http://jmscr.igmpublication.org/home/
ISSN (e)-2347-176x ISSN (p) 2455-0450
crossref DOI: https://dx.doi.org/10.18535/jmscr/v7i7.145

IGM Publication
Journal Of Medical Science And Clinical Research
An Official Publication Of IGM Publication

# Comparative evaluation of three different tooth coloured and light cured restorative materials on cervical abrasion lesions- A clinical study

Authors
**K Ayyappan[1], Manoj S[2], Kurian K George[3], Jolly Mary Varghese[4]**
[1]Additional Professor in OMFS department, Government Medical College, Manjeri
[2]Associate Professor in OMFS department, Government Medical College, Manjeri
[3]Retired Professor, Conservative dentistry, Government Dental College, Thiruvananthapuram
[4]Principal, Government Dental College, Thrissur

**Abstract**
**Aim**: *This study was conducted to compare the clinical performance of three different tooth colored and light cured materials like Dyract-Compomer, Fuji LC and TPH posterior composite on cervical abrasion lesions.*
**Materials and Methods:** *The properties evaluated here are colour match, cavo surface marginal discoloration, marginal adaptation, secondary caries, anatomic form and surface texture. These properties are evaluated by using the USPHS criteria over a period of one year. Patients with three adjacent Supra gingival cervical abrasion lesions were selected. All lesions ware buccal, caries free, non-undercut cervical abrasion lesions which extended into dentin*
**Results**: *Of the three materials studied the clinical performance of Fuji II LC found 100% success in all the properties evaluated in the present study. The other two materials also showed 100% success except for marginal adaptation and anatomic form. In these properties the composite restoration showed 18.7% and Dyract showed 49% success after one year.*
**Keywords:** *Tooth coloured restorative materials, cervical abrasion lesions.*

## Introduction

The main objective of restorative dentistry is achieved when the restored teeth fulfils its role as a useful component of the dentition. The development of aesthetic dentistry and the availability of reliable new dental materials have changed the daily practice of dentistry. These advances have led to more Conservative cavity design and preservation of maximum dental tissues.

Cervical abrasion lesions usually appear in the cement enamel junction with some gingival recession. These lesions produce pain or sometimes sensitivity on probing on application of cold, hot or sweet. The problem the clinician faces to restore such conditions are its non-retentive and smooth surface nature.

Elimination of sensitivity, improved aesthetics and making the tooth a useful component of the dentition is the main objective of treating such conditions. Because of the smooth, non-retentive nature of the lesions, selection of materials for restoration of such lesions is very important.

In the recent years considerable progress has been made in the development of tooth colored restorative materials. The composite material is one of the tooth colored restorative material being used for both anterior and posterior restorative purposes. The adhesion between composite resin and dentin

has been improved by introduction of newer generation dentin adhesives or sandwich technique by which glass ionomer cement works as a kind of bonding agent as well as dentine substitute.

Since its introduction is 1972 glass ionomer cements are extensively used for the restoration of cervical abrasion lesions. This is mainly due to its adhesive property and bio compatibility. The conventional glass ionomer which is the product of alumino silicate glass powder and aqueous solution of poly (acrylic) acid suffers from disadvantages like short working time, long setting time, low fracture resistance and low flexural strengths. To improve the physical property and clinical characteristic of glass ionomer, research introduced the hybrid materials classified as 'Resin modified glass ionomer' or 'Hybrid compomer'.

Light hardened glass ionomer/resin restorative material was introduced by CROLL AND KILLAN[1] in 1990 with 80% glass ionomer and 20% light polymerized resin component, which exhibits the beneficial properties of glass ionomers and composite resins including excellent biocompatibility and adequate pulpal tolerance, co efficient of thermal expansion similar to that of tooth, thereby providing good dimensional stability to the restoration, good compressive strength, chemical bonding to tooth structure, fluoride release that gives the material anti-carcinogenicity. The resin component cures within 30-60 seconds giving the cement substantial initial hardness.

COMPOMER-DYRACT from Dentsply, USA was introduced in 1994. The manufacturer claims that the material has benefits of glass ionomer- adhesion to tooth structure, fluoride release and easy handling property of composite resin which is one of the primary indications of this new material for restoring cervical abrasion lesions.

