

## THE EFFECT OF NANOCOMPOSITES RESIN ON THE AESTHETIC PROPERTIES. A SYSTEMATIC REVIEW.

### Dentistry

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### ABSTRACT

In this study the literature was systematically review the available evidence of the effect of nanocomposite resin restoration on aesthetic outcome. The aims of this systematic review was to investigate the discolouration of nanocomposite after the certain period of time and also the polishing outcome when compare to the other types of composite materials. The source from PubMed, Google Scholar and Science Direct database was included. Screened titles and/or abstracts of 45789 unique studies. In total, 32 studies were selected for full-text reading, from which 20 were included in the qualitative synthesis. The findings was the longest period of time is 6 months and show nanofilled composite resin has shown less discolouration ( $p < 0.001$ ) compared to other types of composite resins. The polishing of nano composite resin was superior compared to the other types of composite resins. Different polishing systems have shown smoother surface compared to nanohybrid and other types of composite resin ( $p < 0.05$ ). Hence, few factors has impact to the discolouration outcome of composite resin. Aesthetic of composite resin is depends not just on the composition but also the polishing part. Overall, nanocomposite is the best in terms of aesthetic and polishing outcome.

### KEYWORDS

Colour Stability, Nanocomposite Resin, Surface Finish, Polishing Outcome, Aesthetic

### INTRODUCTION & BACKGROUND

Due to the colour and the mercury content of amalgam, the scientist looks for alternative material to replace and found the composite restorative materials. However, mechanical properties of these material not as good as amalgam. From micro to nano-scale, no one yet can find the best combination of biological and physical properties to get ideal material that can react like the nature made tissue. Hence, the synthetic biomaterials which can mimic the nature are required, so drastic evolution occur in order to get the best material. The foundation of nanotechnology brings to the discovery of nano-filler particles. Nanocomposites which contain two or more material includes a matrix material which need to biocompatible polymeric, metallic or ceramic material, and nanoscale particles [1].

Material which most commonly used to restore the anterior teeth is composite resin since aesthetic is become the superior concern. However, during early attempt in development, the composite resin, there are lack of properties like discolouration, polymerization shrinkage and high coefficient of thermal expansion, marginal leakage, pulpal injury and recurrent caries. Advancement in resin and bonding science result in improvement of composite resin in order to improve the aesthetic properties [2].

Extensive studies have been done in order to improve the properties of the composite resin with the advances in filler compositions and resin chemistry [3,4]. One of the improvements in composite resin is nanocomposite in which provides mechanical strength and wear resistance that is as same as hybrid composite while its superior polish and gloss retention same as micro fill composite. This is due to filler particle of the nanocomposite. The composition of the resin will determine the properties such as the chemistry of the organic matrix that determine the polymerization shrinkage in composite. Filler contents and filler chemistry that will determine the flexural strength. Composite that contains the nanometric and nanocluster has significant improvement on mechanical properties of the nanocomposite like the flexural strength and wear resistance that same like universal hybrid composites. The size of nanometric particles is below the wavelength of light, hence give the nanocomposite the properties with high aesthetic. This is relevant because the size is not measurable by the refractive index that can result in formulations having a broad spectrum of shade and opacity [4].

### Review

#### Study Design:

A systemic review on the effect of nanocomposite resin to the aesthetic properties.

Using electronic search bar in PubMed (<http://www.ncbi.nlm.nih.gov>), google scholar, scopus, English- language articles published from recent years in dental literature with combinations of search terms as keywords, “NanoComposite Resin”, “aesthetic”, “Nanofilled Composite Resin” and “polishability” “surface finish” followed by MeSH terms that appeared were assessed and the reference lists of articles were manually checked. Narrative overview of the literature synthesizing the findings of the literature retrieved from searches of computerized databases, manual searches and authoritative texts.

Inclusion/Exclusion Criteria: The data from PubMed, Medline, Web of Science, Scopus and scientific computerized will be included. On the other hand, data sources from Wikipedia or unknown sources will be excluded. In this study, 45909 database records were identified and 45789 records were screened after 120 duplicates records are removed. After screening 45707 records were excluded by title and/abstract which not fit the objectives of this study. Then, 32 full text articles were assessed for eligibility but only 20 studies included in this qualitative synthesis.

