

Colour Stability Of Bulk Fill Composites: A Systematic Review

Salim Algarni

Lecturer at the restorative dental science department Faculty of Dentistry Najran University Kingdom of Saudi Arabia
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Abstract

Background: The introduction of Bulk-Fill (BF) composite materials, among other new preparations, was one of the most recent innovations in operative dentistry. All bulk composites' colour stability is a source of concern. There has been a lot of research on the effects of different drinking solutions on the colour consistency of conventional resin-based composites, but little has been written about the colour changes of BF composite resins, which have been developed for the placement of somewhat thicker layers.

Aim: Thus, the objective of this systematic review was to assess the colour consistency of various bulk-filled composites.

Methods and Materials: A massive exploration of preexisting literature was done in order to locate all relevant research that addressed the sustainability of colour of BF composites under the effect of various. According to PRISMA standards, the current systematic evaluation was carried out. A thorough search for non-controversial existing literature on the websites like PubMed portal, MEDLINE portal, and Scopus portal was done in December 2022. There were no comparable articles in Cochrane online library. To make sure that all pertinent studies were found, search keywords were applied. Furthermore, all appropriate scientific papers from Jan 2010 to December 2022 on the effect of various beverages, polishing techniques, storage media, and oral fluids, bleaching protocols on the colour longevity of bulk-filled composite samples were included.

Results: 18 studies were evaluated in this systematic review. 9 studies focused on the effect of different drinks and beverages like tea, coffee, wine, and acidic beverages over the changes in the colour of bulk-filled composites. There were 4 studies that evaluated the impact of different polishing mechanisms. There were 2 researches that described the influence of different bleaching techniques over the change in colour of bulk-filled composites. One study discussed the effect of reinforcement of glass fibers and polythene fibers in bulk-filled composites, the presence of different dentin substitutes and water solubility and water sorption impact over the change in colour. The number of specimens evaluated ranged from n=20 to n=800 across all the included studies. There was the use of two to ten composite materials across all the included studies.

Conclusion: When there was an analysis of the effect of different beverages and drinks over the changes in colour then there were mixed results. Some studies found that colour changes in bulk-filled composites are lesser than in customary composites. While some studies revealed that alteration in colour is greater in bulk-filled composites when compared to customary composites. Some studies found no significant difference in colour change in conventional composite and bulk-filled composite. The polishing operations can have a serious influence on the staining impedance of bulk-fill composite resins.

Keywords: Colour stability, bulk composites

Introduction and Background

Clinical research has demonstrated the use of resin composites for the restoration of teeth in the posterior region of jaws, with wonderful results [1]. Notwithstanding, one of the most important constraints of resin composites is the shrinkage in volume caused by the process of polymerization [2], a characteristic inherent in synthetic polymers.

This feature causes an accumulation of stress forces at the interacting surface between tooth and restoration, which can be restricted by applying a cavity filling methodology known as the incremental filling methodology [1,3]. Whenever such forces due to shrinkage during polymerization exceed the forces of adhesion, cracks can develop, thereby increasing the likelihood of dental caries relapse and poor outcomes of restoration [4]. Because the highest incremental depth has been set at 2 mm, the incremental cavity filling methodology necessitates a prolonged operating time, particularly in deep dental cavities.

Furthermore, it is a comparatively sensitive method, with an enhanced danger of contamination by oral secretions and gas bubbles creation between composite increments. [5] Moreover, disruption of bonding between composite increments and difficulty in placing them into smaller dental cavities are possible [6,7]. To address these shortcomings, improvements to the preparation of composite resins have been implemented in order to support the methodology and enhance the durability of restorations in dentistry. Among such new preparations, a most recent invention was the introduction of Bulk-Fill (BF) composite materials, resins with reduced shrinkage during polymerization, or solitary increment composite resins with the recommendation to restore dental cavities of depth up to 4-5mm in a single step. [5], without affecting polymerization compression, the extent of transformation, or cavity acclimation [8].

The primary characteristic that distinguishes this restorative material is its reduced deformation after the process of polymerization [7], including its capacity to recover for elevated C-factor of certain dental cavities in teeth present in the posterior region, leading to a substantial decrease in chairside working duration [1,8,9].

