Knowledge, Awareness, and Attitude Towards Importance of Finishing and Polishing used of Composite Restorations

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ABSTRACT

Critical clinical procedures during restoration of the teeth include proper finishing and polishing of dental restoratives, they are especially important for the esthetics and longevity of restorations. Residual surface roughness of restorations can influence dental biofilm retention, resulting in superficial staining, gingival inflammation, and secondary caries, which leads to affecting the clinical performance of restorations. Thus, the aim of the study is to determine the level of knowledge, awareness, and practice among the dental students regarding the importance of Finishing and polishing of composite restoration. The questionnaire consisting of 10 questions was prepared online and the link was distributed to the dental students to fill the survey. The data was imported to SPSS software for statistical analysis, chi square test was done. Association between gender distribution and awareness among the students if finishing and polishing of composite restorations are mandatory, shows 23% of males and 39% of females agreed it was mandatory. Association between gender distribution and awareness among the students if type of composite plays a vital role in color stability, both males (29%) and females (44%) agreed that type of composite plays a vital role. Association between gender distribution and finishing and polishing being done by the students, both males (36%) and females (49%) practiced finishing and polishing of composite for the patients in their practice. These associations did not show statistical significance. The use of Composite restorations in the field of dentistry has become extremely popular and most preferred type of restorations among the patients. Importance of awareness regarding new techniques in dentistry should be emphasized to the future dental practitioners.

Key words: Composite, Microfilled, Polishing, Surface roughness

INTRODUCTION

Resin composite materials are the most modified and improved restorative material in dentistry, which was introduced by Bowen et al. [1]. Despite all initial inherent problems, the current status of composite restorations used in conjunction with the total acid-etch technique has made many dentists choose these materials, even for restoring areas of high occlusion stress, such as posterior teeth [2,3]. Enormous esthetic demands have led the dentists to adopt the resin composite restorations in routine dental practice [4]. Surface roughness of the dental restorations remains a striking problem associated with the use of direct composite resins [5] which increases plaque retention resulting in gingival inflammation, superficial discoloration, and secondary caries. On the contrary, smooth, highly polished restorations are shown to be less susceptible to plaque accumulation and extrinsic discoloration; bear improved mechanical properties [6].

Critical clinical procedures during restoration of the teeth include proper finishing and polishing of dental restoratives, they are especially important for the esthetics and longevity of restorations. Residual surface roughness of restorations can influence dental biofilm retention, resulting in superficial staining, gingival inflammation, and secondary caries, which leads to affecting the clinical performance of restorations [7–10]. However, to achieve a highly polished surface of composites is difficult, because of factors such as different amounts of filler particles, the
size of particles and the differences in hardness between the filler particles and matrix of the resin composite. It is believed that the polishing ability of composites vary depending on particle size [11] and microfilled resin composites are more easily polished than hybrid types. The smoothest possible surface is obtained when the resin composite polymerizes against a Mylar matrix without subsequent finishing or polishing [12,13]; however, such a surface has a resin-rich layer, poor mechanical properties, is susceptible to increased wear and discoloration and should be eliminated [6,14]. In addition, in clinical situations, most restorations need to be adjusted to their final shape. Thus, finishing and polishing of restorations are crucial.

It has been reported by Jones et al. [15] that a surface roughness of 0.3 mm can be detected by the tip of the patient’s tongue. Proper contour, smoothness and high gloss can produce the desired results of natural tooth structure desired by patients [16]. A rougher surface texture can lead to decreased gloss and increased discoloration of the material surface which can affect the final results of the restorations and esthetics [17,18]. Therefore, it is of paramount importance to obtain smooth and glossy surfaces. Variables, such as resin composite type, resin monomer, concentration and type of filler particles, the finishing/polishing system used, all influence the final surface polish of resin composites.

A wide variety of finishing and polishing systems with dissimilar compositions, abrasives and shapes are commercially available. Their effects might differ among the resin composites and also there might be variations between the systems which could impact the final surface texture. When different techniques are proposed, not only their efficiency in maintaining a smooth surface but also their ability to obtain a gloss surface have to be considered. It is known that gloss measurement is an additional parameter to roughness while evaluating the effectiveness of polishing [19].

We have numerous highly cited publications on well-designed clinical trials and lab studies [20–34]. This has provided the right platforms for us to pursue the current study. Various studies have been to determine the awareness level of dental students [35,36]. Dental students need to have a better understanding regarding the various tools or assistive measures which aid in diagnosis and a successful treatment. Thus the aim of the study is to determine the level of knowledge, awareness and practice among the dental students regarding the importance of Finishing and polishing of composite restorations.

