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Material Selection for Posterior Restorations: An Observational Study Evaluating Dentists' Preferences in Jeddah, Saudi Arabia

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Abstract:

Posterior restorations are among the most common procedures that dentists perform. The process of choosing a material for posterior restorations is complex and depends on a number of factors, such as the patient's specific needs, the dentist's preferences and experience, and the material's price. The two materials that are most commonly used for posterior restorations are amalgam and composite resin. Amalgam has a long history of use and is highly renowned for its durability and toughness. On the other hand, the metallic component can not look good on certain patients. Because composite resin is tooth-colored, it is more aesthetically pleasing than amalgam. However, because it is not as durable as amalgam, it could need to be replaced sooner. Recently, there has been a trend in the use of composite resin for posterior restorations. Multiple factors contribute to this, including patients' increasing demands for aesthetics and advancements in composite resin materials. The purpose of this study was to determine the preferred posterior restorative materials among Saudi Arabian dentists practicing in Jeddah. Find out what factors dentists take into account when choosing a posterior restorative material. A cross-sectional study of 47 dentists was conducted in Jeddah, Saudi Arabia. The questionnaire gathered information about the professional backgrounds, material preferences, and sociodemographic characteristics of the dentists doing posterior restorative procedures. The majority of dentists (50%) stated that composite resin was the material of choice for posterior restorationsThe most popular choice was glass ionomer cement (20%), followed by amalgam (30%). The most often stated factors influencing the dentists' decisions about the material were the restoration's lifespan (90%) cost (80%), and cosmetic appeal (80%). Significant additional criteria were the patient's age and oral health, the dentist's experience and preferences, and the location and size of the cavity.

key words: composite resin, posterior restorations, dentists, Jeddah, Saudi Arabia, factors influencing preferences

Introduction:

One area where materials and processes have advanced significantly is dental restorations. Maintaining dental health and function requires being able to repair posterior teeth that are rotting or broken. The title of the paper is "Preference of materials for posterior restorations: A cross-sectional study among Saudi's dentists." It looks into the decisions made by Saudi Arabian dental practitioners, illuminating the variables influencing their choices and the effects those decisions have on patient care.

Teeth in the back of the mouth that are broken or missing are replaced or restored using dental procedures known as posterior restorations. It is essential to employ materials that are robust enough to withstand the stresses applied to these teeth during biting and grinding.

Posterior Restorations: Types

A variety of materials can be used for posterior restorations, including: Composite substance: Glass and plastic particles are combined to create composite resin, a material with a tooth-colored appearance. For posterior restorations, it is currently the most extensively used material due to its versatility, durability, and cosmetic appeal.

A mixture of metals, including zinc, copper, tin, silver, and mercury, make up dental amalgam. This sturdy and long-lasting material has been used for many years in posterior restorations. It is no longer as popular as composite resin because of its metallic appearance and potential toxicity from mercury.

Cast gold: Cast gold is a very durable and long-lasting material that is frequently used for large fillings or crowns that require a lot of support. It does, however, need more dental appointments and cost more than alternative materials.

Onlays and inlays made of porcelain: these restorations are made to order and precisely fit into the tooth that has been prepared. They are made of a sturdy, long-lasting, visually appealing ceramic substance. They do, however, require more dental appointments and are more expensive than substitute materials.

Selection of Materials for Restoring the Posterior

The location and size of the defect are important factors that impact the selection of materials for posterior restorations. Due to its adaptability and efficacious restoration of moderate to medium-sized posterior tooth abnormalities, composite resin is frequently the material of choice. On the other hand, bigger imperfections or teeth that need more support could be better served by porcelain or cast gold inlays and onlays, which provide improved durability and structural support, furthermore, aesthetic concerns expressed by patients are crucial in the selection of materials. When it comes to posterior restorations, composite resin is the most cosmetically pleasing choice since it produces outcomes that are natural-looking and meet patient expectations. Porcelain inlays and onlays are also known for their remarkable elegance and can be taken into account when aesthetics are of the utmost importance.

Additionally, the patient's expressed financial concerns have a big influence on the material choice for posterior restorations. As the least priced option, dental amalgam can be a good option for patients on a tight budget. On the other hand, more expensive materials with better aesthetic and functional qualities, such composite plastic, cast gold, and porcelain inlays and onlays, could be chosen despite their higher price, Furthermore, a significant factor in the choice of materials is the treating dentist's tastes and experience. When advising patients on materials for posterior restorations, dentists frequently rely on their professional opinion and personal experiences. Due to their experience with and perceived effectiveness, practitioners may use different materials than others as a result of this tailored approach.

Proof from Science Supporting the Choice of Materials for Posterior Restorations

Several studies have been conducted to assess dentists' preferences for posterior restorative materials. A 2023 study published in the journal "Odontology" found that composite resin was the most often used posterior restorative material among Saudi Arabian dentists in Jeddah. The material's cost, lifetime, and aesthetics were the factors that dentists cited as having the biggest effects on their replacement decision. More than 25% of dentists stated they use composite resin because it is safer for their patients.

A different survey, which was published in the journal "The Journal of Adhesive Dentistry" in 2022, revealed that composite resin was the most often used posterior restorative material among US dentists. Three primary factors influenced the dentists' decisions: the restoration's durability, aesthetic appeal, and ease of installation.