This study was conducted to compare the clinical performance of three different tooth colored and light cured materials like Dyract-Compomer, Fuji LC and TPH posterior composite on cervical abrasion lesions. The properties evaluated here are colour match, cavo surface marginal discoloration, marginal adaptation, secondary caries, anatomic form and surface texture. These properties are evaluated by using the USPHS criteria over a period of one year.

**Materials and Methods**

A total number of 54 patients participated in this study. Diagnosis and treatment planning for restorations followed conventional guidelines. The criteria used to select participants from the patient population were as follows.

- Between the age of 35 to 45 years
- Patients with three adjacent Supra gingival cervical abrasion lesions
- All lesions were buccal, caries free, non – undercut cervical abrasion lesions which extended into dentin
- Patients with good oral hygiene
- Patients with normal occlusion
- Absence of xerostomia
- Absence of any other fillings in the mouth
- Absence of severe medical complications
- Absence of rampant caries or moderate to severe chronic periodontitis
- Absence of history of severe tooth clenching (any abnormal tooth wear was documented)

Patient evaluation included complete medical and dental histories, photographs of all teeth included in the study. Tooth vitality was documented using temperature and electric vitalo meter. Only teeth with vital pulp were included in this study. Cervical lesions were probed with a no: 23 explorer, any sensitive teeth were then given cold and electric pulp tests.

Materials used for this study:-

1. Dyract-Compomer
   (Dentsply International Inc. Milford, USA)
   a. Prime and Bond-
      PENTA (Phosphonated Penta-acrylic ester)
      TEGDMA (Tri ethylene glycol-dimethacylate)
      Elastomeric Resin
      Acetone
   b. Restorative material:
      UDMA resin (Urethenedimetheaylate)
      TCB Resin

Strontium fluoro Silicate glass
Poly acrylic acid

2. Fuji II Light Cured glass ionomer (GC Dental Corp. Japan)

a. Powder –Fluoro alumino silicate glass
b. Liquid – Maleic/acrylic acid Co-polymer HEMA (Hydroxyl Ethyl Methacrylate)

3. TPH Posterior Composite (Caulk, Dentsply USA)
   a. Primer-TEGDMA, Maleic acid in aqueous acetone solution
4. Bonding agent-PEGDMA, Glutaraldehyde in aqueous solution
5. Restorative material- BIS –GMA, TEGDMA, Barium silicate, amorphous silica.

**Method**

After proper oral prophylaxis all lesions were cleaned with non-fluoridated flour of pumice and water on a rubber cup, and isolated with cotton rolls. The gingival tissues were reflected with gingival retraction cord.

The material was used according to the manufactures instructions. Of the three adjacent lesion one lesion was filled with light cure composites material, one with light cure glass ionomer and one with compomer-Dyract. All restorations were finished and polished wet on the day of placement with ultra-fine slow speed diamond finishing burs.

**Evaluation**

The base line examination was done within two months of placement of restorations and subsequent recall examinations at six months and one year thereafter. All restorations were evaluated individually mainly by using the categories and criteria developed by Ryge[2] for the US Public Health Service (USPHS) for clinical evaluation of restorations (Table I). The properties evaluated by using the above mentioned criteria are colour match, cavo surface marginal discoloration and secondary caries.

The other properties evaluated in this study are marginal adaptation, surface texture and anatomic form of the restorations. These are evaluated by using the modified form of the USPHS criteria (Table II)

**Table– 1[2]**

| CATEGORY | CHARACTERISTICS | METHOD |
|---|---|---|
| **Colour match** | | |
| Alfa (A) | The restoration appears to match the shade and translucency of adjacent tooth tissue | Visual Inspection |
| Bravo(B) | The restoration does not match the shade and translucency of adjacent tooth tissues, but the mismatch iswithin normal range of tooth shade (within normal range-similar to silicate cement restorations for which the dentist did not quite succeed in matching tooth colour by his choice among available silicate cement shade) | Visual Inspection |
| Charlie (C) | The restoration does not match the shade and translucency of the adjacent tooth structure, and the mismatch is outside the normal range of tooth shade and translucency. | Visual Inspection |
| Oscar (o) | The restoration does not match the shade and translucency of the adjacent tooth structure, and the mismatch is outside the normal range of tooth shade and translucency. | Visual Inspection |
| **CAVO SURFACE MARGINAL DISCOLORATION** | | |
| Alfa (A) | There is no visual evidence of marginal discoloration different from the colour of the restorative material and from the colour of the adjacent tooth structure. | Visual Inspection |
| Bravo (B) | There is visual evidence of marginal discoloration at the Junction of the tooth structure and the restoration, but the discoloration has not penetrated along the restoration in a pulpal direction. | Visual Inspection |
| Charlie (C) | There is visual evidence of marginal discoloration at the Junction of the tooth structure and the restoration that has penetrated Visual along the restoration in a pulpal direction. | Visual Inspection |
| Secondary caries | | |
| Alfa (A) | The restoration is a continuation of existing anatomic form adjacent to the restoration | Visual Inspection |

