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Knowledge, Awareness and Practice Survey On Bulk Filled Composites For Class 1 And 2 Among Dental Students

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ABSTRACT

Introduction: Bulk-fill composites have been developed as a result of recent advancements to mitigate the shortcomings of the incremental process. Bulk-fill composites can be put in layers up to 4 mm thick, and in some cases, thicker, in a single application, which speeds up restorative treatments. Some bulk-fill composites are designed to be used as posterior restorative materials, whereas others are designed to be used merely as a base material to be coated with a typical resin composite. According to the manufacturers, these materials have a reduced polymerization shrinkage and a higher cure depth.

Materials And Methods: A self administered questionnaire was prepared and distributed online among 100 undergraduate and postgraduate dental college students in chennai. The results were obtained and statistically analysed using SPSS chi square test and represented graphically. ($p<0.05$).

Results: 88.89% of the participants were aware about bulk filled cavity preparation whereas 11.11% of them were unaware. 81.82% of the participants agreed that bulk filled cavity restoration is done mostly in the posterior tooth whereas 18.18% of the participants disagreed with it. The level of significance was found to be p value 0.001 (p value < 0.05) which was statistically significant.

Conclusion: From our study we can conclude that the Post graduate dental students have more knowledge and awareness about bulk filled composites in class 1 and class 2 restoration.

Keywords: *Awareness; eco friendly; Bulk filled composites; class 1 and 2 restoration; dental students; composite resins; innovative technology.*

1. INTRODUCTION

One of the most frequent non-metallic restorative materials utilised for tooth-colored, directly applied restorations is composite resin. Resin composites are commonly employed in a variety of restorative procedures. Due to the great demand for these operations, these materials, which were originally employed in dentistry for cosmetic restoration of anterior teeth, are now commonly used in posterior dental restorations. However, there are drawbacks because of the limited light penetration, such as difficulty in polymerization for deep cavities. (1)A polymer resin matrix with filler particles underpins the material.The majority are based on Bowen's bis-GMA resin, which he created in 1962. Furthermore, the introduction of filler particles improves translucency, lowers the coefficient of thermal expansion, and increases the wear resistance of the material. However, secondary caries, marginal microleakage caused by polymerization shrinkage, and post-operative sensitivity continue to be a problem. Micro-leakage and debonding of the repair occur as a result of polymerization shrinkage. (2,3)

Increased risk of secondary caries and post-operative sensitivity are the clinical outcomes. To address some of the shortcomings of direct placement composites, many ways have been devised.In order to reduce the rate of polymerization shrinkage, incremental filling procedures have been suggested, which are thought to be helpful in reducing polymerization shrinkage while also minimising total volumetric shrinkage.(4) Furthermore, the gradual implantation of composite resin

necessitates a longer time period, lengthening the time required for the restorative treatment. (5)In terms of incremental layering versus bulk filling of composite resin, there is still debate among researchers and practitioners. As a result, adding small particles (e.g. nanoparticles) and placing composite resin up to 4 mm is proposed to limit polymerization shrinkage, hence obviating the necessity for a technique-sensitive stacking process.(5–7)

Bulk-fill composites have been developed as a result of recent advancements to mitigate the shortcomings of the incremental process. Bulk-fill composites can be put in layers up to 4 mm thick, and in some cases, thicker, in a single application, which speeds up restorative treatments. Some bulk-fill composites are designed to be used as posterior restorative materials, whereas others are designed to be used merely as a base material to be coated with a typical resin composite. (8)According to the manufacturers, these materials have a reduced polymerization shrinkage and a higher cure depth. Fillers such as barium aluminium silicate filler, ytterbium trifluoride, and mixed oxides are used to accomplish this. (9)In addition, a prepolymer filler (a shrinkage stress reducer) containing silanes has been introduced, which is thought to alleviate shrinkage stress.As a result, bulk-fill composite resin might be considered acceptable for reducing polymerization shrinkage as well as post-operative sensitivity.(10)

