Research Article

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Evaluation of the Tensile Strength of Different Core Build-Up Materials

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ABSTRACT

Background: Separation of the core build-up material from the prefabricated post is a common problem. In view of the above it is imperative that the clinician now has uncertainties as to which material to select for core build- up and how to retain a core build-up material on the prefabricated posts to achieve optimum results. Lot of research has been done on the retention of core build- up material to the surface of posts. There are however very few studies to show that surface treatment of post-head could improve retention of new materials with the prefabricated post-head.

Objective: The objective of this study was to compare the retention of different core build- up materials with the sandblasted prefabricated metal posts and non sandblasted prefabricated metal posts.

Method: A total of Sixty Self Cure Acrylic Resin blocks were fabricated. Out of sixty blocks, thirty blocks with sandblasted prefabricated metal post and thirty blocks with non sandblasted prefabricated metal post were fabricated. Core build- up was done using three different core build- up materials –High Viscosity Glass Ionomer Restorative material, Dual Core Composite Resin Restorative material, Silver Alloy Glass Reinforced Glass Ionomer Restorative material. Tensile bond strength was determined using an Instron Universal testing machine.

Result: A statistically significant difference was found between tensile bond strength of sandblasted and non sandblasted prefabricated metal posts and core build-up materials of each group.

Conclusion: Tensile bond strength of all three core build- up materials with sandblasted prefabricated metal posts was greater as compared to non sandblasted prefabricated metal posts of each group. Tensile bond strength of High Viscosity Glass Ionomer Restorative material with sandblasted prefabricated metal post was greater as compared to other two core build-up materials.

Keywords: Prefabricated metal post, Core build- up, Sandblasted, Non sandblasted, Tensile bond strength, Post and core.

INTRODUCTION

Fixed partial denture is a prosthesis that is cemented to natural teeth, roots, dental implants that furnish the primary support for the prosthesis.[1] Teeth are prepared to receive such prosthesis. These preparations must be based on fundamental principles from which basic criteria must be developed to help predict the success of Prosthodontic treatment . When the teeth are

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damaged beyond conservative limits there is a reduced, support available from the coronal tooth structure and hence support from the radicular portion of the tooth is considered.[2]

Extensively damaged coronal tooth structure can be due to caries, fracture, trauma. In such teeth the pulp of the teeth may be affected causing pain and sensitivity. To reduce these symptoms teeth need to undergo endodontic treatment.[3] Tooth structure destroyed by caries or trauma is often rebuilt with suitable core build-up materials, to enhance the success and longevity of a endodontially treated teeth[4].Posts are widely use for restoration of endodontically treated teeth, when there is insufficient coronal tooth structure, to retain a core for the definitive restoration.

The method of restoring endodontically treated teeth by placing a post and rebuilding the lost tooth structure using core build-up material is called as post and core. Post is defined as a metal post or other rigid restorative material placed in the radicular portion of a non-vital tooth/teeth[5]. A core is defined as a part of preparation for an indirect restoration consisting of restorative materials[6]. Core provides retention and resistance form for crown. Core build-up materials are usually retained by pins, posts, various bonding systems.

Separation of the core build-up materials from the post is a common problem, while restoring endodontically treated teeth. Surface treatments are common methods for improving the adhesive properties of a material by facilitating chemical and micromechanical retention between different constituents[7]. Advances in adhesive dentistry has resulted in the development of surface conditioning techniques for natural substrates and restorative materials[8]. Clinical success of a post and core restorations, depends on the quality of the post-core interface, material used for core build- up.

Retention of various core build-up materials to various post heads is an important factor in the selection of prefabricated post systems and core build-up materials for the restoration of an endodontically treated teeth.

In view of the above, it is imperative that the clinicians now has uncertainties about selection of core build-up materials and retaining it on the prefabricated posts to achieve optimum results. There are very few studies to show that the surface treatment could increase the retention of newer materials onto the prefabricated post-head.

Therefore this study was planned to compare the retention of different core build-up materials with the surface treatment of prefabricated metal post and there in recommended the long term effectiveness of the core build -up materials based on the observations of the study.

OBJECTIVES

1. To evaluate the tensile bond strength of High Viscosity Glass Ionomer Restorative (SDI Riva Self cure HV, Australia) core build-up material with sandblasted prefabricated metal posts and with non sandblasted prefabricated metal posts.