Even as manufacturers suggest a solitary 4mm layer, many professionals believe the cure intensity and mechanical characteristics will be inadequate. Color stabilization of all these composites, for illustration, is a cause of worry [10,11]. Even though many researches conducted regarding the impacts of numerous beverages solution on the colour consistency of customary resin-based composites, there is a dearth of literature regarding the colour consistency of BF composite resins, that have been introduced for placement of relatively thicker layers.[12] Thus, the objective of this systematic review was to assess the colour consistency of various bulk-filled composites.

Aims and objectives

The systematic review's goals and objectives were to review various studies on the colour stability of bulk-filled composites. The objectives were as follows: (i) Examine the colour consistency of various bulk-filled composite samples in presence of a dye substance, different beverages, drinks, and oral fluids. (ii) Examine the longevity of various bulk-filled composites after different polishing techniques; (iii) Examine the longevity of various bulk-filled composites after the addition of glass and polythene fibers, different bleaching protocols, different dentin replacement materials, water sorption and water solubility.

Scope and limitations

The coverage of this systematic review will be on the colour durability of bulk-filled composite samples. We will use rigorous criteria for inclusion and criteria for exclusion to guarantee that relevant previous literature is reviewed. There will be no restrictions on the size of the study sample, type of storage media, or composite manufacturer. Each and every study that contains either quantitative or qualitative findings on the colour longevity of bulk-filled composite samples will be included and analyzed.

Review

Search strategy

This exploration was done in order to locate all relevant research that addressed the sustainability of the colour of BF composites under the effect of various factors. According to PRISMA standards, the current systematic evaluation was carried out. A thorough search for non-controversial existing literature on the websites like PubMed portal, MEDLINE portal, and Scopus portal was done in December 2022. There were no comparable articles in Cochrane online library.

To make sure that all pertinent studies were found, the succeeding search keywords were applied.: “bulk filled composites”, “colour stability”, “coffee”, “beverages”, “oral fluids”, “bleaching”, “polishing techniques”, “different polymerization characteristics”. Furthermore, all appropriate scientific papers from Jan 2010 to December 2022 on the effect of various beverages, polishing techniques, storage media, and oral fluids, bleaching protocols on the colour longevity of bulk-filled composite samples were included. There wasn't any specific time constraint for the article to be included. We augmented our search by looking through the reference lists of every included publication for supplemental relevant studies.

Inclusion and exclusion criteria

The goal was to encompass all research papers that addressed the colour alteration of bulk-filled resin composites under the influence of different factors like exposure to beverages, different drinks, different polishing devices, different bleaching protocols, incorporation of different fibers etc. Given the absence of any meta-analyses and the dearth of experimental evidence, all research strategies were kept. Furthermore, given the small number of publications, each paper was subjected to a complete analysis. Randomized controlled clinical trials, cohort research, case-control research papers, case studies, and patient case reports were all analyzed. PICO criteria were used to determine specific criteria for inclusion and criteria of exclusion.

P (population): Bulk-fill composite resins.

I (intervention): Measurement of colour change.

C (comparison): Conventional composites, nanohybrid composites.

O (outcome): Colour alteration of bulk-filled resin composites under the influence of different factors like exposure to beverages, different drinks, different polishing devices, different bleaching protocols, incorporation of different fibers etc.

The study sample consisted of resin-based composites, bulk-filled composites, and universal composites. All other research that focused on restorations such as ceramic, porcelain fused metal, and zirconia restorations were exempted. When multiple research studies were performed at the same organization, the research paper with the most comprehensive or latest data was chosen. Expert opinions, animal studies and grey literature were all removed.

Article selection

The number of papers obtained through a literature search by using keywords was 104. The number of similar and duplicate articles that got eliminated was 67. The number of distinct articles which were selected initially was 37. Then 15 articles were excluded after reviewing abstracts and titles. The number of papers selected for which full text was managed was 22. Extra papers that were found manually from cross-checking of references were 3. The number of articles with full text eligible for the study was 25. However, 07 articles were found inadequate on final screening. At the end, eighteen researches were evaluated and included in this systematic review. (Figure 1).

