chemical to it. However, the material is sometimes ineffective barrier against external harmful factors or may itself constitute the irritation factor for pulp-dentin complex [1,3,4].

## PURPOSE OF THE STUDY

Is to determine how the physicochemical characteristics of modern restorative materials are passed on to their clinical and functional characteristics.

## MATERIAL AND METHODS

The following two restorative materials were tested in compression tests:
(1) light-cured hybrid composite Charisma universal;
(2) (Composite Curing consistency controlled fluid Flow – line.

After restoration's applying the sectioned crown tooth and root were included in epoxy resin in specimens of 8 mm height and 12 mm diameter. Prior to introduction into the liquid media, the surface of samples were processed, on abrasive paper with different particle sizes, always maintaining the hydration status of the tooth, to achieve a planar surface.

Compression test was performed with a specific plant equipped with advanced computer-aided acquisition of experimental data. The research was conducted in the Department of Unconventional Technologies of the Polytechnic Institute of Iasi, aiming compressive strength of the material.

**Figure 1.**

## RESULTS

The figures 2 - 5 are shown diagrams of force and displacement during compression test.

Although compressive strength values corresponding to those two significantly different experiments, we observed an increase in the values, however, from the values in the literature they are still different.

The results of the statistical analysis shows that to achieve the best results that the materials must be prepared according to the manufacturer, otherwise there is a chance that sustainability fillings are much reduced.