2. To evaluate the tensile bond strength of Dual core composite Resin (DMG Luxacore Z, Germany) core build-up material with sandblasted prefabricated metal posts and with non sandblasted metal posts.

3. To evaluate the tensile bond strength of silver Alloy Reinforced Glass Ionomer Restoration (SDI, Riva Silver, Australia) core build-up material with sandblasted prefabricated metal posts and with non sandblasted" metal posts.

4. To compare the tensile bond strength of different core build-up materials with sandblasted prefabricated metal posts and with non sandblasted prefabricated metal posts.

MATERIALS AND METHOD

The study was divided in the following steps-

1) Fabrication of Self Cure Acrylic Resin blocks and sandblasting of the prefabricated metal post-head.

2) Core build-up using 3 different materials

i) High Viscosity Glass Ionomer Restorative material (SDI, Riva, Self cure HV, Australia)

ii) Dual Cure Composite Resin (DMC – Luxacore Z, Germany)

iii) Silver Alloy Reinforced Glass Ionomer Restorative material (SDI, Riva Silver, Australia)

3) Evaluation of tensile bond strength

Fabrication of Self Cure Acrylic Resin blocks and sandblasting of the prefabricated metal post-head.

Metal mould made up of stainless steel material was used for the fabrication of the Self Cure Acrylic Resin blocks and core build -up procedure. The metal mold comprised of three parts, first part representing the root that is a base, second part is used to centre the posts in the base and third part for the core build- up. The first part of the metal mould has a vertical cuboidal cavity of height, width and length measuring 25mm, 10mm and 10 mm respectively. The second part holds and centres the prefabricated metal posts into the cuboidal cavity. This part has a hole measuring 1-50mm in diameter to hold the post head. The third part is used for the standard core build-up on the post heads. This part has a cylindrical cavity measuring 9mm in diameter and 8mm in depth. All the three parts have orientation slots to stabilize and standardize the placement of the post and build up of core material(fig.1).

For fabrication of blocks, Self Cure Acrylic Resin material [DPI-RR Cold Cure, Mumbai]was used. Total sixty Self Cure Acrylic Resin blocks were fabricated. Out of sixty blocks, thirty blocks with prefabricated metal posts were sandblasted using sandblasting machine[Duostar Bego] and remaining thirty blocks containing prefabricated metal post were not sandblasted. The blocks along with prefabricated metal posts were held in the sandblasting machine. The head of the metal post was directed towards the nozzle and sandblasting was done using Alumina particles of 50 microns[Duostar Bego],at 60-90psi for 5 seconds(fig.2). All sixty blocks along with prefabricated metal posts were now referred as samples. The samples were grouped as follows,

Group 1: Non sandblasted prefabricated metal posts
Group 2: Sandblasted prefabricated metal posts

According to the core build-up materials used, the samples were further divided into three Groups,
Group A: High Viscosity Glass Ionomer restorative material[SDI Riva self cure HV, Australia]
Group A1: Non sandblasted prefabricated metal posts
Group A2: Sandblasted prefabricated metal posts
Group B: Dual Cure Composite Resin material [DMG- Luxacore Z, Germany]
Group B1: Non sandblasted prefabricated metal posts
Group B2: Sandblasted prefabricated metal posts
Group C: Silver Alloy Reinforced Glass Ionomer Restorative material [SDI Riva Silver,Australia]
Group C1: Non sandblasted prefabricated metal posts
Group C2: Sandblasted prefabricated metal posts

Core build-up using different materials-

Core build up using High Viscosity Glass Ionomer restorative material (SDI Riva self cure HV, Australia) (Group A)

Twenty Self Cure Acrylic Resin blocks, ten with sandblasted prefabricated metal posts and ten with non sand blasted prefabricated metal posts were used for core build-up. The finished Self Cure Acrylic Resin blocks along with prefabricated metal posts were placed back in the base former (first part) of metal mould. A cellophane sheet was placed through the head of the prefabricated metal posts on the upper surface of Self Cure Acrylic Resin block to ensure that the core build up material does not bond to acrylic resin base. The block was covered with the third part of the metal mould for core build up. Vaseline was applied to the inner part of the metal mould used for core build up.