| | | |
|---|---|---|
| Bravo (B) | There is visual evidence of dark deep discoloration adjacent to the restoration (but not directly associated with cavo surface margin | Visual Inspection |

**Table II**[3]

| CATEGORY | DESCRIPTION | METHOD |
|---|---|---|
| **ANATOMIC FORM** | | |
| A1 | Restoration is continuation of existing anatomic form | Visual Inspection and Explorer |
| B1 | Restoration is NOT continuous with existing form - along less than 50% of the margin | Visual Inspection and Explorer |
| B2 | Restoration is NOT continuous with existing form - along more than 50% of the margin | Visual Inspection and Explorer |
| **MARGINAL ADAPTATION** | | |
| A1 | No visible evident of crevice, sharp probe does not catch when drawn across the margin | Visual Inspection and Explorer |
| A2 | No visible evidence of crevice, Less than 50% of the margin is detectable as a crevice with a sharp probe | Visual Inspection and Explorer |
| A3 | No visible evidence of crevice, more than 50% of the margin is detectable as a crevice with a sharp probe. | Visual Inspection and Explorer |
| B1 | Crevice - visible (and penetrable) along less than 50% of the margin | Visual Inspection and Explorer |
| B2 | Crevice - visible (and penetrable) along more than 50% of the margin. | Visual Inspection and Explorer |
| **SURFACE TEXTURE** | | |
| A | Smooth surface essentially free of pits and scratches | Visual Inspection and Explorer |
| B | Smooth surface except for minor finishing scratches or unpolished fissures. | Visual Inspection and Explorer |
| C | Rough surface due to irregular scratches | Visual Inspection and Explorer |
| D | Coarse surface (associated with the type of material essentially free of pits, scratches.) | Visual Inspection and Explorer |
| E | Coarse surface with pitting/ voids/ deep/ scratches | Visual Inspection and Explorer |

**Observations**

A total number of 54 patients participated in this study. The base line evaluation was done within two months after placing the restoration. At the base line, all patients were evaluated and the recall rate was 100%. After 6 months 48 patients were evaluated and recall rate was 88.8%. And after one year 43 patients are evaluated with a recall rate of 79.6%.

The ratings for colour match and cavo surface marginal discoloration is shown in Table III for each of the periods. The marginal adaptation and Anatomic form are shown in Table IV. The ratings for secondly caries and surface texture in Table V.

**Colour match**

In the base line evaluation all the composite and Compomer restorations exhibit the same shade and translucency of adjacent tooth (Alfa rating). In case of glass ionomer restoration, 43 restorations exhibit Alfa rating and 11 restorations Bravo ratings. After six months and after one year no change was observed in any of the ratings.

**Cavo Surface marginal discoloration**

All the three types of restoration at the base line evaluation showed the same rating (Alfa). After 6 month and one year no change in color at the cavo surface margin was observed.

**Marginal adaptation**

Evaluation at base line of the restorations are not showing any visible crevice along the periphery of the restoration and there is no catch when the explorer drawn across the surface of the restoration towards the tooth (A1rating). After 6 months no visible evidence of crevice and there is no catch observed with an explorer in case of glass ionomer restorations. But in case of composite and Dyract restorations 18 composite restorations and 7 compomer restorations a crevice was detected with a sharp explorer nearly half of the margins of restorations (A2 rating).

After one year no change was observed in case of glass ionomer restoration. Among the other fillings, 9 composite and 5 compomer fillings a crevice was detected at the margins mainly on the cervical region of the restoration (A2 rating). At the same

time 26 composite and 18 compomer restoration the catch was detected along entire margins of the restorations (A3 rating).