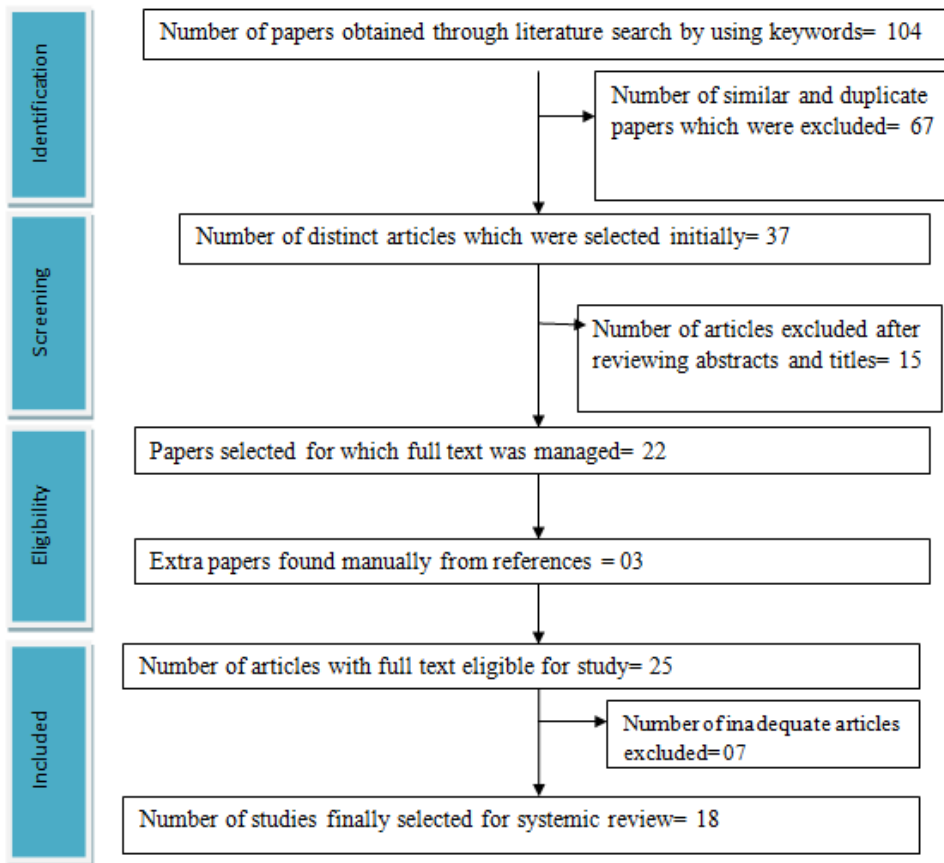


Figure1: PRISMA systematic evaluation of studies

Table 1: Important features of studies included in the systematic reviews.

Authors and years	Aim of the study	Composites included in study	Total number of specimens	Study outcomes
Effect of different beverages and drinks				
Barutcigil Ç et al, 2018 [13]	To inspect the changes in colour of BF composites samples	Three BF composite resins. and one Nanohybrid composite resin taken as control	N=60. They were divided into four categories with each category having 15 specimens	The colour of sample of BF composites altered considerably after soaking in beverages.
Backes CN et al, 2020[15]	To examine the durability of colour of BF composites samples light-cured at various ranges prior to and following contact	One conventional composite and one bulk filled composite	N=120. They were divided into two categories with each category having 60	Irrespective of the range of light activation, traditional composite resin discoloration was greater than bulk-fill resin composites.

	with a solution enriched with coffee		specimens	
Shamszadeh et al, 2016 [16]	To assess the colour longevity of bulk-fill resin composites as a function of cross-sectional area and storage medium.	A conventional composite resin and a bulk filled composite	N=60. They were divided into two categories with one category consisting of 20 specimens while other category consisting of 40 specimens.	After coffee contact, the alteration in colour of bulk-fill resin composites was larger than that of customary resin, and it is also related to thickness of composite layer.
Şişmanoğlu S and Sengez G,2022[22]	To look into the implications of acidified cocktail on the staining activity of BF composites materials of various viscosities.	One Nanohybrid composite, two packable BF composite, and a flowable BF composite	N=144.They were divided into four category with each category consisting 36 specimens	All bulk-fill composites materials analysed showed staining well above a clinically reasonable threshold.
De Arruda BM et al.2021[23]	To scrutinize the durability of colour of various BF composites following external darkening with coffee.	3 different BF composite resins One conventional composite resin.	N=48. They were divided into 4 categories with each category consisting of 12 specimens.	All of the composite materials tested were vulnerable to extrinsic staining induced by coffee, with BF composite exhibiting the least amount of colour change.
Özyurt E et al, 2022 [30]	To compare the durability of conventional composite resins and bulk-fill composite resins.	Three bulk-fill composites and one conventional composite	N=120. They were divided into four categories with each category	In terms of colour consistency, beverages can have a negative impact on the surface characteristics of bulk-fill resin composites.
Erdemir, U et al 2018 [26]	To scrutinize the consistency of color of various BF composite materials with an increased fiber load after one week and one month of soaking in various drinks.	Three different bulk-fill composites and a conventional hybrid composite	N=160. They were divided into four categories and each category consisted of 40 specimens	Throughout both evaluation timeframes, the composite resins materials evaluated showed substantially different alterations in colour after soaking in the four solutions.
Meenakshi CM et al,2020 [27]	The purpose of this study was to see how acidic beverages affected the roughness of surface properties and durability	One bulk filled composite, one conventional composite	N=180. They were divided into two categories with each category	Surface roughness alterations and colour alteration of both composite materials risen dramatically in acidic beverages, with Coca-