High Viscosity Glass Ionomer restorative material (SDI Riva Self cure HV) is supplied in a capsule as a paste along with the plunger. Capsule was activated by pushing the plunger until it was flushed with the body. Immediately the capsule was placed into the amalgamator (model no. SR-043; Shenruo Mainland China) and triturated for 10 seconds. The capsule was removed and placed into the Riva Applicator. The trigger of the Riva applicator was clicked until paste was seen in the clear nozzle. High Viscosity Glass Ionomer restorative material (SDI Riva Self Cure HV, Australia) was carefully extruded over the head of the prefabricated metal posts, to completely fill the third part of the metal mould. The material was allowed to set for 15 minutes after which the metal mould was separated and samples were retrieved. Similarly core build-up of ten samples using non sandblasted prefabricated metal posts (Group A1) and ten samples using sandblasted prefabricated metal posts (Group A2) was done(fig.3).

Core build up using Dual Cure Composite Resin (DMG-Luxacore Z, Germany) (Group B)

Twenty Self Cure Acrylic Resin blocks, ten with sandblasted prefabricated metal posts and ten with non-sand blasted prefabricated metal posts were used for core build up. The finished Self Cure Acrylic Resin blocks along with prefabricated metal posts were placed back in the base former (first part) of metal mould.

Dual Cure Composite Resin (Luxacore Z, DMG Germany) is a dual cured, highly filled, core build up material available in 2 paste system, base paste and catalyst paste. The head of the prefabricated metal post was conditioned with Silane (bond enhancer, Pulpdent) for retention. For mixing the material, the cartridge cap was removed and attached to a mixing tip by turning it 90° counter clockwise and the material was dispensed. This material was then condensed on the head of the prefabricated metal posts in the third part of the metal mould. Incremental placement and curing was done to minimize polymerization shrinkage . The increments were exposed to the Visible Light Cure (QHL 75, Dentsply, Germany) polymerization unit for 20 seconds each. Increments of Dual Cure Composite resin (DMG Luxacore Z, Germany) was built-up and polymerized till the third part of the metal mould was completely filled up. After the complete polymerization samples were retrieved from the metal mould . Similarly core-build up of ten samples using non sandblasted prefabricated metal posts (Group B1) and ten samples using sandblasted prefabricated metal posts (Group B2) was done(fig.4).

Core build up using Silver Alloy Reinforced Glass Ionomer Restorative material (SDI Riva Silver, Australia) (Group C)

Twenty Self Cure Acrylic Resin samples, 10 with sandblasted prefabricated metal posts and 10 with non sand blasted prefabricated metal posts were used for core build up. The finished Self Cure Acrylic Resin blocks along with prefabricated metal posts were placed back in the base former(first part) of metal mould.

SDI Riva Silver, Australia is a Silver Alloy Reinforced Glass Ionomer restorative material used for core build-ups. It is supplied in capsule form along with plunger. The plunger end of the inverted capsule was slowly pressed against the flat surface until the flange of the plunger was flushed with the capsule body. Resistance was felt and then was suddenly released, as the plunger pierced a diaphragm, which allowed the mercury to enter the mixing chamber. The capsule was inserted in the amalgamator and triturated for 8 seconds. After trituration was completed, the capsule was carefully removed from the clip and the material was dispensed from the capsule.

This triturated material was then condensed on the head of the prefabricated metal posts with a round amalgam condenser in the third part of the metal mould. The material was allowed to set for 15 minutes and the metal mould was separated to retrieve the sample. Similarly core-build up of ten samples using non sandblasted prefabricated metal posts (Group C1) and ten samples using sandblasted prefabricated metal posts (Group C2) was done(fig.5).

Evaluation of tensile bond strength of the samples

Tensile bond strength was determined by recording the tensile force required to dislodge the prefabricated metal posts from the core material. An Instron Universal Testing Machine (Model No: 4467) was used for testing the samples. The samples from each group (Group A1, A2, B1, B2, C1 and C2) was locked into the clamps of the Universal testing machine ensuring that one clamp held the self cure acrylic resin blocks and other core build up material. The tensile force was applied by the machine at 3000 kg load cell at a cross head speed at 5mm/mm. The readings were recorded when the core build up separated from the prefabricated metal posts. Sixty samples, 10 of each group were tested and readings were recorded, tabulated and statistically analyzed.

