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RESEARCH ARTICLE

DETERMINATION OF REINFORCEMENT OF FIBRE WITH COMPOSITE IN ROOT FILLED TEETH, COMPARISON OF RESTORATION TECHNIQUES: AN IN- VITRO TECHNIQUE

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ABSTRACT

INTRODUCTION: Pediatric endodontic procedures has increased steadily in the past decade. Therefore, restoration of teeth after endodontic treatment is becoming an integral part of the restorative practice in dentistry.

AIM: To evaluate the compressive strength of root filled deciduous molar teeth with different restorative techniques along with fibre placement.

METHODOLOGY: Fifty extracted deciduous molars were taken [Figure No. 2] and divided into four groups. Group 1- served as control, Group 2- pediatric endodontic procedure was performed and were kept unrestored (post obturation restoration). In groups 3 and 4 – post obturation restoration with composite composite was done.

A 3mm groove using 343 sized bur was prepared on the occlusal surface of the finished restorations in group 4 from buccal to lingual direction. Glass fibre was inserted in the groove in combination with flowable resin that was cured and covered with composite resin.

Cavity surfaces were covered with flowable resin in group 5 and were placed onto the bed of resin in buccal to lingual direction before the composite restoration.

Compressive loading of the teeth was performed by a Universal Testing Machine at a crosshead speed of 3mm-1 until failure. Data was recorded in Newton and submitted to Anova and Tukey post hoc test.

RESULTS: Fibre when placed from buccal to lingual direction under composite restoration (Group 5) {2213.02(204.4)} significantly increased fracture resistance.

CONCLUSION: Post endodontic restoration is an important step necessary step for a good prognosis of the tooth. In the present study restoration has been evaluated along with fibre placement in two variations and fibre placement under the composite restoration was found to be providing a greater compressive strength. However, further studies both in vivo and in vitro need to be done to evaluate the efficiency of fibre placement as a post endodontic restoration.

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INTRODUCTION

The purpose of a restorative material is not only to restore the decayed tooth and provide an effective seal between the tooth and restoration but also to strengthen the tooth. Restoration of root-filled teeth is a critical final step for successful endodontic treatment. Loss of dentine including anatomic structures such as cusps, ridges, and arched roof of the pulp chamber may result in tooth tissue fracture after the final restoration. Therefore, intracoronal strengthening of teeth to protect them against fracture is important particularly in posterior teeth where stresses generated by forces of occlusion can lead to fracture of unprotected cusps.

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MATERIALS

- Endodontic system
- Metapex
- Composite resin
- flowable composite
- bonding agent
- etchant
- light curing unit
- fibre
- saline
- cold cure

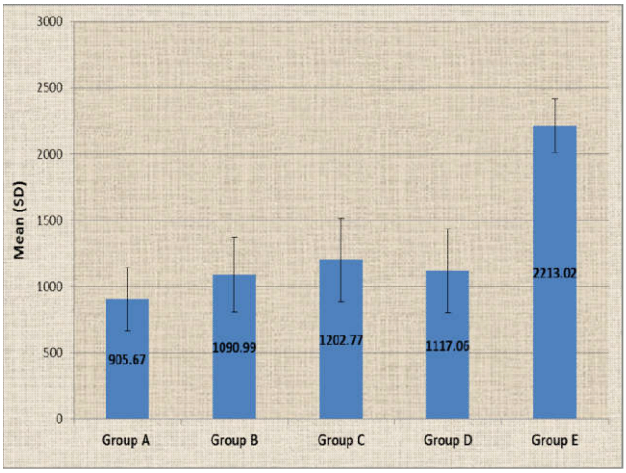
METHODOLOGY

50 extracted deciduous molars were taken for the study

GROUP 1- This group did not receive pediatric endodontic procedure and hence was used as a control group (CONTROL GROUP)

GROUP 2 – GROUP 5 (STUDY GROUP)

From GROUP 2 to GROUP 5- access cavities were prepared using a water – cooled diamond bu no 343 in a high speed handpiece and the pulp tissue was removed with barbed broaches. The canals were prepared to size 35K- file, 2 millimetres of 5.25% Naocl was used as an irrigant SOLUTION during and after the biomechanical preparation. The canals were dried with absorbent paper points and filled with Metapex. The teeth were then embedded in self – curing polymethyl methacrylate resin.



Graph No. 1. Mean values of the samples

GROUP 2: This group was not restored after endodontic procedure.