To review the discoloration of nano composite flowchart of articles selected.

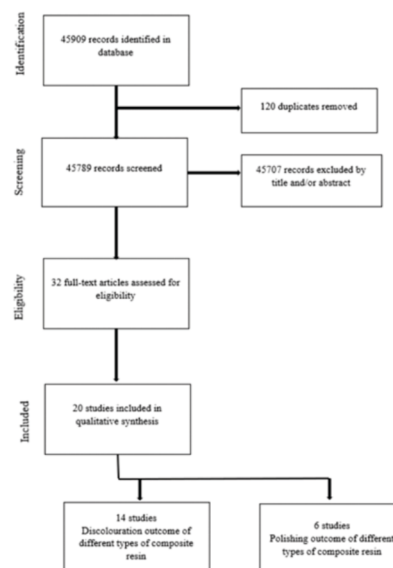


Figure 1: Flow Diagram Of The Systematic Review

**Table 1: To Review The Discoloration Of Nano Composite Over The Period Of Time With Other Types Anterior Composite Materials**

| Author                                                                                                                                                                    | Methodology Material                                                                                                                                                                                                                        | Solution                                               | Time period                                            | Method use                                                          | Result                                                                                                                                                                                                                                 | Conclusion                                                                                                                                              |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|--------------------------------------------------------|---------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| Ugur Erdermir et al [2]                                                                                                                                                   | Clearfil Majesty Posterior (Nanofilled), Filtek Supreme (Nanofilled), Clearfil APX (Microhybrid), Filtek Z 250 (Miiifilled hybrid)                                                                                                          | Distilled water, Powerade, Red Bull, and Burn          | 1 month and 6 months                                   | Spectrophotometer                                                   | After 1 month, Clearfil APX and Filtek Z250 ( $p < 0.05$ ) while after 6 month, Clearfil Majesty Posterior significantly less colour change than other type of composite ( $p < 0.001$ )                                               | The nanofilled composites demonstrated less colour change than the microhybrid composites tested after 6 months.                                        |
| Riccardo Beltrami et al. [3]                                                                                                                                              | Gradia Direct (Microfilled), Filtek Supreme XTE (Nanofilled), Ceram-X-Universal (Nanoceramic), G-aenial (Microfilled hybrid), Essentia (Microfilled hybrid), Admira Fusion (NanohybridOrmocer based), Estelite (Supra-nano sphericalhybrid) |                                                        | Diamond grit, tungsten carbides and diamond grit.      | 28 days                                                             | Restorative material, time of exposure to the staining agent, and polishing/finishing Spectrophotometer technique were found statistically significance ( $P < 0.05$ ) in color change.                                                | Finishing treatments used had a significant effect on the color stability of the esthetic restorative materials tested.                                 |
| Matteo Ceci, Matteo Viola et al. [4]                                                                                                                                      | Gradia Direct Flo (Microfilled), Filtek supreme XTE (Nanofilled), Ceram X Universal (Nanohybrid), Gradia Direct (Microfilled), Admira Fusion (Ormocer-based)                                                                                |                                                        | Coffee, red wine, and physiological solution           | 7, 14, 21 and 28 days                                               | Gradia Direct Flo showed the highest Spectrophotomete variation for each color r coordinate in each of the two experimental groups ( $P < 0.05$ )                                                                                      | Nanohybrid composite reported the lowest color variations                                                                                               |
| Claudio GC Gradia Direct (microfilled), Poggio, Filtek Supreme XTE (nanofilled), Matteo Ceram X Duo (Nanohybrid), Ceci et al. Admira Fusion (Nanohybrid [5]Ormocer-based) |                                                                                                                                                                                                                                             | Coffee, Coca-Cola, red wine and physiological solution | 7, 14, 21 and 28 days                                  | All composite has Spectrophotometer highest colour change in coffee | Clinical choice of material used depends on the habits and to general teeth discolouration.                                                                                                                                            |                                                                                                                                                         |
| Neeraj Malhotra et al. [6]                                                                                                                                                | P60 (Microhybrid Posterior), Z100 (Universal Microhybrid), Ceram-X-Mono (nanocomposite)                                                                                                                                                     |                                                        | Tea, Tobacco, turmeric                                 | 15 days                                                             | Spectrophotomete Z100 least stainability r for all solution                                                                                                                                                                            | Z100 showed better stain resistance than p60 and Ceram- X- Mono                                                                                         |
| Abdul Aziz Grandio Nano (Universal Abdullah Al Nanohybrid), Arabesk top Kheraif [7] (Microhybrid)                                                                         |                                                                                                                                                                                                                                             | Coffee, Tea, Pepsi Cola, Distilled water               | 1, 2, 7, 15, 30, 60 and 90 days                        | Grandio Nano severely CIE LAB discolouration (9.863)                | The discoloration of GN was significantly higher after 90 days of immersion                                                                                                                                                            |                                                                                                                                                         |
| S. N. Al-Haj Ali et al. [8]                                                                                                                                               | Filtek Z250 (Microhybrid), Filtek Z350 (Nanofilled), Tetric N- Ceram (Nanohybrid)                                                                                                                                                           |                                                        | Coca-cola, Iced black tea, Red Bull, orange juice      | 15 days                                                             | The highest mean $\Delta E$ value was Filtek Z350, followed by Tetric N-VITA EasyShade Ceram and Filtek Z250. spectrophotomete The lowest mean $\Delta E$ r value was Filtek Z250 were immersed in distilled water ( $2.80 \pm 0.50$ ) | Filtek Z350, which contained TEGDMA in its compo- sition, was significantly more prone to discoloration as compared to Filtek Z250 and Tetric N- Ceram. |
| Shatha Abdul-Kareem et al. [9]                                                                                                                                            | Amelogen Plus (microhybrid), Essentia (ultrafine hybrid), Beautiful II (nanohybrid),                                                                                                                                                        |                                                        | Pepsi, orange juice, tea, coffee and artificial saliva | 28 days                                                             | The lowest $\Delta E$ value Adobe Photoshop observed is Amelogen Cs6, Ver.13.0.1 Plus composite resin graphic program and the highest $\Delta E$ (AdobeSystems value observed for Inc., San Jose, Essentia composite CA, USA) resin    | Essentia resin composite performed inferior to Amelogene Plus and Beautiful II in terms of color stability.                                             |