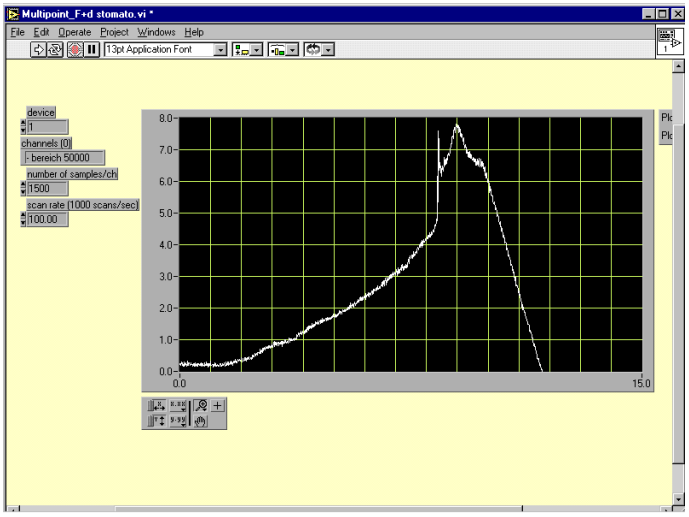


**Figure 1. Chart movement during the test compression for the composite flow**

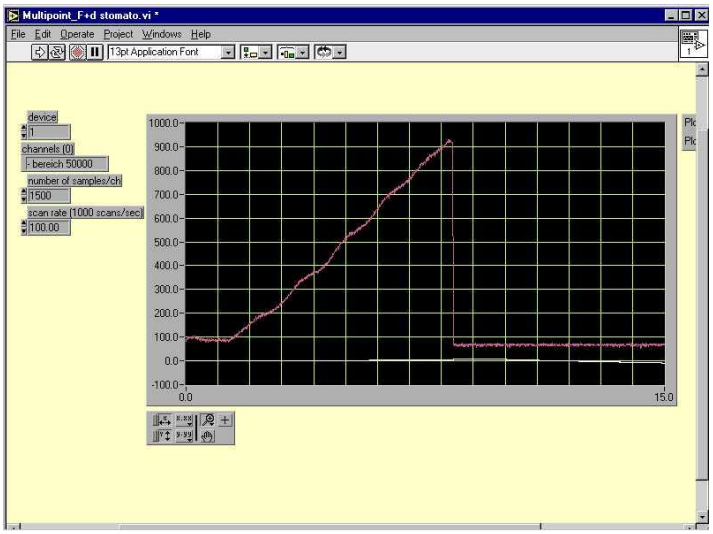


**Figure 2. Diagram compressive force during the test for flow composite**

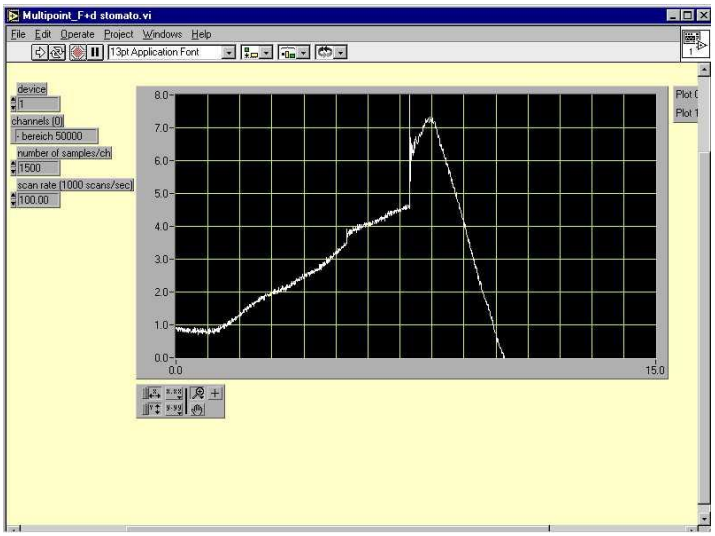


**Figure 3. Diagram displacement during compression test for photopolymer composite**

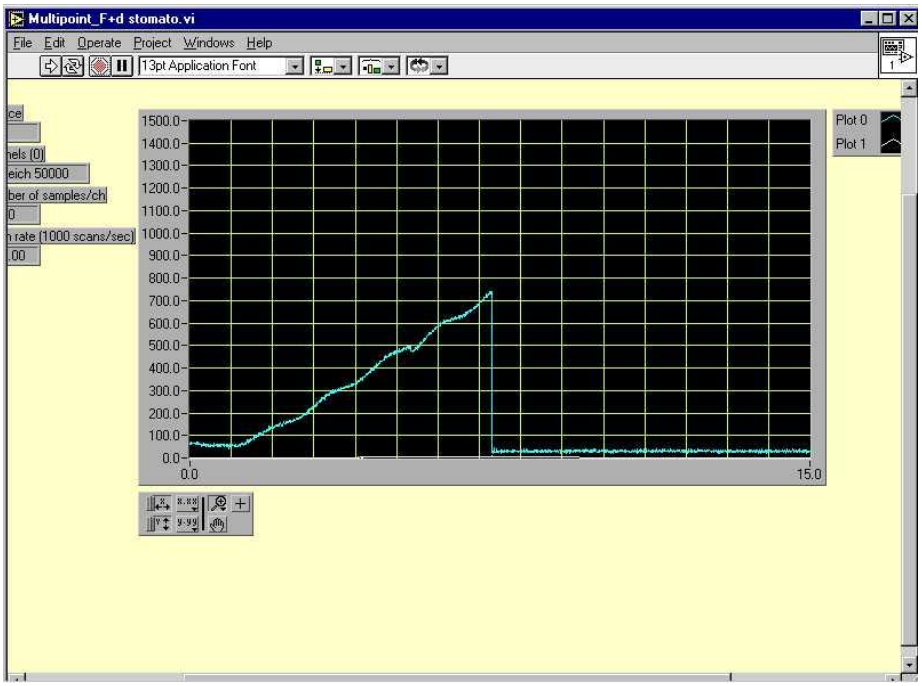


**Figure 4. Diagram of compression force during the test for photopolymer composite**

## DISCUSSION

Quality restorations of dental caries in terms of sustainability depends among other factors and the behavior of the restorative material in relation to the mechanical, chemical and physical properties that occur during the use of restoration. In turn, the behavior is dependent on the nature of the material and its properties [5,6,7]. The properties of a material are either dependent or independent of the structure. The other properties are dependent on the maximum extent, on the nature and the chemical composition of the material.

Nature and chemical composition of the investigated materials significantly affect the average value of microhardness. Both light-cured composite and the flow one had average values of microhardness [1,8].

In general, the composites obtained by curing had an higher average of microhardness value than those obtained by self-polymerization. Observation made above on sustainability restorations decay applies also in this case [9].

Statistical analysis of experimental data relating to the values of the compressive strength, in the experimental conditions used for the compression have not shown a significant difference between the mean values of compressive strength. However, it can be observed a higher value of compressive strength for the composite flow, which is consistent with the microhardness measurements. Tougher materials are brittle and tend to crack more.

## CONCLUSIONS

As expected, the studies carried out have shown that the properties of the dental materials studied are dependent on the nature of the investigation, of the chemical composition and of the method of preparation used. Compressive strength of the composites differ, a greater value being obtained for the composite flow. The durability of dental restorations, judged by wear resistance, which is measured by the amount of material microhardness is higher for light-cured composite restorations than composite flow.

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