	of Bulk-Fill composite materials.		consisting of 90 specimens.	Cola being the most affected. Bulk-fill outperformed customary composite in terms of surface durability and colour durability.
Bahbishi N et al, 2020 [28]	To evaluate the durability of colour and surface fracture toughness of BF composites found in the market of Saudi Arabia.	4 bulk-filled composite samples and one universal composite sample (control)	N=100. They were distributed into five different categories with each category having 20 specimens	When contrasted to universal composite resin control, bulk-filled composite materials demonstrated greater colour durability but reduced microhardness.
Effect of polishing				
Koc-Vural U et al, 2017[17]	The colour durability of bulk-fill resin composites and nanohybrid resin-based composite materials was evaluated using three separate stepwise aluminum-oxide inseedinated finishing as well as polishing discs.	One nanohybrid bulk-fill composite, one micro-hybrid bulk-fill composite, two nanohybrid incremental-fill	N=36. They were distributed into three categories on the basis of methods of polishing	The polishing operations can have a serious influence on the staining impedance of bulk-fill composite resins.
Nascimento HOD et al, 2022[18]	Surface quality alterations and alterations in colour. in BF composite resins after soaking in a dye-enriched solution was measured to determine the impact of polishing devices	One conventional resin composite and two bulk-fill composite	N=180. They were divided into three categories with each category having 60 specimens.	The polished substance, polishing mechanism, and colour solution all play a role in the coarseness and durability of resin composites.
Kiliç E et al,2021[19]	To appraise how polishing devices affected the roughness of surface and colour alteration of BF restorative resin composite materials.	4 BF restorative composites and 1 micro-hybrid resin composite	72 cylindrical specimens were prepared for each resin composite	The colour durability and roughness of the surface of BF composite samples appear to be affected by the chemical compositions of composite and polishing devices used.
Kamheya M et al, 2018[20]	To assess the decline in the quantity of discoloration induced by widely accepted beverages in bulk-filled resin composites after scrubbing with whitening dentifrices.	Two bulk-fill composite resins	N=160. They were divided into two categories in which each category consisted of 160 specimens.	Even though whitening dentifrices could not eliminate all of the staining induced by widely accepted beverages, they can be employed to reduce it.