For many years, a more streamlined and less technique-laden approach to clinical installation has been a goal for composite restorative materials. A bulk-fill flowable composite has the advantage of being able to respond to the cavity preparation precisely while also removing the requirement for incremental placement and condensation (plugging).(11)The flowable composite material employed in this example (Estelite Bulk Fill Flow) takes it a step further by removing the necessity for an enamel capping layer, allowing cavity preparations of 4.0 mm or less in depth to be completely filled with only one increment of composite. When you combine that with the high brilliance of the completed restoration due to the use of spherical fillers, you have a winning combination.Since its introduction into dentistry, composite resins have undergone substantial evolution. (12,13)In order to reduce polymerization shrinkage and enhance wear resistance, changes to the monomer matrix and filler particles of composites have been implemented.(12) Our team has extensive knowledge and research experience that has translate into high quality publications(14–23),(24–27),(28–32)(33). The aim of this study is to evaluate the knowledge, attitude and practice on bulk filled composites for class 1 and class 2 restoration among dental students.

2. MATERIALS AND METHODS

Study design:

A cross sectional study was conducted in February 2021 through an online survey among Undergraduate and postgraduate dental college students of private dental institutions.

Study subject:

A convenient sample of 100 dental college students was done. Among 100 participants.

Inclusion criteria: All undergraduate and postgraduate students from private institutions who were willing to participate were included.

Ethical considerations:

Returning the filled questionnaire was considered as implicit consent with no need for signing a written consent. Ethical approval for the study is obtained from the Institutional Review Board (IRB).

Study method:

Self administered questionnaire of close-ended questions was prepared and it was distributed among undergraduate and postgraduate dental college students of private dental institutions through online survey forms “GOOGLE FORMS”.

Data quality assurance:

The collected data were checked regularly for clarity, competence, consistency, accuracy and validity. The necessary correction was made on questionnaires that need correction accordingly and invalid questionnaires were removed before the actual data collection.

Statistical analysis:

Data was analysed with the SPSS version (22.0). Descriptive statistics as number and percent were calculated to summarise qualitative data. Chi square test was used to analyze and compare the education level of students and their knowledge and practice of bulk filled composites. $p<0.05$ was considered statistically significant.

3. RESULTS

The survey was conducted among hundred undergraduate and postgraduate dental college students in Chennai. The questionnaire was prepared and circulated online on the data that was collected and graphically represented using SPSS. On

studying the graphical data the following results were obtained, 50.51% of the participants were males and 49.49% of them were females.52.53% of the participants were from under graduation and 47.47% of the participants were postgraduates. 88.89% of the participants were aware about bulk filled cavity preparation whereas 11.11% of them were unaware (figure 1). 80.81% of the participants agreed that bond strength is found to be more in bulk filled cavity method whereas 19.19% of them disagreed and chose conventional methods (figure 2). 81.82% of the participants agreed that bulk filled cavity restoration is done mostly in the posterior tooth whereas 18.18% of the participants disagreed with it (figure 3). 67.68 percent of the participants said class 1 restoration for polymerisation shrinkage stress and reduction in the cusp deflection that is observed during restoration whereas 32.32% of the participants agreed to class two restoration.

93.94% of the participants agreed that the bulk filled cavity material can be applied in increments up to 4 mm whereas 6.06% of the participants disagreed with it. 76.77% of the participants said that the work front cavity requires a special tooth preparation but 23.23% of them disagree (figure 4). 92.93% of the participants feel that overfilling of the tooth preparation during bulk filled restoration is a major disadvantage whereas 7.07% of the participants said no. 86.87% of the participants agreed to class 2 As a type of restoration on which bulk filled cavity can be prepared whereas 13.13% of the participants said class 1 restoration.