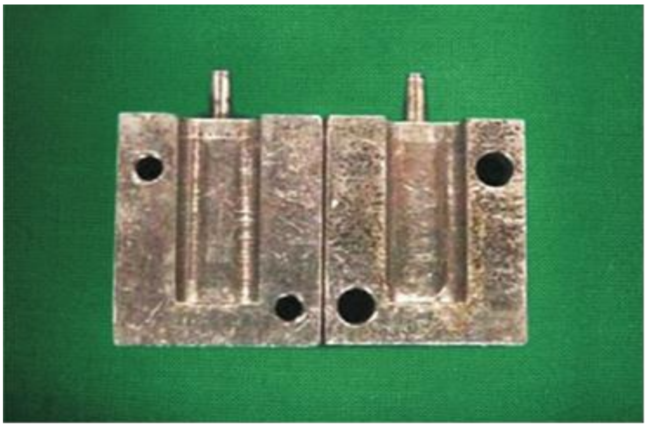


Fig 1: Cross section of metal mould.

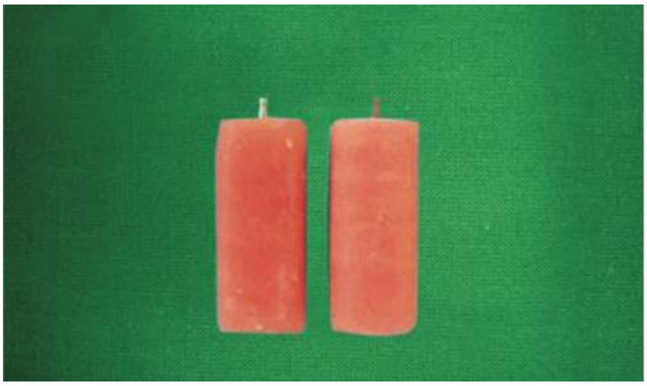


Fig 2: Self Cure Acrylic Resin blocks with prefabricated metal posts (Non sandblasted and sandblasted).

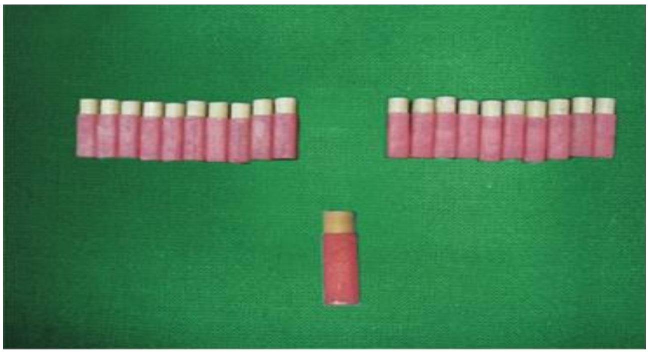


Fig 3; Photograph showing samples of core buildup using High viscosity Glass Ionomer Restorative material (SDI Riva self cure HV, Australia).

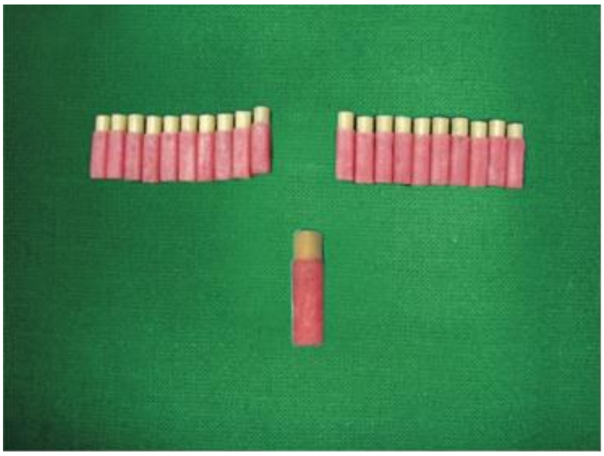


Fig 4: Photograph showing samples of core buildup using Dual Cure Composite Resin material (DMG-Luxacore Z, Germany).

Fig 5: Photograph showing samples of core build up using Silver Alloy Reinforced Glass Ionomer restorative material(SDI Riva Silver, Australia).

RESULTS AND STATISTICAL ANALYSIS

The tensile bond strength of High Viscosity Glass Ionomer restorative material (SDI Riva self cure HV, Australia.) as shown in Table no. 1 demonstrated an average value of 4.87 Mpa for sandblasted prefabricated metal post and 4.08 Mpa for non sand blasted prefabricated metal post.

Null Hypothesis: There is no significant difference between the mean tensile bond strength of Group A1 and Group A2.

Alternate Hypothesis: There is significant difference between the mean tensile bond strength of Group A1 and Group A2.