Bleaching protocol				
Tavares BG et al, 2020 [25]	To assess the impact of bleaching methodologies on colour alteration in bulk-filled resin composite	One low-viscosity BF composite, one high-viscosity BF composite and a customary nano-particulate composite resin (control)	N=160. They were divided into four categories with each category having 40 specimens	The colour of bulk-fill composite resin changed slightly. The change in colour was more affected by composition of material rather the type of bleaching procedure
Erturk-Avunduk AT et al, 2022 [14]	To scrutinise discoloration in bulk-fill treated with bleaching agents like carbamide peroxide and hydrogen peroxide	9 varieties of BF composites and 1 nanohybrid resin composite (control)	N=800. They were divided into nine categories with each category consisting of 80 specimens	Bulk-fill materials outperformed traditional resin composite specimens in terms of staining and bleaching resistance.
Effect of glass and polyethylene fibers				
Tuncdemir AR et al, 2018 [21]	The purpose of this study was to see how glass fibres and polyethylene fibres affected the colour alteration and translucency alteration of bulk-filled composites and anterior resin composite materials prior to and following artificially accelerated ageing.	Anterior composite and bulk-fill composites.	N=60. They were divided into six categories with each category having 10 specimens	Reinforcement with glass fibres and polyethylene fibres changed the colour and translucency of both anterior resin composite materials and bulk-fill composite materials.
Different Dentin replacement materials				
Miletic V et al, 2019 [24]	To investigate alteration in colour in bulk-fill resin composite with markedly different dentin aggregate replacements after red wine smudging.	One universal composite One bulk filled composite	N=140. They were divided into two categories with each category having 70 participants.	Alteration in colour of a comparable intensity can be anticipated in both bulk-filled resin composite and customary composites
Water sorption and solubility				
Mansouri SA et al, 2018 [29]	To make a comparison between the bulk-filled composite resin to a customary one in terms of water sorption, water solubility, and durability.	Bulk-fill composite and nanohybrid composite (control)	N=20. They were divided into two categories with each category having 10 specimens.	The preservice of the colour of the BF composite was appreciated, and the water sorption data and solubility data were comparable.

Results

Characteristics of studies

The studies were published between 2016 and 2022. Most of the studies were in-vitro studies. 9 studies focused on the effect of different drinks and beverages like tea, coffee, wine, and acidic beverages over the changes in the colour of bulk-filled composites. There were 4 studies that evaluated the impact of different polishing mechanisms. There were 2 researches that described the influence of different bleaching techniques over the change in colour of bulk-filled composites. One study discussed the effect of reinforcement of glass fibers and polythene fibers in bulk-filled composites, the presence of different dentin substitutes and water solubility and water sorption impact over the change in colour. The number of specimens evaluated ranged from n=20 to n=800 across all the included studies. There was the use of two to ten composite materials across all the included studies. (table1).

Effect of different beverages and drinks over the changes in colour

Barutçigil Ç et al [13] noticed that the colour of BF composites altered considerably after soaking in beverages when they conducted research to inspect the changes in the colour of BF composites samples.

Backes CN et al [15] concluded that irrespective of the distance range of light activation, traditional composite resin discoloration was greater than bulk-fill resin composites when they carried out an experiment to analyze changes in the colour of bulk-fill resin composites samples light-cured at various distance ranges prior to and following contact with a solution enriched with coffee. There was an analysis of one conventional composite and one bulk-filled composite.

Shamszadeh et al [16] conducted a search to assess the colour longevity of BF composites as a function of cross-sectional area and storage medium. After coffee contact, the alteration in the colour of BF composites was larger than that of customary resin, and it is also related to the thickness of the composite layer.

Şişmanoğlu S and Sengez G[22] found that all bulk-fill composites materials analyzed, showed staining well above a clinically reasonable threshold when they conducted research to look into the implications of acidified beverages on the staining of bulk-fill composites materials of various viscosities.

De Arruda BM et al [23] conducted a study to scrutinize the durability of the colour of various BF composites following external darkening with coffee. All of the composite materials tested were vulnerable to extrinsic staining induced by coffee, with BF composite exhibiting the least amount of colour change.

Özyurt E et al [30] concluded in their study that in terms of colour consistency, beverages can have a negative impact on the surface characteristics of bulk-fill resin composites. Erdemir, U et al [26] conducted a study to scrutinize the consistency of the color of various BF composite materials with an increased fiber load after one week and one month of soaking in various drinks. It was concluded that throughout both evaluation timeframes, the composite resin materials evaluated showed substantially different alterations in colour after soaking in the four solutions.

Meenakshi CM et al [27] conducted research to see how acidic beverages affected the roughness of surface properties and durability of Bulk-Fill composite materials. Surface roughness alterations and colour alteration of both composite materials raised dramatically in acidic beverages, with Coca-Cola being the most affected. Bulk-fill outperformed customary composite in terms of surface durability and colour durability.

Bahbishi N et al [28] performed research to examine the durability and surface fracture toughness of Bulk-Fill composites found in the market of Saudi Arabia. They found that When contrasted to universal composite resin control, bulk-filled composite materials demonstrated greater colour durability but reduced microhardness. (table1).

Impact of bleaching over the changes in colour

Erturk-Avunduk AT et al [14] when conducted a study to scrutinize discoloration in bulk-fill treated with bleaching agents like carbamide peroxide and hydrogen peroxide then they found that bulk-fill materials outperformed traditional resin composite specimens in terms of staining and bleaching resistance.