|                               |                                                                                                                             |                                                                                     |                          |                        |                                                                                                                                                                                                                                |                                                                                                                                                                                                              |
|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------|------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Amit Khatri et al. [10]       | Conventional composite (microhybrid) and nanocomposite                                                                      | Coffee, food dye, chocolate, artificial saliva                                      | 1 week and 4 weeks       | Spectrophotometer      | Highest $\Delta E$ after a week and 4 week was conventional composite                                                                                                                                                          | Conventional composite resin is more susceptible to discoloration in various media over an extended period of time as compared to nano-composite.                                                            |
| P Sarveswar Reddy et al. [11] | Filteks 350 (Nanoresin), Filtek Z250 (Microhybrid), Filtek Z100 (Hybrid)                                                    | Coca-cola, coffee, tea, distilled water                                             | 24 hours, 15 and 30 days | Spectrophotometer      | Hybrid has shown more color changes beverages compared to other composites                                                                                                                                                     | Nanofilled composite resin less surface roughness and color change than microhybrid and hybrid composite resins                                                                                              |
| Ardu S [12]                   | Essentia (universal), Brilliant Everglow (Submicron hybrid), Inspiro SN (Nanohybrid)                                        | Artificial solution, tea, coffee, red wine, curry with water, curry with oil, water | 28 days                  | Spectrophotometer      | All tested materials showed significant colour changes ( $p < 0.01$ ) after 28 days staining immersion.                                                                                                                        | Essentia more resistance to staining                                                                                                                                                                         |
| Claudio Poggio et al [13]     | Gradia direct, Filtek supreme XTE, Ceram-X Universal, G-aenial essentia, Admira Fusion, Estelite                            | Coffee, red wine, physiological solution                                            | 4 weeks                  | -                      | The highest discoloration is Admira Fusion                                                                                                                                                                                     | Long-term exposure to some food dyes (coffee in particular) can significantly affect the colour                                                                                                              |
| Neslihan Tekce et al. [14]    | Dyract XP (compomer), Filtek Ultimate Universal (Nanofill), Filtek Ultimate flowable (Nanofill), Filtek Silorane (Silorane) | Water, black tea and coca-cola                                                      | 1 month                  | VITA Easyshade Compact | color changes of the resin materials were in the range of 1.31 - 15.28 $\Delta E^*$ unit                                                                                                                                       | Dyract XP showed the most unacceptable color changes, and the Filtek Silorane was leastly affected.                                                                                                          |
| S. Vijay Singh et al [15]     | Nanocomposite, Z-350 (microfilled), Charisma                                                                                | Tea and turmeric                                                                    | 7 and 21 days            | Photo spectrometer     | Minimum discoloration was seen in Charisma after 7 days in turmeric (LIE= 14.79) and tea solution (LIE=3.85). Maximum discoloration was seen in Charisma after 21 days in turmeric (LIE = 36.39) and tea solution (LIE = 11.2) | The microhybrid composite resin more color stable than the nanocomposite (Filtek Z350) after 7 days, however after 21 days, color changes were observed more with microhybrid composite than nano-composite. |