Table 1: Showing the Mean Values and Comparison between Group A1 and Group A2 High Viscosity Glass Ionomer Restorative Material (SDI Riva Self Cure HV, Australia)

A1:Non sandblasted Posts			A2:Sandblasted Posts		
Sr. No.	Maximum Load (N)	Tensile Bond Strength (MPa)	Sr.No.	Maximum Load (N)	Tensile Bond Strength (MPa)
1	235.44	3.69	1	303.11	4.76
2	215.02	3.38	2	329.00	5.17
3	264.6	4.15	3	311.34	4.89
4	290.27	4.56	4	274.49	4.31
5	275.96	4.33	5	319.57	5.0
6	379.06	5.95	6	294.49	4.6
7	188.74	2.96	7	384.55	6.04
8	130.43	2.0	8	277.73	4.36
9	282.63	4.4	9	343.29	5.39
10	303.40	4.76	10	230.88	3.6
AVERAGE		**4.08**	AVERAGE		**4.87**

Interpretations: Since p-value for the **independent t-test** is 0.043(i.e<0.05) less than that of the 0.05, we reject null hypothesis and conclude that there is significant difference in mean tensile bond strengths of group A1 and Group A2.

The tensile bond strength of Dual cure composite resin material(Luxacore Z DMG, Germany) as shown in Table no. 2 demonstrated an average value of 5.94 Mpa for sandblasted prefabricated metal post and 5.39 Mpa for non sand blasted prefabricated metal post.

Table 2: Showing The Mean Value And Comparison Between Group B1 And Group B2 Dual Cure Composite Resin Material (DMG-Luxacore Z, Germany)

B1:Non sandblasted Posts			B2:Sandblasted Posts		
Sr. No.	Maximum Load (N)	Tensile Bond Strength (MPa)	Sr.No.	Maximum Load (N)	Tensile Bond Strength (MPa)
1	493.31	7.75	1	521.36	8.19
2	498.00	7.82	2	500.21	7.86
3	326.14	5.12	3	249	3.92
4	198.54	3.11	4	405.6	6.37
5	270.48	4.24	5	462.85	7.27
6	372.69	5.85	6	276.45	4.34
7	290.17	4.55	7	348.78	5.48
8	375.14	5.89	8	302.0	4.75
9	370.83	5.82	9	472.95	7.43
10	350.54	5.5	10	235.49	3.70
AVERAGE		**5.39**	AVERAGE		**5.94**

Null Hypothesis: There is no significant difference between the mean tensile bond strength of Group B1 and Group B2.

Alternate Hypothesis: There is significant difference between the mean tensile bond strength of Group B1 and Group B2.

Interpretations: Since p-value for the **independent t-test** is 0.3736 ($p<0.05$) greater than that of the 0.05, we accept null hypothesis and conclude that there is no significant difference in mean tensile bond strengths of group B1 and Group B2.

The tensile bond strength of Silver Alloy Reinforced Glass Ionomer Restorative material (SDI Riva Silver, Australia) as shown in Table no.3 demonstrated an average value of 4.32 Mpa for sandblasted prefabricated metal post and 3.14 Mpa for non sand blasted prefabricated metal post.

Table 3: Showing the mean value and comparison between group c1 and c2 silver alloy reinforced glass ionomer restorative material (SDI Riva Silver, Australia.)

C1:Non sandblasted Posts			**C2:Sandblasted Posts**		
Sr.No.	Maximum Load (N)	Tensile Bond Strength (Mpa)	Sr.No.	Maximum Load (N)	Tensile Bond Strength (Mpa)
1	410.22	6.44	1	435.45	6.84
2	402.10	6.32	2	463.21	7.28
3	135.43	2.12	3	252.64	3.97
4	98.58	1.54	4	143.27	2.25
5	132.49	2.08	5	258.01	4.05
6	266.95	4.19	6	170.32	2.67
7	205.01	3.22	7	305.66	4.80
8	184.1	2.89	8	205.31	3.22
9	135.53	2.1	9	344.56	5.42
10	159.44	2.5	10	192.37	3.03
AVERAGE		**3.14**	AVERAGE		**4.32**

Null Hypothesis: There is no significant difference between the mean tensile bond strength of Group C1 and Group C2.

Alternate Hypothesis: There is significant difference between the mean tensile bond strength of Group C1 and Group C2.