GROUP 3: The cavities were cleaned and dried after priming for 20 seconds, cavity surfaces were gently dried, bonding agent was applied to the cavity surfaces and cured for 20 seconds. The cavities were then restored with a resin composite using a bulk technique and cured for 40 seconds from the occulsal surface using a composite curing unit.

GROUP 4: The cavities of teeth were restored with the dentin bonding system and composite resin as described in group 3, after finishing the restoration a groove of 3mm width and 1mm depth was prepared on the occlusal surface of the restorations between cusps tip, from a buccal to lingual direction with a high speed bur under water cooling.

The end of the grooves was on the occlusal one-third of the buccal or lingual walls of the teeth. The grooves were rinsed and dried before flowable composite resin was added on to the floor of the groove of the cavities but not cured. A 3mm wide fibre was cut along using scissors. The fibre was saturated with adhesive resin, excess was removed with a hand instrument and then placed onto the bed of uncured Fibre Composite Resin (FCR) this combination was then cured for 20 seconds from the occlusal surface and the exposed fibre surface was covered with composite resin and cured for 40 seconds. GROUP 5: After priming and bonding procedures, cavity surfaces were coated with a fibre composite resin before curing, a piece of fibre was prepared as described in group 4 and embedded inside the Fibre Composite Resin (FCR) from the occlusal one-third of the buccal wall to the occlusal one-third of the lingual wall after curing for 20 seconds, the cavities were restored with composite.

Figure No. 1 Materials

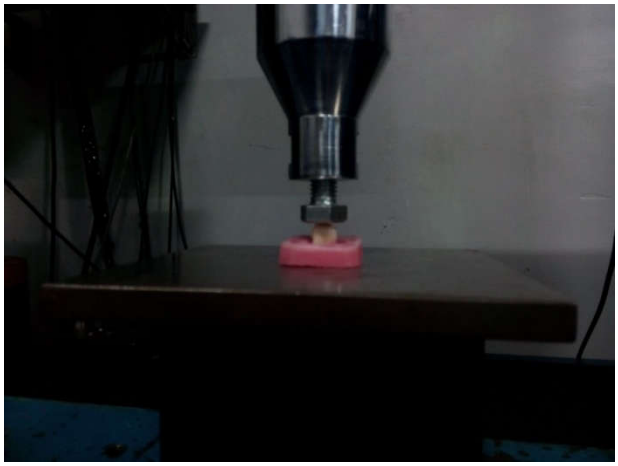


Figure No. 2. Sample under Universal Testing Machine

All the samples were then incubated at 37 degrees Celsius for 24 hours. The specimens were then placed into a Universal Testing Machine. A 3mm diameter stainless steel bar was kept parallel to the long axis of the teeth. The upper stage was positioned so that the bar was kept parallel to the long axis of the teeth until the bar just contacts the occlusal surface of the restoration and buccal and lingual cusps of the teeth. A vertical compressive force was applied at a crosshead speed of 0.3mm min^{-1} and therefore necessary to fracture each tooth was recorded as Newtons and the data were subjected to One-way Anova and post hoc Tukey test [Figure No. 3]

RESULTS

Fibre was placed from buccal to lingual direction under composite resin restoration (Group 5) {2213.02(204.4)} significantly increased fracture resistance. One-way Anova indicated that overall difference in statistical significance between the groups was found at the 0.001 level. Inserting a piece of Glass Fibre from buccal to lingual direction under the resin composite restoration (group 5) {2213.02 (204.4) } significantly increased fracture strength of molar teeth when compared with the group 3 {1202.77 (315.8) } which was restored with dentine bonding system and composite resin . In group 4, the preparation of a groove in a bucco-lingual direction after finishing the restoration and inserting a Glass fibre provided less higher fracture strength than group 5 restored with the use of the fibre under the restoration (group 5) ($P < 0.001$). [1 and 2 and Graph 1]

Table 1. Comparison of Mean (SD) values of fracture Load (N) of all the groups using ANOVA test

Groups	No of samples	Mean (SD)
Group A	10	905.67 (240.1) [a]
Group B	10	1090.99 (282.9) [b]
Group C	10	1202.77 (315.8) [c]
Group D	10	1117.06 (315.6) [d]
Group E	10	2213.02 (204.4) [abcd]
F value	-	35.478
P value	-	<0.001*

(p< 0.05 - Significant, p < 0.001 - Highly significant**)*
(Same alphabets indicate significant difference according to Tukey's post hoc test)

Table 2. One –way Anova test

Fracture Load					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	10755359.320	4	2688839.830	35.478	.000
Within Groups	3410501.748	45	75788.928		
Total	14165861.068	49			