**Surface texture**

The surfaces of all restoration at base line evaluation are smooth (A rating). The same rating was observed after 6 months and one year.

**Secondary caries**

In the base line, after 6 months and after one year evaluation, there is no visual evidence of dark discoloration adjacent to the restoration which indicates absence of secondary caries.

**Anatomic form**

Baseline evaluation of all the restorations exhibit continuation of existing anatomical form of the tooth (A rating). After 6 months, in 18 composite and 7 Dyractrestoration the continuation was lost mainly on the coronal region (B1 rating). After one year 9 composite and 6 compomer showed B1 rating and 26 composite and 18 compomer restorations the continuations of restorations were lost in entire margins of restorations (B2 rating). In case of glass ionomer restorations no change was observed after 6 months and after one year.

**Table – III** Evaluation of color match and cavo surface marginal discoloration

| Category and rating | Base line - % | | | After six months- % | | | After one year - % | | |
|---|---|---|---|---|---|---|---|---|---|
| | Composite | Fuji –II | Dyract | Composite | Fuji –II | Dyract | Composite | Fuji –II | Dyract |
| Color match Alfa | 100 | 79.7 | 100 | 100 | 79.7 | 100 | 100 | 79.7 | 100 |
| Bravo | 0 | 20.3 | 0 | 0 | 20.3 | 0 | 0 | 20.3 | 0 |
| Charlie | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Cavo Surface Marginal Discoloration Alfa** | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Bravo | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Charlie | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

**TABLE – IV** Evaluation of Marginal Adaptation and Anatomic Form

| Category and rating | Base line - % | | | After six months- % | | | After one year - % | | |
|---|---|---|---|---|---|---|---|---|---|
| | Composite | Fuji –II | Dyract | Composite | Fuji –II | Dyract | Composite | Fuji –II | Dyract |
| Marginal Adaptation A1 | 100 | 100 | 100 | 62.6 | 100 | 65.3 | 18.7 | 100 | 49 |
| A2 | 0 | 0 | 0 | 37.4 | 0 | 14.7 | 20.9 | 0 | 9.3 |
| A3 | 0 | 0 | 0 | 0 | 0 | 0 | 60.4 | 0 | 41.7 |
| B1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| B2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Anatomic Form A | 100 | 100 | 100 | 62.6 | 100 | 65.3 | 18.7 | 100 | 49 |
| B1 | 0 | 0 | 0 | 37.4 | 0 | 14.7 | 20.9 | 0 | 9.3 |
| B2 | 0 | 0 | 0 | 0 | 0 | 0 | 60.4 | 0 | 41.7 |

**Table – V** Evaluation of Secondary caries and surface texture

| Category and rating | Base line - % | | | After six months- % | | | After one year - % | | |
|---|---|---|---|---|---|---|---|---|---|
| | Composite | Fuji –II | Dyract | Composite | Fuji –II | Dyract | Composite | Fuji –II | Dyract |
| Surface texture A | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| B | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| D | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| E | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Secondary caries Alfa | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Bravo | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

**Discussion**

The restoration of cervical abrasion lesions remained as a problem even with the modern adhesive restorative systems. The non-retentive and smooth surface of the lesions demands special properties from the restorative materials that are utilized to restore them.

In the last decades several materials, like composite resin, glass ionomer and combinations have been attempted to restore cervical lesions. Combinations were mainly introduced with the purpose of combining the advantages of two different restorative materials, since these restorative materials are required to adhere to more than one type of tooth structure. During seventies composite resin restorative material became popular as a cervical restorative material. However Bowen in the early seventies even though proposed resins for class V lesions, soon realized that the introduction of NPGMA (N - Phenyl Glycidyl methacrylate) as an adhesive promoter was needed. This was the beginning of an era of introduction of several adhesive materials and combination materials.

The glass ionomers became the material of choice for cervical lesions, since the material would bond to different types of tooth structure and did not need any specific tooth preparations to receive the materials. Glass ionomer materials also have a special therapeutic effect of fluoride release. However it was soon realized that the strength of the material was not satisfactory when compared to composite. At this juncture the combined materials came into popularity. The first of the series of combination material was presented to the profession by Mitra, 1990[4] in the form of a resin modified glass ionomer. Following this several combination materials came into clinical use. Confusion prevailed among the clinicians to designate these various combinations of materials until 1994. McLean 1994[5] proposed a definite classification of these combination materials. He proposed the type I- conventional acid-base reaction glass ionomer. Type Il as resin modified glass ionomer which still retains the acid-base chemical reaction, while type Ill as poly acid modified composite resin which do not retain the acid-base chemical reaction.