Interpretations: Since p-value for the **independent t-test** is 0.0868 ($p<0.05$) greater than that of the 0.05, we accept null hypothesis and conclude that there is no significant difference in mean tensile bond strengths of group C1 and Group C2.The standard deviation of the readings were calculated in Table No. 4 using ANOVA Test.

Table 4: Showing descriptive statistics for group A, B and C.

Descriptive statistics:

		Tensile bond strength	
		Mean	Standard Deviation
High viscosity Glass Ionomer Restorative material (SDI Riva self cure HV, Australia.)	Non sandblasted Posts	4.08	1.12
	Sandblasted posts	4.87	.63
Dual Cure Composite resin material (DMG Luxacore Z, Germany.)	Non sandblasted Posts	5.39	1.38
	Sandblasted head posts	5.94	1.55
Silver Alloy	Non sandblasted Posts	3.14	1.70

ReinforcedGlassIonomer restorative material (SDI Riva Silver, Australia.)	Sandblasted posts	4.32	1.56

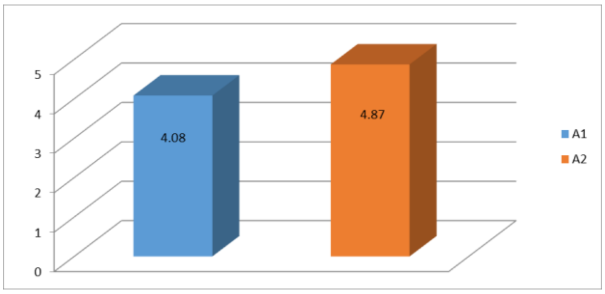
Null Hypothesis: There is no significant difference between means of Tensile bond strength of different groups.

Alternative Hypothesis: There is significant difference between means of Tensile bond strength of different groups.

Interpretations: Since p-value for the **ANOVA** is 0.000 less than that of the 0.05,(p<0.05) we reject null hypothesis and conclude that there is significant difference in mean tensile bond strengths of different material. To find which of these groups differ significantly we carried out multiple comparisons Sidak test. Intergroup comparisons were done using the Sidak test in table No. 5.

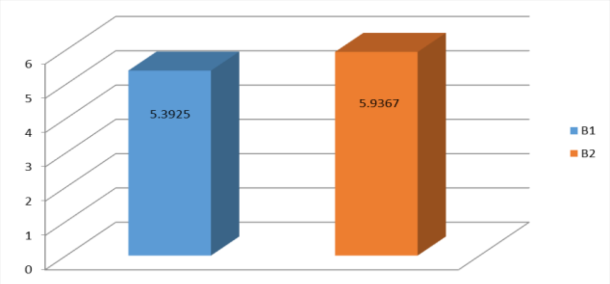
Table 5: Showing sidak analysis for group A, B and C Tensile bond strength between group comparison: Sidak Test result

(I) VAR00004	(J) VAR00004	Mean Difference (I-J)	Std. Error	p-value	Interpretations
A1	A2	-.79083	.55920	.929	Non-Significant
	B1	-1.31083	.55920	.285	Non-Significant
	B2	-1.85500*	.55920	.022**	Significant
	C1	.94500	.55920	.779	Non-Significant
	C2	-.24667	.55920	1.000	Non-Significant
A2	B1	-.52000	.55920	.999	Non-Significant
	B2	-1.06417	.55920	.613	Non-Significant
	C1	1.73583*	.55920	.041**	Significant
	C2	.54417	.55920	.998	Non-Significant
B1	B2	-.54417	.55920	.998	Non-Significant
	C1	2.25583*	.55920	.002**	Significant
	C2	1.06417	.55920	.613	Non-Significant
B2	C1	2.80000*	.55920	.000**	Significant
	C2	1.60833	.55920	.078	Non-Significant
C1	C2	-1.19167	.55920	.430	Non-Significant

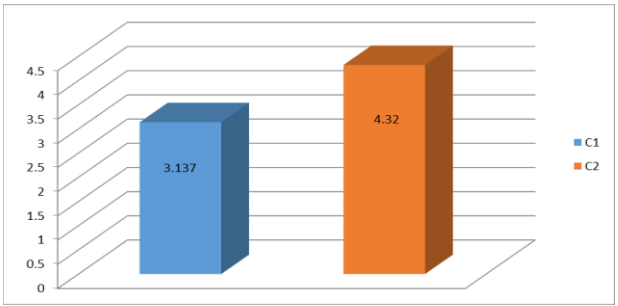


Graph 1: Mean value difference of tensile bond strength between group A1 and A2 high viscosity

glass ionomer restorative material (SDI Riva selfcure HV, Australia).



