Evaluation of Microhardness of Different Resin Composites

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Published by
Enhanced Research Publications
India
www.erpublications.com

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ISBN: 978-81-937741-9-9
(Paperback)

Price: ₹ 450.00
US Dollar: $ 45 (Includes Shipping Charges)

Publisher :
Enhanced Research Publications
India
An International Journals and Books Publisher

Phone : 8607698989, 8684930049
E-mail : erpublications@gmail.com
Website : www.erpublications.com

Typeset by : www.gipg.org
Book Available : www.erpublications.com
www.amazon.in
www.gipg.org

Branch Office :
ER Publications, Rohtak
Shop No. 33, Agromall Sector-14
Rohtak, Haryana-124001
Phone : +91 8607698989

PREFACE

Aim: This in-vitro study is aimed to investigate the influence of the different curing distances (0mm, 3mm, 6mm and 9mm) in terms of surface microhardness (KHN) of different resin composites.

Materials and Methods: The materials tested were Microhybrid composite- Esthet X HD (Dentsply), Nanohybrid composite- Filtek Z250 (3M ESPE, St. Paul, MN, USA), Nanofilled composite- Filtek Z350 (3M ESPE, St. Paul, MN, USA). 40 specimens of each material was prepared by using the cut dentin section with a hole (with internal dimentions 3.5mm in diameter and 2mm in height) which act as a natural mold. The subgroups were divided according to the distance in mm of the light cure gun tip from the composite resin surface (0 mm, 3 mm, 6 mm, and 9 mm). Samples were subjected to a load of 100 gf (gram force) with a dwell time of 15 seconds to the central top surface of each sample via an Indentator to check surface micro-hardness which was carried out using a Digital Microhardness Tester to attain Knoop Hardness Value (HV).

Results: Comparing the mean difference in surface microhardness for Filtek Z350 in different simulating groups, Filtek Z350 showed the maximum microhardness as compared to Filtek Z250 but there was no statistical difference seen between these two. The Esthet X HD

showed minimum microhardness with statistically significant difference when compared with Filtek Z350 samples and Filtek Z250.

Conclusion: The nano composites might be considered better in terms of surface hardness as compared to micro hybrids. The KHN values of almost all resin composites decreased with the increase in light source distance from the resin composite surface.

TABLE OF CONTENTS

INTRODUCTION

Dental caries is a multifactorial, infectious, microbiologic disease of teeth that result in localized dissolution and distruction of the calcified tissues which leads to cavity formation. The aim of the restorative dentistry is to restore the carious or the damaged tooth structure with various materials to re-establish the normal form and function. Of the oldest restorative materials used in dentistry silver amalgam was the first material to be used to restore the defected or diseased teeth due to its favorable properties, easy handling characteristics and obtaining of appropriate contacts. However, one of the disadvantages of extensive restorations in silver amalgam is that, since it does not stick to dental structure, it does not reinforce the weak walls of the cavity because of its low resiliency and high modulus of elasticity. This limits its use in cavities where the enamel is not supported by dentin. In addition mercury toxicity and lack of adhesiveness to dental structure required cavity design with mechanical retention at the expense of healthy tooth structure, which increases its fracture susceptibility. [1]

Today every focus is diverted to conserve tooth structure using restorative materials, which adheres to tooth structure by minimal intervention and are tooth colored to provide aesthetics. Strong durable bond between dental biomaterials and tooth substrate is essential, not only from a mechanical stand point, but also from biological and aesthetic perspectives.