The findings show no significant different of discolouration outcome between the nanocomposite with other types of CR. This is because, there are few factor also play a role in discolouration, not just the composition itself. For example the period of time. There is types of CR which more colour stable in short period of time.

**Table 2: To Review The Polishing Outcome Of Nanocomposite Resin With Other Type Of Composite Resin Materials**

| Author                   | Methodology                                                                                                                                                         |                                                   |             | Method                                                                                                                                                                                                                                                                  | Result                                                                                                                                                                                                                                                                                                          | Conclusion |
|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
|                          | Material                                                                                                                                                            | Polishing                                         | Time Period |                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                 |            |
| Haifa M.                 |                                                                                                                                                                     |                                                   |             | Filtek Supreme A significant decrease XT presented the was noted in the color smoothest change values of Color Eye 7000A surfaces and was Filtek Supreme XT Spectrophotometer considered the specimens when most stain polished with Astropol susceptible (P material). |                                                                                                                                                                                                                                                                                                                 |            |
| Barakah and Nadia M.     | Filtek Supreme XT (nanofilled), Tetric EvoCream (Nanohybrid), Filtek Z250 (Microhybrid)                                                                             | PoGo, Astropol, Hi-Shine                          | 3 weeks     |                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                 |            |
| Taher                    |                                                                                                                                                                     |                                                   |             |                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                 |            |
|                          | Gradia Direct (Microfilled), Filtek Supreme                                                                                                                         |                                                   |             |                                                                                                                                                                                                                                                                         | Restorative material, Finishing time of exposure to treatments used the staining agent, had a significant and polishing/finishing effect on the Spectrophotometer technique were found color stability of statistically the esthetic significance ( $P < 0.05$ ) restorative in color change. materials tested. |            |
| Riccardo Beltrami et al. | XTE (Nanofilled), Ceram-X- Universal (Nanoceramic), G-aenial (Microfilled hybrid), Essentia (Microfilled hybrid), Admira Fusion (NanohybridOrmocer based), Estelite | Diamond grit, tungsten carbides and diamond grit. | 28 days     |                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                 |            |