Graph 2: Mean value difference of tensile bond strength between group B1 and B2 dual cure composite resin material (DMG Luxacore Z, Germany).



Graph 3: Mean value difference of tensile bond strength between group C1 and C2 silver alloy reinforced glass ionomer restorative material (SDI Riva Silver, Australia)

DISCUSSION

The retention between the core materials and the prefabricated posts is critical to the desired post-core integrity, which in turn is important for the success of a definitive restoration. There are various forces that are subjected to the post and core assemblies like compressive forces and tensile forces. Hence, it is essential to know the magnitude of forces required to dislodge the core material from the posts and the ability of the post-core assembly to resist the intra-oral compressive and tensile forces. The tensile forces are subjected onto the post and core assemblies by sticky food which at times tends to dislodge the definite restoration. These tensile force acts mainly on the interface between the crown and core, at the interface of the core and head of the post and at the junction of apex of the post and the root surface.

Bonding of these posts to some of the materials like composite relies only on chemical interaction between post surface and the resin material used for luting or building up the cores(9).In an attempt to maximize resin bonding to post surface several treatments have been recently suggested.

These procedures may be divide into three categories[9].

- Silanization and/ or adhesive bonding.
- Acid etching.
- Sandblasting and silica coating.

In prosthetic dentistry, sandblasting with alumina particles is extensively used for treating metallic substrate to clean the surface of organic contaminants and to provide surface irregularities that enhances mechanical bonding with different materials and increase the surface area of the metallic surface.

In this study the metal post heads were sandblasted to increase the surface roughness and to evaluate whether it can enhance the bond strength between the metal surface and core build up materials.

High viscosity glass ionomer core materials are now being employed as they are fast setting, easy to place and allow the finishing of the preparation for the final restoration at the same appointment. They are also the only core materials, which chemically bond to the tooth structure improving retention of the restorations and reducing marginal leakage as compared to the unbonded amalgam or composite resin cores[10].

Dual Cure Composite Resin material used as a core material is better because it offers both modes of curing in one material that is chemical cure and light cure. The main advantage being, its ability to harden the surface immediately when light cured, while allowing the deeper layers not accessible to the light to cure chemically. This chemical cure property also gives them an advantage over pure light cured materials, which are limited by depth of cure. Silver Alloy Reinforced Glass ionomer restorative material is now being employed for core build ups because of its high early bond strength and compressive properties creating favorable core build up conditions.

This can be attributed to the fact that sandblasting with alumina particles increases the surface area of metallic surface and thus enhances the mechanical bonding through microretention.

The results showed that the highest bond strength values were achieved by Dual Cure Composite Resin (DMG LuxaCore Z, Germany) followed by High Viscosity Glass Ionomer restorative material (SDI Riva self cure HV, Australia.) and Silver Alloy Reinforced Glass Ionomer Restorative material (SDI Riva Silver) (SDI Riva Silver, Australia) . Silver Alloy Reinforced Glass Ionomer Restorative material (SDI Riva Silver, Australia) showed the least tensile bond strength values in Table no. 4.

On inter group comparison difference between A1 and B2, A2 and C1, B1 and C1, B2 and C1 were found to be statistically significant with mean difference being less than 0.05.

Dual Cure Composite Resin material (DMG LuxaCore Z, Germany) showed the highest tensile bond strength as it is reinforced with zirconia dioxide. The materials excellent flow properties guaranteed optimal adaptation. The reinforcements of zirconia dioxide results in increased hardness, strength, decreased wear, reduction in polymerization shrinkage and improved workability by increasing viscosity. Also because of silanization, the amount of retention of Dual Cure Composite Resin material (DMG LuxaCore Z, Germany) would have increased. Studies conducted by Mclean and Gasser[11] Moll et al[12], Millstein et al[13], Chan and Bryan[14] and Kouvarik et al[15] showed similar results.

