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# Original Article

## A Comparative Study of Fracture Resistance of Endodontic Treated Molars Restored with Composite

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***ABSTRACT*:**

**Background:** The goal of endodontic treatment is to maintain the tooth as a functional unit within the dental arch. The present study was conducted to compare the fracture resistance of endodontically treated molars with cuspal coverage restorations using different resin composite materials. **Materials & Methods:** The present study was conducted on 60 mandibular molars. Mesio-occluso-distal (MOD) cavities were prepared with the initial occlusal depth of 1.5 mm crossing the oblique ridge to include the mesial and distal fosssa. Access was obtained in all teeth with K file. The working length was determined by subtracting 1 mm from this length. Cleaning and shaping of the canals was completed in crown-down manner with till #30 file and 3% sodium hypochlorite irrigation was used in the procedure. Vertical fracture resistance was tested using universal testing machine. **Results:** Group I (20) were sound teeth without any restoration, group II (20) were those restored with reinforced composite and group III (20) were those who received indirect composite. The difference was statistical non- significant (P-1). In group I fracture resistance observed was 1420.8 N, in group II 1240.2 N and in group III 1152.4 N. The difference was non- significant (P> 0.05). **Conclusion:** The superior properties of composite have made it popular among different restorative materials. Both re-inforced composite and indirect composite exhibited similar fracture resistance.

**Key words:** Composite, fracture, indirect composite

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### INTRODUCTION

There can be various complaints of the patients. The most common is tooth pain which can be due to fractured tooth, peri-apical lesion etc. Endodontic therapy involves proper cleaning, finishing and restoration of the canals. The goal of endodontic treatment is to maintain the tooth as a functional unit within the dental arch. The objectives of restoring endodontically treated teeth are to replace the missing tooth structure, maintain function and esthetics, and to protect the tooth against fracture and reinfection.[1]

The loss of marginal ridges due to caries, removal of the pulp chamber roof along with inner dentin during access cavity preparation and loss of the protective feedback mechanism in non-vital teeth contribute to the high fracture susceptibility of endodontically treated teeth.[2] As the restorative modality is critical for the long term success of endodontic treatment, the possible reconstruction materials and techniques are being debated. The advancements in adhesive technology and the improved strength of newer composites have made it possible to create a conservative and esthetic post-endodontic restoration.[3]

The success of endodontic treatment can be judged by the fracture resistance of the tooth. More the resistance, more is the strength of the tooth. The present study was conducted to compare the fracture resistance of endodontically treated molars with cuspal coverage restorations using different resin composite materials.

## MATERIALS & METHODS

The present study was conducted in the department of Endodontics. It comprised of 60 mandibular molars. Mesio-occluso-distal (MOD) cavities were prepared with the initial occlusal depth of 1.5 mm crossing the oblique ridge to include the mesial and distal fosssa. Access was obtained in all teeth with K file. The working length was determined by subtracting 1 mm from this length. Cleaning and shaping of the canals was completed in crown-down manner with till #30 file and 3%sodium hypochlorite irrigation was used in the procedure. Teeth were divided into 3 groups of 20 each. Group I were sound teeth without any restoration, group II were those restored with nanohybrid composite and group III were those who received bulk fill composite.

Vertical fracture resistance was tested using universal testing machine. A vertical compressive force was applied with a 3-mm diameter stainless steel sphere near the interface between the buccal and lingual cuspal slopes of the teeth at a crosshead speed of 0.5 mm/min until the samples fractured. The amount of force required for vertical fracture was recorded in Newtons (N). Results thus obtained were subjected to statistical analysis using chi- square test. P value less than 0.05 was considered significant.

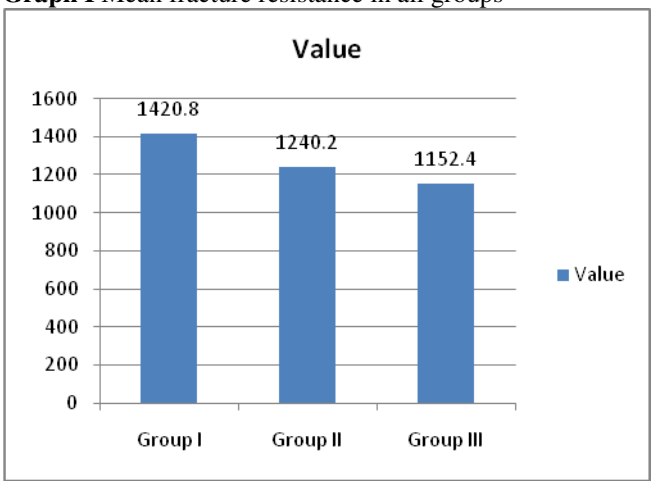
## RESULTS

**Table I Distribution of teeth**

| Group I | Group II | Group III | P value |
|---|---|---|---|
| Control | Reinforced composite | Indirect Composite | 1 |
| 20 | 20 | 20 | |

Table I shows that group I (20) were sound teeth without any restoration, group II (20) were those restored with reinforced composite and group III (20) were those who received indirect composite. The difference was statistical non- significant (P-1).

**Graph I** Mean fracture resistance in all groups




Graph I shows that in group I fracture resistance observed was 1420.8 N, in group II 1240.2 N and in group III 1152.4 N. The difference was non- significant (P> 0.05).

## DISCUSSION

Dental composite resins have certain properties that will benefit patients according to the patient's cavity. It has a micro-mechanic property that makes composite more effective for filling small cavities where amalgam fillings are not as effective and could therefore fall out (due to the macro-mechanic property of amalgam). Synthetic resins evolved as restorative materials since they were insoluble, of good tooth-like appearance.[4]

In clinical practice, the remaining coronal tooth structure and functional requirements are important for the clinician to determine the optimum type of restoration. To conserve more tooth structure, direct composite restorations should be used.[5] The success of any restoration depends upon the endodontic therapy and at the same time the fracture resistance of the endodontically treated teeth. The adhesive property of composite resin restoration allows minimal cavity preparation and provides intra-coronal reinforcement. However, in large cavities, cusp coverage with direct or indirect composite restoration seems to be a more secure option.[6]

In present study, the fracture resistance of endodontically treated molars with cuspal coverage restorations using different resin composite materials was assessed. Teeth were divided into 3 groups of 20 teeth each. Group I (20) were sound teeth without any restoration, group II (20) were those restored with reinforced composite and group III (20) were those who received indirect composite. This is in agreement with Hamouda et al.[7]

In a study by Sonam et al[8], 90 extracted, maxillary molar teeth were randomly divided into two control groups and four test groups. In seventy five teeth, class II MOD cavities with mesio-palatal cusp cappings followed by root canal therapy and post endodontic restorations were done. Restorative materials tested were: nanohybrid composite, bulk fill composite, fiber reinforced composite and indirect composite. After finishing and polishing of the restorations, teeth were subjected to thermocycling and then to compressive loading in a universal testing machine. Post endodontic restorations using fiber reinforced composite and indirect composites exhibited fracture resistance similar to sound intact teeth ($p>0.05$). Significant difference in fracture resistance was observed for nanohybrid composite when compared with fiber reinforced and indirect composite groups ($p<0.05$). Most of the restorable fractures were observed in the nanohybrid composite group followed by the indirect composite group. Unrestorable fractures were seen mostly in the bulk fill composite group followed by the fiber reinforced composite group.

## CONCLUSION

The superior properties of composite have made it popular among different restorative materials. Both re-inforced composite and indirect composite exhibit similar fracture resistance.

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