In the present study, among the materials used the Fuji II-LC comes under Type Il asper Mc Lean's classification and Dyract coming under type III poly acid modified composite. In the year 1994 Mc Lean[5] also suggest that the poly acid modified composite resins as more of resinous material and less of glass ionomers. However the manufacturers of Dyract have made long claims over the materials and suggested this as an alternative material of choice for restoring cervical lesions.

In this study fifty four patients with three adjacent supra gingival cervical abrasion lesions are included. All lesions are non-retentive and with a smooth surface. Each lesions are restored with three different types of materials and evaluated at base line, after six months and after one year. The properties evaluated include colour match, cavosurface marginal discoloration, secondary caries, marginal adaptation, surface texture and anatomic form.

The clinical criteria (USPHS) used in this study to assess the clinical performance, waas able to distinguish significant differences among the three types of restorations in one year period. Many authors have recognised the deficiencies of USPHS criteria. For example, in the USPHS criteria there is no category for marginal adaptation between evidence of a marginal crevice and exposure of the base or dentine. So in this study the marginal adaptation, anatomic form and surface texture are evaluated by using the modified form of the USPHS criteria. Method of examination in this criterion is by using explorer and visual inspection. So in this study only supra gingival cervical lesions were included.

**Colour match and Cavo Surface marginal discoloration**

Discoloration is a major aesthetic failure of direct tooth coloured restorations. It results from surface staining, marginal staining, due to micro leakage, changes in the surface morphology by wear and internal material deterioration. Although extrinsic surface and marginal surface staining are minimized

by regular tooth cleaning intrinsic discoloration is material dependent and difficult to control by clinical dentist.

The opacity of translucent material is very sensitive to surface roughness, as roughened surface increases random reflection at the surface, leading to an increase of opacity[6]. So every effort was made in this study to keep the surface of restorations as smooth as possible. Mount in 1991[7] stated that translucency of conventional and resin modified glass ionomer cement restorations will improve because the material continue to mature, since these materials were composed of numerous inorganic particles and a matrix phase. The refractive index between the two phases, the particle phase and matrix phase is higher. So the opacity of the material is greater due to multiple reflection and refraction at the matrix - particle interface.

Clinical discoloration is affected by many parameters, including type of restorative materials, diet, oral hygiene of patient. S.INOKOSHI, M.F.BURROW[6] and associates in their study on opacity and colour change of tooth coloured restorative materials showed that the light cured composite are highly colour stable and in case of resin modified glass ionomer there is slight decrease in opacity and colour change. With these findings they suggest that dentist should select a shade that is lighter than the original tooth colour.

The inherent appearance of all restorative materials was acceptable because of the provision of various colour shades. In this study there was no change in colour observed from the base line evaluation to one year in any of the restorations. In case of some composite and Dyract restorations slight marginal discoloration was observed after one year on close clinical examination. And these discolorations are removed by means of wet cotton, which indicate that this marginal discoloration may be due to bond brake down and consequently a leaking margin that allows ingress of exogenous stains from food and drink. In this study no materials showed any marked difference in colour change.

**Secondary caries**

After one year clinical evaluation of the three types of restoration no secondary caries was noted. This could be due to proper maintenance of oral hygiene, may be due to continued fluoride release from the materials or inhibition of demineralization associated with these materials. Researchers have shown that 20ppm is the minimum amount of fluoride needed to affect the activity of decay causing bacteria streptococcus mutants. In a study by Y.E.ABOUSH[8] observed that fluoride release from Fuji II LC was above 20ppm and from Dyract it is only 8ppm. There is no known study related to fluoride release from TPH composite material.

However one year may be an inadequate time for caries to develop, so long term investigations are needed for assessing secondary caries.

**Marginal Adaptation**

One factor essential for the longevity of restoration is the marginal adaptation. The ability of the restorative materials to efficiently seal the cavity margins in dentin is of particular concern in cervical abrasion lesions. Previous studies have compared earlier materials and methods (GORDEN et al 1995[9]) (HEMBERY.J.H et al, 1995[10]).