**MATERIALS AND METHODS**

A questionnaire consisting of 10 questions were prepared and distributed to 100 dental students to assess their knowledge, awareness, and practice towards the importance of finish and polishing of composite resins. The questionnaire was prepared online, and the link was distributed to the dental students to fill the survey. The questionnaire contained close ended and few multiple-choice questions about basic knowledge and awareness on the importance of finishing and polishing composite resins and practice of the same. The results were tabulated in Microsoft Excel and was imported in SPSS software for statistical analysis. Chi square tests were done with significance level at 5%.

**Questionnaire**

Do you think polishing of composite restorations is mandatory?

In your opinion, does the type of composite play a vital role in color stability?

Is color stability of significant concern while providing composite restorations?

Is polishing paste required?

Polishing of composite restoration influences the colour stability over a period.

Finished restoration offers high esthetics, longevity of restorations and maximal oral health.

Rough surfaces of the restorations are more likely to cause?

Do you finish & polish composite restorations in your practice?

Do you use Polishing kit/Polishing burs?

Difficulty level of polishing direct anterior composite restoration?

**RESULTS AND DISCUSSION**

Completed questionnaires were returned by
all the participants giving a response rate of 100%. Results of our study can be analysed as follows. Figure 1 shows association between gender distribution and awareness among the students if finishing and polishing of composite restorations are mandatory, shows 23% of males and 39% of females agreed it was mandatory. This association was statistically not significant, Chi square value -0.573 and p value is 0.449. Association between gender distribution and awareness among the students if type of composite plays a vital role in color stability, both males (29%) and females (44%) agreed that type of composite plays a vital role. This association was statistically not significant, Chi square value -0.008 and p value -0.927 as seen in Figure 2. From Figure 3 association between gender distribution and awareness among the students if color stability is a significant concern shows both males (32%) and females (55%) agreed that color stability is significant. This association was statistically not significant, Chi square value -2.888 and p value-0.89. The association between gender distribution and awareness among the students if polishing paste is required shows that both males (20%) and females (32%) felt the need of polishing paste during the procedure however there was an equal distribution of agreement and disagreement among the male students in this aspect. This association was statistically not significant, Chi square value -0.107 and p value-0.744 as seen in Figure 4. Figure 5 shows the association between gender distribution and awareness among the students regarding the influence of polishing on color stability, both males (22%) and females (36%) felt that polishing influences color stability of composite restoration and this association was statistically
not significant, Chi square value -0.246 and p value -0.620. The association between gender distribution and knowledge among the students regarding finished restoration and its results shows that both males (32%) and females (52%) agreed that finished restorations offer longevity, high esthetics and offer better results. This association was statistically not significant, Chi square value -0.794 and p value -0.373 as seen in Figure 6.

Figure 7 shows association between gender distribution and knowledge among the students regarding surface irregularities both males (23%) and females (42%) felt that all the listed options above (Violet) would be the result of surface irregularities of a composite, i.e, retention of plaque, fracture of the restoration and eventually compromises the restoration.
that finished restorations offer longevity, high esthetics and offer better results. This association was statistically not significant, Chi square value -3.787 and p value- 0.285. Association between gender distribution and finishing and polishing being done by the students, both males (36%) and females (49%) agreed that finishing and polishing of composite is routinely done for the patients in their practice and this association was statistically not significant, Chi square value -1.307 and p value- 0.253 as seen in Figure 8. Figure 9 shows association between gender distribution and methods of finishing and polishing being done by the students, finishing and polishing burs are mostly being used by the dental students (31% & 44% among males and females respectively) while dedicated polishing kits are being used only by few students (9% and 16% among males and females respectively) and this association was statistically not significant, Chi square value -0.222 and p value- 0.637. Association between gender distribution and difficulty levels of finishing and polishing anterior restoration, both males (27%) and females (47%) have suggested that finishing and polishing of anterior restoration is difficult and this association was statistically not significant, Chi square value -2.141 and p value- 0.343 as seen in Figure 10.

Finishing and polishing of resin composite restorations are critical steps to enhance the esthetics and longevity of restored teeth [37]. Poorly polished restorations are susceptible to surface discoloration, plaque buildup, gingival irritation, and recurrent caries [38]. The surface quality of resin composite restorations is associated with the polishing quality along with its inborn physical properties like volume, hardness, quantity of filler particles and organization of the resin matrix [39]. Most of the respondents (23% of males and 39% of...
from figure 7, 23% of males and 42% of female gingival irritation, and recurrent caries [46,47].