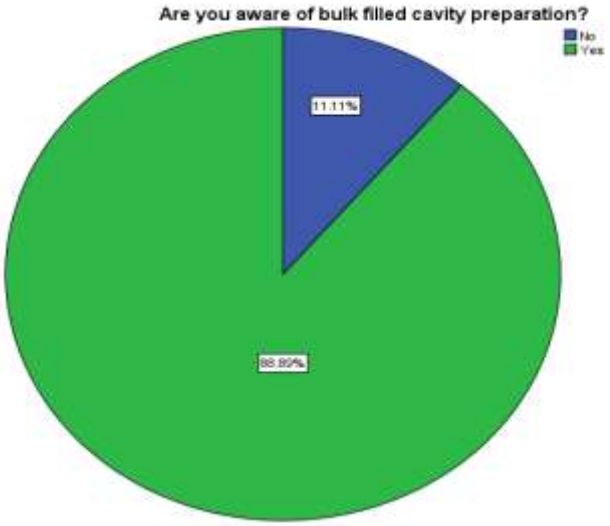

Figure 1: The pie chart represents the frequency distribution of the participants who are aware of bulk filled cavity preparation. 88.89% of the participants were aware about it (green) and 11.11% of the participants were not aware (Blue).

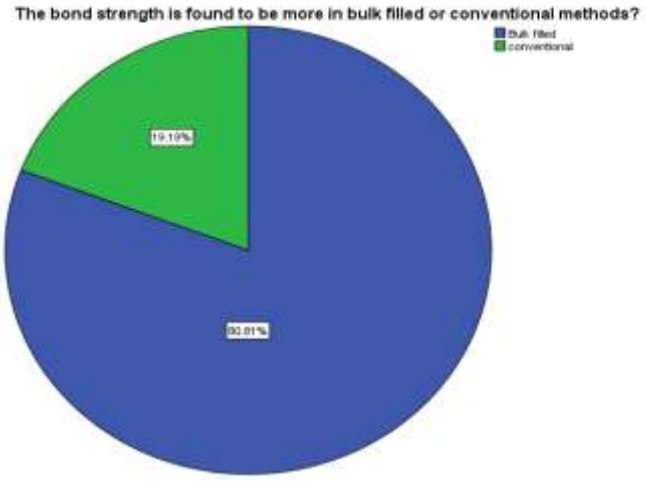

Figure 2: Pie chart represents the frequency distribution of the participants who are aware about the bond strength that is found in bulk filled and conventional method. 80.81% of the participants agreed that bulk filled method has more bond strength (blue) and 19.19% of the participants said conventional method has more bond strength (green).

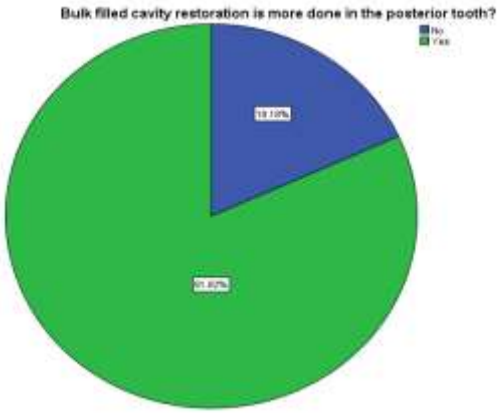

Figure 3: Pie chart represents the frequency distribution of the participants who are aware about the bulk filled cavity restoration done in the posterior tooth. 81.82% of the participants agreed that the restoration is done more in the posterior tooth (Green) and 18.18% of the participants disagreed with it (blue).

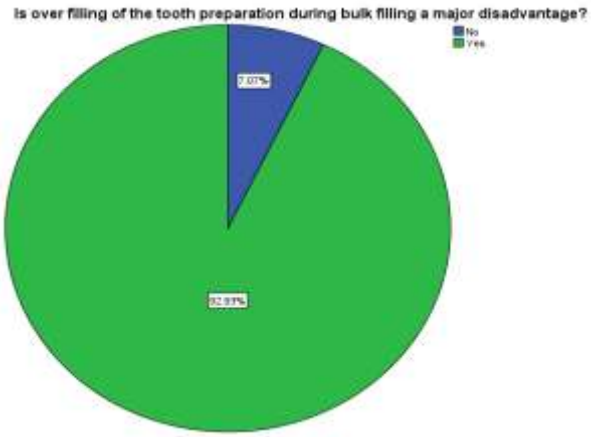

Figure 4: The pie chart represents the frequency distribution of the participants on the awareness about or filling of the tooth preparation during Bal feeling as a major disadvantage. 92.93% of the participants said it is a disadvantage (green) whereas 7.07% of the participants disagree (blue).