DISCUSSION

Loss of substantial coronal tooth structure as a result of dental caries, trauma, and endodontic therapy can affect the overall strength of a pulpless tooth. Several studies have indicated that the strength of the tooth is directly related to the remaining bulk of dentin. Posterior teeth with root canal treatment should receive cuspal coverage restorations. Bonded restorations, once thought to obviate the need for cuspal coverage, provide only short-term strengthening of the teeth. Bandar M *et al* , 2013 stated that the use of direct composite resin restorations provided significantly greater fracture resistance compared to teeth restored with amalgam This is because of the bonding behavior of composite resin restoration and tooth structure to form a single body.

Ausiello P *et al*, 1997 it was statistically apparent that several adhesive restorative systems could satisfactorily be used to restore teeth after endodontic therapy. Su¨kranBolay *et al*, 2012 stated that Fiber-reinforced posts can be used as a core material in endodontic ally treated teeth as well as composite core reconstructions. Re *et al*, 2004 and Blaser *et al*, 1983 stated that there was no significant difference between fracture resistance of intact teeth and the teeth that were prepared but unrest red. Similar results were found in the present study. Belli *et al*., 2004, stated that when the fibre was placed on the occlusal surface of the restoration in buccal to lingual direction, significant higher fracture resistance was observed. The present study is in disjunction with this study because in the present study fibre when placed from the occlusal one-third of the buccal wall to the occlusal one-third of the lingual wall showed higher fracture resistance. Belli *et al*., 2005 stated that inserting a piece of glass fibre from the buccal to the lingual aspect in the occlusal portion of the restoration or a circumferential fibre in the base of the restoration significantly increased fracture resistance when compared to the no-fibre group. Mondelli *et al*.1980, Gelb *et al*. 1986, Joynt *et al*. 1987, El-Sherif *et al*.1988, Jagadish & Yogesh 1990, Bader *et al*. 2004 stated that the fracture strength of root-filled teeth was reduced because of tooth structure loss.

The results of the present study also showed that restoration of a root-filled tooth is important to achieve an increased resistance to fracture. The results of the present study indicate that the use of a fibre under or over the final composite restoration significantly increases the fracture resistance of teeth. The results indicate that the use of a fibre under the final composite restoration significantly increased fracture strength. However, the clinical conditions and complexity of forces generated by intraoral restoration techniques described in this study must be evaluated further in vivo.

Conclusion

Post endodontic restoration is an important step necessary step for a good prognosis of the tooth. In the present study restoration has been evaluated along with fibre placement in two variations and fibre placement under the composite restoration was found to be providing a greater compressive strength. However, further studies both in vivo and in vitro need to be done to evaluate the efficiency of fibre placement as a post endodontic restoration.

REFERENCES

Ausiello, P., De Gee, A.J., Rengo, S., Davidson, C.L. 1997. Fracture resistance of endodontically-treated premolars adhesively restored. *American Journal of Dentistry* 10(5):237-241.

Bandar, M. A. Al-Makramani , Abdul A. A. Razak, Ng M. Yi, Sin Y. Ying, Fuad A. Al-Sanabani. 2013. sEffect of restorative techniques on fracture resistance of endodontically treated premolars. Open Journal of Stomatology, 3, 379-385.

Belli, S., Erdemir, A., Ozcopurr, M. and Eskitascioglu. G. 2005. The effect of fibre insertion on fracture resistance of root filled molar teeth with MOD preparations restored with composite. *International Endodontic Journal.:* 38, 73-80.

Belli, S., Erdemir, A., Yildirim. C. 2005. Reinforcement effect of polyethylene fibre in root-filled teeth: comparison of two restoration techniques. *International Endodontic Journal*. 38, 1–7.

Endodontics, 2004. Colleagues for excellence, Spring/Summer

Fahad, A. Alharbi, Dan Nathanson, Steven M. Morgano, Nadim Z. Baba.Fracture resistance and failure mode offatigued endodontically treated teeth restored with fiber-reinforced resin postsand metallic postsin vitro.Dental Traumatology.2014;30: 317–325.

Restoration of Endodontically Treated Teeth: The Endodontist's Perspective, Part 1.

S¸u¨kran Bolay, ElifO¨ztu¨rk, Behram Tuncel, Atilla Ertan. 2012. Fracture resistance of endodontically treated teeth restored with or without post systems. *Journal of Dental Sciences.* 7, 148e153.

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