|                               |                                                                                                                                                                          |                                                                        |           |                                                                                                                                                                                                                                                                                                                                                        |
|-------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                               | (Supra- nano<br>sphericallyhybrid)                                                                                                                                       |                                                                        |           |                                                                                                                                                                                                                                                                                                                                                        |
|                               |                                                                                                                                                                          |                                                                        |           | Lowest to highest                                                                                                                                                                                                                                                                                                                                      |
| Nihan Gonulol et al           | Grandio (Nanohybrid), Filtek Z250 (Microhybrid), Filtek Supreme XT Dentin (Nanofilled), Filtek Supreme XT Translucent (Nanofilled), Aelite Aesthetic Enamel (Nanohybrid) | MDT 859/014XF, Edenta CH, Soft-Lex XT, Astropol, Enhance, PoGo, Edenta | 48 hours  | surface roughness Discoloration of was: Filtek Supreme composite resins Translucent (FST) < was found to be Filtek Z250 (FZ250) < Colorimeter related to surface Filtek Supreme Dentin treatments, as (FSD) < Aelite well as resin Aesthetic Enamel composition. (AEE) < Grandio                                                                       |
|                               |                                                                                                                                                                          |                                                                        |           | (GRD)                                                                                                                                                                                                                                                                                                                                                  |
|                               |                                                                                                                                                                          |                                                                        |           | Matrix finish caused                                                                                                                                                                                                                                                                                                                                   |
| Deljoo Z et al                | Gradia direct (microhybrid), Ice (nanohybrid)                                                                                                                            | Matrix finish, Soft- Lex disc, Enhance point                           | 7 days    | significantly less The nanohybrid colour change than exhibited less Sof-Lex discs and Spectrophotometer colour change both less than than microhybrid Enhance point for both composite. composites in all storage media                                                                                                                                |
|                               |                                                                                                                                                                          |                                                                        |           | Show that the groups                                                                                                                                                                                                                                                                                                                                   |
| Shaymaa SH. Hassan            | Filtek Z350 XT (Nanofilled), Valux Plus (microhybrid)                                                                                                                    | Superfix                                                               | 7 days    | which was polished 24 The hours after curing had nanocomposite a lower statistically showed higher Spectrophotometer significant color color stability change than the than microhybrid groups which was composite polished immediately after curing                                                                                                   |
|                               |                                                                                                                                                                          | Sof-Lex Pop-                                                           |           | The surface Filtek Z250 groups, roughness of a statistically lower Ra composite resin values were observed depends on the after polishing with a composition of Assistant program silicon carbide brush the restorative regardless of the material and previous finishing finishing an system, Sof-Lex Pop- polishing On or Praxis TDV techniques used |
| Polyana Moura Ferreira et al. | Filtek Z250 (Microhybrid), Filtek X350XT (nanofilled)                                                                                                                    | On, Praxis TDV, felt discs with diamond paste, silicon carbide brush   | 3 minutes |                                                                                                                                                                                                                                                                                                                                                        |

Mostly the studies show nanocomposite better in polishing outcome. One of the reason is because of the filler size. Smaller the filler size, the polishing outcome will become more excellent.

## DISCUSSION

According to Poggio et al, composite resins can absorb water and other fluids containing pigment, resulting in discoloration. Water act as vehicle for stain penetration into the resin matrix [17,18]. Water sorption occurs mostly via direct absorption in the resin matrix, however water is not absorbed by the glass filler particles. According to research, composite resins containing a larger percentage of inorganic fillers exhibit less colour change. As a result, as the amount of resin matrix increases, so does the amount of water sorption [19,20].

Accordingly, the stainability of a resin material is highly influenced by resin-based cement and the relative quantity of resin and filler content present. Less filler and more resin in resin-based cements causes the filler to absorb more water at the resin-based interface [21,22,23], resulting in hydrolytic degradation [24,25].

While it was stated that the higher organic matrix of hybrid materials may be the cause of their increased vulnerability to water absorption and material degradation. This is explained the findings done by Malhotra et al that higher filler content of Z100 (Universal Microhybrid) could be responsible for its high stain resistant property as compared with P60 (Microhybrid Posterior) and Ceram-X-Mono (nanocomposites), which have an approximately equal amount of filler and thus an equivalent stainability [26].

Other than that, the composition of resin also play a role as it was reported that resins having higher concentration of triethyleneglycol dimethacrylate (TEGDMA) were more prone to discolour than composite containing higher concentrations of urethane dimethacrylate (UDMA). This was also confirmed by I. Sideridou et al, who discovered that UDMA-based composites resin had lower water sorption and colour stability than other dimethacrylates in their resin matrix under standard curing conditions. These monomers make the resin matrix hydrophilic in nature which enhances water and other

fluid sorption, causing color change within the material [26,27]. This is consistent with the findings by Ali et al that nanofilled (Filtek Z350) is more susceptible to staining due to has composition of TEGDMA compared to nanohybrid (Tetric N-Ceram) and microhybrid (Filtek Z250) [27].

Smaller filler particles are used in composites nowadays because they produce a smoother surface and help with better distribution inside the resin matrix. According to research, the small particle size in nanofilled composite resin allows for minimal staining susceptibility. Smaller filler particles are used in composites nowadays because they produce a smoother surface and help with better distribution inside the resin matrix. According to research, the small particle size in nanofilled composite resin allows for minimal staining susceptibility. However, some studies reported that increased particle size results in less colour change due to a decrease in the proportion of organic filler matrix which explain the reason of microhybrid better than nanohybrid like reported by Al Kheraif et al. This consistent with the findings by Villalta et al which demonstrated that nanofilled composite resin absorb stain easily more than microfilled one. These findings same as Lee and Powers obtained in their studies which conclude that the most least to stains is not necessarily the smoothest surface because staining ability was influenced by the composition of the monomer and filler for each composite [24,25].