In the present study loss of marginal adaptation were observed in 60.4% composite restorations and 41.7% Dyract restorations after one year. In case of light cured glass ionomer restorations no loss of marginal adaptation were observed.

Marginal gap formation has been suggested to be the result of polymerization shrinkage and difference between coefficient of thermal expansion of tooth structure and restorative materials. The amount of polymerization shrinkage and thermal expansion may be directly affected by the concentration of fillers and resin composition of the material. It has been suggested by some authors that the forces exerted by polymerization shrinkage and thermal expansion exceeds the bond strength of dentinal bonding agents, which produce marginal gap formation.

In the present study no attempt was made to include either the 4th or 5th generation bonding system with composite resins. This may be one of the reasons for

an increased value for loss of marginal adaptation with composite resins.

Much research has been carried out to evaluate the bonding and sealing ability of glass ionomers (POWELL AND JOHNSON, 1992) (MOUNT AND MAKINSON 1992[7]) (SINDHU AND HENDERSON, 1994) (DOUGLES AND FUNDINGSLAND, 1995[2]). The clinical performance of these materials can be explained by the hydrophilic nature of glass ionomer. The presence of tubular fluid of vital dentin can reduce dehydration of glass ionomer material during the setting period. It may also improve the hydrated gel phase during solidification and allow a self repairing process (DAVIDSON AND DEGEE, 1994[11]). According to the above theory the glass ionomer forms internal microcracks as compensation for the polymerization shrinkage in order to maintain the bulk volume. After water sorption and consequential swelling the cracks close and due to the continuing chemical reaction the partially lost cohesive strength is repaired. This may be a reason for an intact margin in Fuji II LC restorations even after one year.

The relatively good performance of the glass ionomer materials in vivo is also due to its property of bonding to dentin via the development of ionic crosslinks at the tooth /restoration interfaces (WILSON and others in 1993[12]). That is also a positive quality for glass ionomer. The lack of such ionic bondingmay be another reason for loss of marginal adaptation in composite and Dyract restorations.

The results of present study as far as the new material (Dyract - compomer) is concerned is not satisfactory. Very limited clinical studies are available regarding the new material. Andrean. V.H. 1996[13] in an invitro study about the sealing ability of three materials, which includes resin composite, resin modified glass ionomer and compomer classified as polyacid modified composite found out that there is no significant difference in the sealing ability among the three materials. In the present clinical study there is considerable difference in the marginal adaptation among the three materials used.

One of the unique features of the Dyract's adhesion to enamel is the omission of acid etching which is the critical step in most resin composite restorations. The manufacturers claim that this is achieved through the use of a specially formulated coupling agent (prime/Adhesive) which is thought to form ionic bonds with the calcium hydroxyl appetite. The Dyract also claims to be self-adhesive because of the hydrophilic carboxylic groups present in its patent resin. Whether etching of enamel will improve the sealing ability of Dyract needs further investigation.

The possible problems associated with Dyract when compared to Fuji II LC may be less amount of fluoride release. The loss of marginal adaptation of Dyract restoration in this study may be due to a high resin content which produce increased polymerization shrinkage. The lack of glass ionomer like ionic bonding between the tooth structure and Dyract may also be a possible reason for the loss of marginal adaptation. Dyract is a new material and further elaborate laboratory and clinical investigations are needed before reaching a final conclusion.

**Surface texture and Anatomic form**

In the present study there was no change in the surface texture among the three types of restorations. Possible explanation for this may be due to the nature of filler particles in the restorative materials. Presence of smaller and harder filler particles produced a smooth surface, similarly the cross linked network formed by curing of dimetchacrylate resists crazing on the surface. J.S.Mathis and J.C.Ferracare[14] in a study observed light cured resins causes an increase in the overall toughness and reduction in the brittleness. The loss of anatomic form in this study is due to the loss of marginal adaptation.

In case of cervical abrasion lesions retention of restoration is an important factor, because of the lack of inherent macro mechanical retention. A number of studies have reported the excellent retention of self-cured glass ionomer restoration in cervical abrasion lesions. The present study

indicates the light cured glass ionomer will have predictable long term retention.