Tavares BG et al [25] carried out research to assess the impact of bleaching methodologies on colour alteration in bulk-filled resin composite. The colour of bulk-fill composite resin changed slightly. The change in colour was more affected by the composition of the material rather than the type of bleaching procedure (table1).

Influence of different polishing processes and whitening dentifrices

Koc-Vural U et al [17] found that the polishing operations can have a serious influence on the staining impedance of bulk-fill composite resins when the colour durability of bulk-fill resin composites and nanohybrid resin-based composite materials was evaluated using three separate stepwise aluminium-oxide inseeded finishing as well as polishing discs.

Nascimento HOD et al [18] concluded that the polished substance, polishing mechanism, and colour solution all play a role in the coarseness and durability of resin composites when surface quality alterations and alterations in colour in bulk fill composite resins after soaking in a dye enriched solution was measured to determine the impact of polishing devices.

Kiliç E et al [19] came to the inference that the colour durability and roughness of the surface of bulk-fill resin composite materials appear to be affected by the chemical compositions of composite and polishing devices used.

Kamheya M et al [20] found that even though whitening dentifrices could not eliminate all of the staining induced by widely accepted beverages, they can be employed to reduce it. (table1).

Effect of glass and polyethylene fibers

Tuncdemir AR et al [21] in their study found that reinforcement with glass fibers and polyethylene fibers changed the colour and translucency of both anterior resin composite materials and bulk-fill composite materials. They studied to see how glass fibers and polyethylene fibers affected the colour alteration and translucency alteration of bulk-filled composites and anterior resin composite materials prior to and following artificially accelerated ageing. (table1).

Different Dentin replacement materials

Miletic V et al [24] in their research to investigate alteration in colour in bulk-fill resin composite with markedly different dentin aggregate replacements after red wine smudging found that Alteration in the colour of a comparable intensity can be anticipated in both bulk-filled resin composite and customary composites. (table1).

Water sorption and solubility

Mansouri SA et al [29] performed research to make a comparison between the bulk-filled composite resin to a customary one in terms of water sorption, water solubility, and durability. They found that the colour changes of the BF composite resin were lower, and the water sorption data and solubility data were comparable. (table1).

Discussion

The main feature that sets this restorative material apart is its decreased deformation following the polymerization process [11], as well as its ability to recover for elevated C-factors of some dental cavities in teeth located in the posterior region, which results in a significant reduction in chairside working duration [12,13,14].

Even though manufacturers advise using a single 4mm layer, many experts think the cure intensity and mechanical properties won't be sufficient. Concern has been raised about the colour stabilization of all of these composites, for example [17,18]. Even though there has been numerous research on the effects of various beverages on resin

composites' colour consistency, there is not enough information available on the colour consistency of bulk-fill composite resins, which were developed for the installation of significantly thicker increments. [14]

The goals and objectives of the systematic review were to review various studies on the colour changes of bulk-filled composites. The following were the goals: i) In the presence of a dye substance, various beverages, drinks, and oral fluids examine the colour consistency of various bulk-filled composite samples. (ii) Investigate the durability of the colour of various bulk-filled composites after different polishing techniques; (iii) Investigate the durability of changes in the colour of various bulk-filled composites after the addition of glass and polythene fibres, different bleaching protocols, different dentin replacement materials, water sorption and water solubility.

When there was an analysis of the effect of different beverages and drinks over the changes in colour then there were mixed results. Some studies found that colour changes in bulk-filled composites are lesser than in customary composites [15,27,28]. While some studies revealed that alteration in colour is greater in bulk-filled composites when compared to customary composites. [13,16,22]. In a study, Erdemir, U. et al. [26] examined the colour consistency of several BF composite materials with increased fiber loads after one week and one month of soaking in different beverages. It was determined that the composite resin materials studied displayed noticeably varied colour changes after soaking in the four solutions over both evaluation durations. The research was done by Meenakshi CM et al. [27] to determine how acidic beverages affected the durability and surface roughness of Bulk-Fill composite materials. Acidic beverages significantly increased the surface roughness changes and colour changes of both composite materials, with Coca-Cola being the most affected.