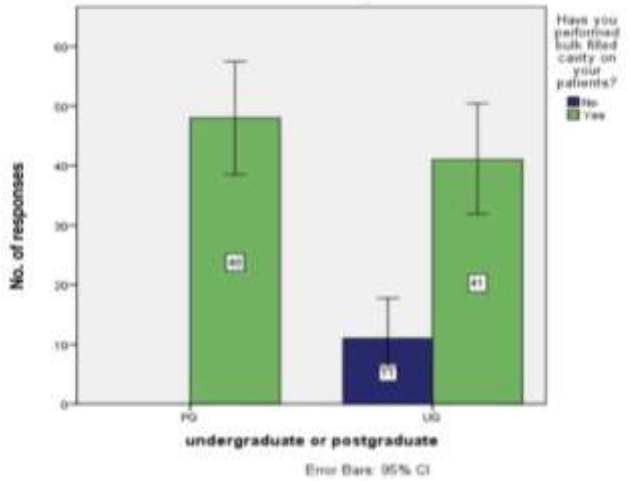

Figure 5: The bar graph represents the association between the educational qualification and the participants experience of performing bulk filled cavity on their patients. Blue denotes no and green denotes yes. Majority of the PG students have a greater knowledge and experience of performing bulk field cavities on their patients than the UG students. Pearson chi square test shows p value 0.001 (p value < 0.05) hence, it is statistically significant.

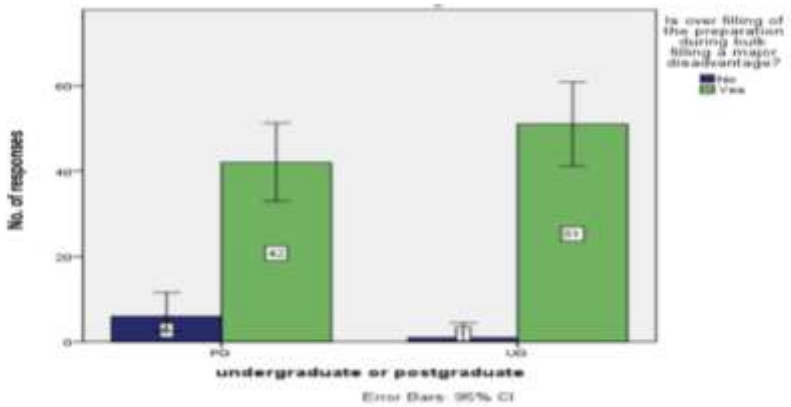

Figure 6: The bar graph represents the association between the educational qualification and the knowledge about or filling of the truth operation during bulk feeling as a major disadvantage. Green denotes yes and blue denotes no. Majority of the undergraduate students said that overfilling of the tooth during bulk filling is a major disadvantage and a few of the postgraduate students disagree with it. Pearson chi square test shows p value 0.001 (p value < 0.05) hence, it is statistically significant.