Color stability of the composite resin materials is related to type of the composite resin restorative materials and polishing procedures [40]. In agreement with this, 29% of males and 44% of females among the dental students as seen in figure 2, expressed that the type of composite plays a vital role in color stability. Various studies have concluded that staining or discoloration was one of the primary reasons for replacement of composite restorations [41]. Similarly from figure 3, 32% of males and 55% of female respondents claimed that color stability is of significant concern while providing composite restorations and 20% of males and 32% of the female respondents felt it is essential to use polishing paste during polishing procedure as seen in figure 4, these results were corroborating with a survey done by Al Qarni et al. [42]. Sen et al. [43] reported that the polishing pastes provided a smoother surface effectively and it has been reported that use of polishing paste after the use of polishing disks significantly decreased staining in comparison to the use of polishing disks alone, for all types of composites [40]. Various studies has been done which stated that color stability of the composite resin over a period of time is influenced by the polishing procedure and among the respondents in our study 22% of males and 36% of females agree to this fact.

High-quality finishing and polishing of composites are important steps to enhance both the esthetics and longevity of restored teeth [44,45]. In accordance with this statement as seen in figure 6, 32% of males and 52% of females among the respondents felt polishing of the composite restorations provides longevity of restoration and optimal oral health. Unfortunately, polishing is complicated by the heterogeneous nature of these dental materials, i.e., hard filler particles embedded in a relatively soft matrix. Composite surface roughness is basically dictated by the size, hardness, and amount of filler which influences the mechanical properties of the resin composites. Surface irregularities can lead to staining, high wear rates, plaque retention, gingival irritation, and recurrent caries [46,47]. From figure 7, 23% of males and 42% of female students were also aware of this fact. Conversely, a high degree of smoothness and low surface porosity decrease the adherence of agents responsible for changing the color of composite resins, such as dental biofilms, tobacco, and food colorants [48]. Therefore, it is especially important that dental restorations are polished to delay the discoloration and aging processes of composite resins.

Figure 8 reveals that 36% of males and 52% of females among the dental students involved in this survey were positively employing finishing and polishing of the composite restorations routinely for their patients. Color stability of the composite resin materials is related to the type of composite resin and polishing procedures. Manufacturers provide a variety of instruments to accomplish finishing and polishing, such as diamond rotary cutting instruments, carbide burs, abrasive-impregnated rubber cups and points, abrasive disks and polishing pastes. Different types of composites call for different polishing techniques and various studies have reported that dedicated polishing systems and procedures are needed to create the kind of surface smoothness that prevents early discoloration [10,43]. Most of the respondents (31% of males and 44% of female) are using fine diamond polishing burs whereas only a few students among the respondents (9% of males and 16% of female) use dedicated polishing kits as seen in figure 9. This method of using finishing and polishing burs must not be used by the dentists when dedicated polishing kits are available in the market, as they are available for the sole purpose of polishing composite restorations and which may yield better esthetic results comparatively. When dentists perform anterior composite restorations, the selection of materials and equipment, including the type of composite, the type of adhesive system, and the kind of light curing unit, may influence mechanical properties and ultimately affect clinical performance [49,50]. From figure 10 we can see that the dental students who attempted this survey revealed that polishing of anterior restorations are difficult (27% males and 47% females), this may be because of several reasons like esthetic replication, anatomy of the anterior teeth and also maybe due to the lack of instruments/materials among the students. Several different composites are available in
the market, including: microfilled composites, providing a more polishable surface; hybrid composites jointing resistance and smooth surface; and more recently the composites with nanofillers, offering several advantages over the previously available composites [51–53].

This study consisted of a limited number of students and it was found that most of the female students had the knowledge and awareness regarding the importance of finishing and polishing of composite restorations. To ascertain the results of this study and to increase the level of significance, future studies with a larger sample size must be conducted.

CONCLUSION

The use of Composite restorations in the field of dentistry has become extremely popular and most preferred type of restorations among the patients. There are various case reports and pre-clinical studies which show the benefits and outcomes of the finishing and polishing of the composite restorations. Within the limitation of this study, it was found that female participants were more aware regarding the importance of finishing and polishing of composite restorations. Most of the dental students reportedly use finishing and polishing burs which may be due to the lack of knowledge and awareness regarding the polishing kits. Therefore it is necessary to impose the importance regarding the new techniques in dentistry and must be emphasized to create more awareness to the future dental practitioners.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

REFERENCES