The major drawbacks of the Glass ionomer core build up materials was that they are technique sensitive and any deviation from the manufacturer's instructions could lead to the failure of the core and the final crown. Adhesive failures can occur from contamination of the tooth surface. Meticulous moisture control is vital. Excessive moisture results in loss of components during the initial setting phase and reduces the marginal seal of the restoration. Hence it might have resulted in reduced amount of bonding with the post that would have accounted to less amount of tensile bond strength. Studies conducted by Toleghani Leinfelder[16], Barem et al[17]were shown to have similar results with this study.

The possible reason for a lower fracture resistance of the Silver reinforced with Glass ionomer is that amalgam is weaker under shear conditions. It is also possible that silver is stronger in bulk and the posts used in the study reduced the bulk of the silver restorations while allowing the concentration of stresses at a specific point or line angles. This could have weakened the amalgam and accounted for the lower results. Studies conducted by Cohen et al[18,19] were concurrent with this study.

The Dual Cure Composite Resin (DMG LuxaCore Z, Germany) and High Viscosity Glass Ionomer restorative material (SDI Riva self cure HV, Australia.) cores yielded on testing, but the Silver Alloy Reinforced Glass Ionomer Restorative material (SDI Riva Silver) cores showed cohesive debonding in some of the samples.

The present study confirms that retention of the sandblasted prefabricated metal posts, as tested under tensile loads is much more in cases of the Dual Cure Composite Resin (DMG LuxaCore Z, Germany) in comparison to High Viscosity Glass Ionomer restorative material (SDI Riva self cure HV, Australia.) followed by Silver alloy-reinforced Glass Ionomer Restorative material (SDI Riva Silver, Australia) which is in accordance with study conducted by Brandal et al[20].

It can thus be presumed that the success of the post-core and crown retention would be generally better when the core build-up materials are Dual Cure Composite Resin material (DMG LuxaCore Z, Germany) and High Viscosity Glass Ionomer restorative material (SDI Riva selfcure HV, Australia). The Silver alloy-reinforced Glass Ionomer Restorative material (SDI Riva Silver, Australia) cores can be reserved for the situations in which much of the sound tooth structure is intact, bulk of the core build up material is possible and additional retention features can be utilized.

The Silver alloy reinforced Glass Ionomer Restorative material (SDI Riva Silver) core build up materials may be used if there is sufficient supporting tooth structure but are contraindicated as free standing posts supported molded core material.

When comparing different posts, sandblasted prefabricated metal posts showed higher retention properties compared to non sandblasted prefabricated metal posts. Hence it is recommended that using sandblasted prefabricated metal posts and Dual Cure Composite resin core build-up material shows maximum tensile bond strength when compared to other groups.

However no single dental material, including the core build-up materials, has proved to be superior to others in all respects. This leads to clinical discretion and operator's preference in selection of a core build-up material for a particular clinical situation.

LIMITATIONS OF THE STUDY

- The tests do not completely simulate the clinical situations.
- In the oral cavity, the tensile force is one of the many masticatory forces. Situations in which only pure tensile stresses are being applied are not very common.

CONCLUSION

Within the limitations of this in vitro study the following conclusions could be drawn:

- The tensile bond strength of High Viscosity Glass Ionomer Restorative (SDI Riva Self cure HV, Australia) core build up material with sandblasted prefabricated metal post was greater as compared to that of non sandblasted prefabricated metal post.
- The tensile bond strength of Dual Cure Composite resin (DMG Luxacore Z, Germany) core build up material with sandblasted prefabricated metal post was greater as compared to that of non sand blasted prefabricated metal post.
- The tensile bond strength of Silver Alloy-reinforced Glass Ionomer restorative (SDI Riva Silver, Australia) core build up material with sandblasted prefabricated metal post was greater compared to that of non sandblasted prefabricated metal post.
- The tensile bond strength of Dual Cure Composite resin (DMG Luxacore Z, Germany) core build up material proved to be greater than that of High Viscosity Glass Ionomer Restorative material (SDI Riva Self cure HV, Australia) followed by Silver Alloy-reinforced Glass Ionomer restorative material (SDI Riva Silver, Australia).

SUMMARY

The results of the study showed the Dual Cure Composite Resin (DMG-LuxaCore Z, Germany) to have the maximum tensile bond strength followed by High Viscosity Glass Ionomer restorative material (SDI Riva self cure HV, Australia) and Silver Alloy Reinforced Glass Ionomer Restorative material (Riva silver, Australia) respectively.Hence it is recommended that using sandblasted metal posts and Dual Cure Composite resin core build -up material is clinically more beneficial.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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