A high degree of polymer conversion and efficient polymerization can also affect color stability because residual monomer left in the polymeric chain can lead to the formation of calorimetric degradation products that facilitate the penetration of solvents from the oral environment into the polymeric network. This phenomenon promotes hydrolytic degradation of the newly formed chain [26]. However, this is not consistent with the finding done because nanohybrid shows more degree of conversion but still has highest colour changes. This may also be explained as, which the degradation of the matrix result in hydrolysis of the bond with the silane coupling agent that causes detachment of the filler and lead for most of the colour changes [27].

Not just that, various authors also reported that diet also play a role

which the exposure to acidic or alcoholic drinks also can altered the surface roughness of the resin composite to the extent degree. The absorption of these type of solution into the resin matrix would enhance the staining process and softening the composite resin surface. This will increase extrinsic discolouration. Hence, as clinician, it is crucial to give the education to the patient about the expected outcome [28].

A restoration polishing is particularly important in order to delay the discolouration of the composite. Higher smoothness and less porosity reduce the adherence of agents responsible for changing the color of composites, such as dental biofilm, food colourants, tobacco and others [29].

It was stated that polishability of the resin composite directly affected by the filler particle size. Generally, the smaller the average particle size, the easier it will be to polish the resin. Yadav et al reported that the filler content of the composite affect its roughness, which consequently, nanofilled composites showed smoother surfaces than microfilled composites [30,31].

A decrease in the particle size of the abrasive produces a superior surface. The grit in the polishing material should be smaller that the particle size of the restorative material is that being polished to produce better results [32]. Traditionally, it is believed that the ability to polish composites varies depending on their particle size. Previous studies have shown that resin composites with smaller particle sizes promotes higher gloss and lower surface roughness after polishing with several polishing systems. It has been tested the surface roughness of various composites in their studies and reported that since Filtek Supreme contains predominantly zirconia- silica nanoclusters, the surface roughness is expected to be poorer than Filtek Supreme Translucent, which contains only silica nanofillers and nanoclusters [33].

It has been shown that polishing improved the staining resistance of the resin composites, and nanocomposites exhibited similar staining resistance or surface roughness to microhybrid composite. However, it is shown that the smoothest surface was not necessarily the most stain resistant. Bagheri et al stated that discolouration is not exclusively dependent on the surface roughness but exposure to the staining media that change the surface quality and predispose the material to discolouration [34,35].

It was reported that staining susceptibility of resin-based material may be related to resin filler type, type of resin matrix or type of the staining agent and Domingos PAS et al stated that UDMA seems to be more stain resistant than bis-GMA due its low sorption and water solubility characteristics. It has been noted that a composite with large filler particles are more prone to water aging discolouration than a composite with small filler particles, which is in line with the hydrolytic degradation matrix filler particle interfaces. Thus, a composite with large filler particle has more colour permeability than a composite with small filler particle. This is consistent with the findings by Hasan SH that the microhybrid Valux Plus™ composite, in the presence of small-to-large filler particles (filler particle size range of 3.5 to 0.01 micron, with a bis-GMA and TEGDMA resin base, is more prone to colour discolouration [33,36,37].

## CONCLUSIONS

Discolouration of any types of composite resin is depends on the factors. As being such as the composition itself, the filler, matrix resin types degree of conversion. . As clinician, we need to know the composition of the material so that we can choose the right polishing system to get better outcome as well as the timing for performs the finishing and polishing system because there are also difference outcome. However, polishability of nanocomposite is superior compare to other composite material but the stain resistant is less compares to microhybrid for over long period of time Further modification of nanocomposite resin and further investigation on aesthetic outcome is required.

## Additional Information

### Disclosures

Conflicts of interest: In compliance with the ICMJE uniform disclosure form, all authors declare the following: Payment/services info: This research is supported by the university short term grant of Universiti Sains Malaysia grant number 304/PPSG/6315520. Financial relationships: Saleem declare(s) a grant from Universiti Sains Malaysia. This research is supported by the university short term

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