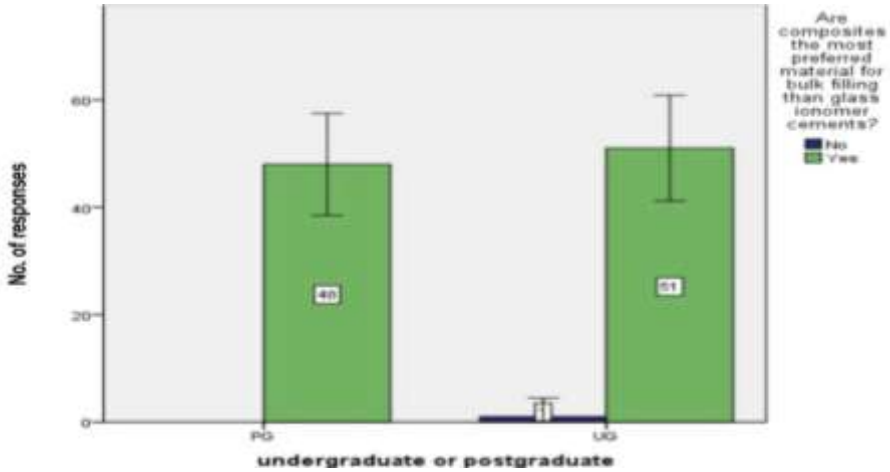

Figure 7: The bar graph represents the association between the educational qualification and the knowledge about composites as the most preferred material for bulk filling than glass Ionomer cements. Blue denotes no and green denotes yes. Majority of the PG and UG students agreed to compose it as the most preferred material for bulk filling than glass ionomer cements. Pearson chi square test shows p value 0.001 (p value < 0.05) hence, it is statistically significant.

4. DISCUSSION

Dental caries, which is defined as a bacterial infection that damages the tooth structure, is currently the most frequent dental condition. Dentists recommend removing carious dental tissue and filling the resulting cavity with appropriate restorative materials to cure the condition. Due to their good physical, mechanical, thermal, and tribological qualities, polymeric compounds are currently employed as dental restorative materials. (34)A rise in the usage of resin-based composite dental materials has been fueled by a growing demand for cosmetic, tooth-colored, and mercury-free restorations.Direct dental restorations should be able to endure occlusal loading, minimise or prevent stress development, avoid gap creation, and be stable in oral settings. They should also be simple to apply. These restorations should ideally be able to inhibit biofilm attachment, have remineralization capabilities, and be self-repairing.(34,35)

Composite resin restorations have progressed quickly and significantly in terms of both visual (improved aesthetics) and mechanical qualities over the previous decade. Resistance to fracture, volumetric contraction caused by material polymerization, and the development of polymerization stress are some of the limits. Deep or extensive preparations necessitate the application of numerous layers of conventional resin material, which is technically challenging, takes a long time in the clinic, and carries some hazards, such as the entrapment of air bubbles or contamination between layers. (36)

In response to these challenges, a new generation of composite resins known as "bulk-fill" resins has emerged.(37)The increased translucency of these resins resulting from the use of more photoinitiator reagents enables for deeper photopolymerization and the insertion of the material into thick 4–5 mm increments with uniform polymerization and conversion. Bulk-fill resins also contain polymerization modulators, which result in decreased shrinkage and stress at the bonded interface. The addition of thicker increments also helps to reduce air voids, resulting in a more uniform restorative unit.(36,38)

In a study, In terms of post-operative sensitivity, bulk resins and standard resins differed significantly. However, the majority of the studies included in this review found no change in post-operative sensitivity between bulk-fill and conventional resins, or no difference in post-operative sensitivity between bulk-fill and conventional resins.(39) In another study, argued that the absence of post-operative sensitivity was due to the use of liners in deep and extremely deep holes (e.g., calcium hydroxide liners or resin-modified glass ionomers). The clinical performance of bulk-fill resins used in NCCLS was satisfactory, with follow-up periods exceeding one year.(39,40)

When putting bulk-fill resins, most research employed universal adhesives in self-etching mode. These adhesives are gaining favour among clinicians because they simplify operations; nevertheless, the dentin bonding potential of these adhesives can be improved by changing the application method. (41)Within a follow-up period of 12 to 72 months and up to 10 years, investigations found that the clinical performance of conventional and bulk-fill resin compounds in direct posterior tooth restorations was equivalent. These clinical findings could be explained by mechanical qualities such as shrinkage stress (for materials of normal consistency), flexural strength, and fractus strength. These findings appear promising, as most clinicians prefer to work with simple-to-use, clinically reliable bulk-fill resin materials, which require less chair time in the dental office.(39,40,42)

The limitation of this research is that the population of study can be expanded to a larger group of people.

5. CONCLUSION

From our study we can conclude that the postgraduate dental students have more knowledge and awareness about bulk filled cavities in class 1 and class 2 restorations than the undergraduate students who need more experience and practice about bulk filled cavity preparation. Further awareness and knowledge about it is required for the undergraduate students.

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CONFLICT OF INTEREST: The authors have none to declare.

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AUTHOR CONTRIBUTION: All authors have equal contribution in conducting the survey and drafting the manuscript.

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