The studies of HEYMANN[15] and co-workers showed that the tooth flexure produces forces that are capable of debonding cervical restorations, especially those without macro mechanical retention. In addition inter related factors including occlusal stress, age of the patient, elastic modulus of the restorative material were important determinants of the retention of restorations. These factors might also affect the retention of composite, light cured glass ionomer and compomer restorations. After one year, however these aspects could not be evaluated in the present study because no prior assessment of occlusal stress was carried out and also because all restorations are present.

The total retention of these materials could also be explained by the mechanism of adhesion to dentine and flexibility of the materials. The combinations of ionic bonding of the modified poly (alkenoic) acid and micromechanical bonding of resin monomer to dentine may enhance the retention of restoration. In addition the cement may have a modulus of elasticity which is close to that of tooth structure, thus providing the same degree of flexibility as the tooth.

## Conclusion

In this study light cured glass ionomer successfully challenged the problem of retention and aesthetics. Of the three material studied the clinical performance of Fuji II LC found 100% success in all the properties evaluated in the present study. The other two materials also showed 100% success except for marginal adaptation and anatomic form. In these properties the composite restoration showed 18.7% and Dyract showed 49% success after one year.

However this study is of limited scope because it is only applicable to the three types of material used in this study, these are the only easily available material at the time this study was conducted. The findings should not be extrapolated to other similar materials in the same category. Further researches is warranted to study the various materials now available. Carefully controlled clinical trials and longitudinal studies are also needed to evaluate new materials comprehensively.

## References


1. Crocc, Killian (1990). Using Glass Ionomers. Kada (121) 181-183.
2. Barnes, D.M., Blank, L.W., Gingell, J.C. And Gilner, P.P. : A Clinical Evaluation Of A Resin-Modified Glass Ionomer Restorative Material. J.A.D.A. 1995, 126; 1245–1253.
3. Chaiwat Maneenut, Martin.J. Tyas (Nov: 1995). Clinical Evaluation Of Resin - Modified Glass Ionomer Restorative Cements In Cervical 'Abrasion' Lesions One Year Study. Quint: Int: (26) 739-743.
4. S.B. Mitra, Adhesion To Dentine And Physical Properties Of A Light Cured Glass Ionomer Liner/Base. J Dent Res. 1991 Jan;70(1):72-4.
5. Mclean Jw, Nicholson Jw, Wilson Ad Proposed Nomenclature For Glass-Ionomer Dental Cements And Related Materials. Quintessence Int. 1994 Sep;25(9):587-9
6. Inokoshi S, Burrow Mf, Kataumi M, Yamada T, Takatsu Opacity And Colour Changes Of Tooth - Coloured Restorative Materials. Oper Dent. 1996 Mar-Apr;21(2):73-80 17.
7. Mount Gj. Adhesion Of Glass Ionomer Cement In The Clinical Environment. Oper Dent. 1991 Jul-Aug;16(4):141-8
8. Aboush Ye, Jenkins Cb An Evaluation Of Bonding Of Glass Ionomer Restoratives Of Dentine And Enamel. Br Dentj, 1986 Sept.6. 179-184.
9. Gorden.J, Christenson (Aug: 1995). Restorative Dentistry.An Update. Jada (126) 1165-1168.
10. Aron.D.Puclett, James.G. Fitchie, Beth Benett, John-H.Hembree (Nov: 1995). Micro Leakage And Thermal Properties Of Hybrid Ionomers. Quint: Int: (26) 577-581.

11. Davidson. C.L., Degee. A.J (1994). Self Repair Of Damaged Glass Ionomer Cement, J.Dent, Res (73)181.
12. Wilson, E.L. Pashley, L. Tao, W.G. Matthews, D.H. Pashley (1993). Bond Strengths Of Superficial, Intermediate And Deep Dentine In Vivo With Four Dent In Bonding Systems. Dent: Mater. (9) 19-12.
13. Andrean.V.H (1996). Sealing Capacity Of Resin - Modified Glass - Ionomer And Resin Composite Placed In Vivo In Class V Restorations. J. Oper. Dent. (21) 69-72.
14. R.S. Mathis, J.L. Ferracane (1989). Properties Of Glass Ionomer Resin-Composite Hybrid Material. Dent. Mater,5(5) ;355-358.
15. Heymann.H.O, Sturdevant. J.R, Bayne. S. Wilder. A.D(1991). Examining The Tooth Flexure Effects On Cervical Restorations: A Two Year Clinical Study. J Am Dent Assoc, 1991, (122) (5);41-47