Bulk-fill performed better than traditional composite in terms of surface and colour durability. A study was conducted by Bahbishi N. et al. [28] to look at the durability and surface fracture toughness of bulk-fill composites available in the Saudi Arabian market. They discovered that bulk-filled composite materials displayed higher colour durability but lower microhardness when compared to universal composite resin control. When conducting a study to examine the variations in the colour of BF composite samples, Barutcigil et al. [13] observed that the colour of BF composites significantly changed after soaking in drinks.

When Backes CN et al. [15] conducted an experiment to examine changes in the colour of bulk-fill resin composites samples light-cured at various distance ranges prior to and following contact with a solution enriched with coffee, they came to the conclusion that traditional composite resin discoloration was greater than bulk-fill resin composites. One conventional composite and one bulk-filled composite were both subjected to analysis. Shamszadeh et al [16] conducted a study to determine how cross-sectional area and storage media affected the colour lifetime of BF composites. The colour change of BF composites after coffee contact was more than that of conventional resin, and it is also correlated with the thickness of the composite layer.

When Sişmanolu S and Sengez G did a study to examine the effects of acidified drinks on the staining of bulk-fill composites materials of various viscosities, they discovered that all of the bulk-fill composites materials tested showed staining considerably over a clinically appropriate threshold. A study was carried out by De Arruda BM et al. [23] to examine how long different BF composites would retain their colour after being externally darkened with coffee. Coffee-induced extrinsic staining was a threat to all of the composite materials evaluated, with BF composite showing the least degree of colour change.

When there was the evaluation of the influence of different polishing processes and whitening dentifrices over the change in colour then also mixed results were obtained.[17,18,19] When the colour durability of bulk-fill resin composites and nanohybrid resin-based composite materials was evaluated using three separate stepwise aluminum-oxide inseeded finishing as well as polishing discs, Koc-Vural U et al [17] discovered that polishing operations can have a significant influence on the staining impedance of bulk-fill composite resins. When surface quality alterations and colour changes in bulk fill composite resins after soaking in a dye-enriched solution were measured to determine the impact of polishing devices, Nascimento HOD et al [18] concluded that the polished substance,

polishing mechanism, and colour solution all play a role in the coarseness and durability of resin composites. Kiliç E et al [19] concluded that the chemical compositions of the composite and the polishing devices used appear to affect the colour durability and surface roughness of bulk-fill resin composite materials. Kamheya M et al [20] discovered that, while whitening dentifrices cannot eliminate all staining caused by commonly consumed beverages, they can be used to reduce it.

There have been also studies to show that the addition of glass fibers influences colour stability and it was observed that it improved the stability of colour. Tuncdemir AR et al [21] discovered that glass and polyethylene fiber reinforcement changed the colour and translucency of both anterior resin composite materials and bulk-fill composite materials in their study. They investigated how glass fibers and polyethylene fibers affected the colour and translucency changes of bulk-filled composites and anterior resin composite materials before and after artificially accelerated ageing.

This systematic review provided a detailed analysis of the impact of different factors on the changes in the colour of BF composites like beverages, polishing mechanisms, alcohol, and bleaching procedure. etc. It will help academicians and clinicians in supplementing their information.

The limitation of this systematic review was that most of the studies reviewed were in vitro studies and the findings may not correspond exactly with the natural clinical condition of the oral cavity. More studies should be conducted in natural oral conditions to get better results.

Conclusion

When there was an analysis of the effect of different beverages and drinks over the changes in colour then there were mixed results. Some studies found that colour changes in bulk-filled composites are lesser than in customary composites. While some studies revealed that alteration in colour is greater in bulk-filled composites when compared to customary composites. Some studies found no significant difference in colour change in conventional composite and bulk-filled composite. It was also observed that irrespective of the range of distance of light activation, traditional composite resin discoloration was greater than bulk-fill resin composites. The polishing operations can have a serious influence on the staining impedance of bulk-fill composite resins. The polished substance, polishing mechanism, and colour solution all play a role in the coarseness and durability of resin composites. Even though whitening dentifrices could not eliminate all of the staining induced by widely accepted beverages, they can be employed to reduce it. Reinforcement with glass fibers and polyethylene fibres changed the colour and translucency of both anterior resin composite materials and bulk-fill composite materials. Bulk-fill materials outperformed traditional resin composite specimens in terms of staining and bleaching resistance.

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