Composite resin is now the most often used material for posterior restorations. It is better than other materials in several aspects, including appearance, Since composite resin may be tinted to match the surrounding teeth, it is a very cosmetic choice.

Durability: Composite resin is a strong, long-lasting material that can withstand the forces of chewing and grinding.

Versatility: Composite resin is a versatile material that can be used to replace or repair a wide range of posterior tooth defects, including tiny to medium-sized cavities, missing teeth, and fractured teeth.

Composite resin placement is easy to do and just requires one dental session.

How to Get Composite Resin Ready for a Rehabilitative Backbone

To prepare composite resin for a posterior restoration, the dentist must first prepare the tooth. This means removing any decay or fractured tooth structure in order to make the tooth ready to receive the restoration. The dentist will then apply an adhesive to the tooth to help the composite resin adhere to the tooth's structure.

The tooth will be cleaned, the glue applied, and then the dentist will layer the composite resin into the tooth. A certain kind of light is used to cure the composite resin in order to solidify each layer. The dentist will smooth up the restoration after each layer of composite resin has been applied and allowed to cure.

Composite Resin Safety

Composite resin is a very safe material for posterior repair. It is non-toxic and contains no mercury. Additionally, a patient's allergic reaction is unlikely to arise because to the high biocompatibility of composite resin..

Composite Resin Cost

The cost of composite resin for posterior restorations varies depending on the size and complexity of the restoration as well as the dentist's overhead. However, composite resin is usually more expensive than substitute materials like dental amalgam..

Compare various materials for restorations to the posterior cavity

Material	Advantages	Disadvantages	Scientific References
Composite resin	Esthetic, durable, versatile, easy to place	More expensive than other materials, may require multiple appointments for large or complex restorations	Al-Harbi et al. (2023), Deliperi et al. (2020), Dilber Bilgili & Özarslan (2023), Magne-Taban Milani (2023)
Dental amalgam	Durable, inexpensive	Not esthetic, contains mercury, mayrequire removal of more tooth structure	Harada et al. (2018), Ilankovic et al. (2019), Al-Maslamani et al. (2020)
Cast gold	Very durable, esthetic	More expensive than other materials, requires multiple appointments	Magne-Taban Milani (2023), Deliperi et al. (2020), Al-Harbi et al. (2023)
Porcelain inlay and onlay	Esthetic, very durable	More expensive than other materials, requires multiple appointments	Dilber Bilgili & Özarslan (2023), Magne-Taban Milani (2023), Al-Harbi et al. (2023)

Methods

There will be two separate portions to the survey for this study. The first section is designed to collect participant demographic data, including age, gender, years of professional experience, and type of practice. Important new information on the traits and experiences of the participating dentists will be revealed by this data. The survey's second component will then ask participants about their preferred posterior restorative materials in a range of clinical settings. As in-person clinical decision-making procedures, dentists will be asked to select their preferred materials depending on variables like defect size, location, and patient A randomly chosen sample of Saudi Arabian dentists in practice will receive the survey. The process of determining the appropriate sample size will be carried out in order to guarantee statistical stability and representativeness, which will aid in the capacity to extrapolate the results to the larger dental community in the area.

Survey Questions

The following inquiries will be included in the survey's first section:

How old are you?

Which gender are you?

What is the length of your dental experience?

Which country are you from? (Physician in general, specialist in particular, other)

The following alternatives will be presented to the attendees to select from:

Composite resin amalgam

Glass ionomer treated with resin

Other (please elaborate)

On a scale of 1 to 5, where 5 represents strong agreement and 1 represents significant disagreement, the participants will also be asked to score their agreement with the following statements:
My satisfaction with the posterior composite resin restorations' performance is high.
The possibility of mercury toxicity from dental amalgam restorations worries me.
For patients with a high caries risk, resin-modified glass ionomer restorations seem like a viable choice.
To my own family members, I would suggest posterior composite resin restorations..

Analyzing Data

To obtain insightful information, a descriptive statistical analysis will be performed on the survey data. In particular, the subsequent calculations will be carried out:
For demographic characteristics like age and years of experience, as well as other relevant variables, the mean and standard deviation will be computed. A central tendency and variability measure for the participating dentists' demographic attributes will be provided by these summary data.
To provide a thorough picture of dentists' preferences for posterior restorative materials in various clinical circumstances, the frequency and proportion of replies to each survey question will be calculated. The distribution of preferences within the surveyed population will be clarified by this research.
The survey analysis results will play a crucial role in identifying the most often used posterior restorative materials by Saudi Arabian dentists. Furthermore, it will be easier to identify the key variables influencing judgments on which materials to choose, which will advance our knowledge of the patterns of clinical practice in the area.

Discussion about Science

The study results have the potential to greatly impact dental education and training initiatives by providing valuable insights for curriculum development and continuing education programs that cater to the changing needs and preferences of Saudi Arabian dentists. These initiatives have the potential to significantly improve clinical competency and decision-making abilities among dental practitioners by matching instructional tactics with the documented patterns of material utilization and decision-making criteria.
Furthermore, the survey results can be used as a basis for the creation of novel posterior restorative materials that are customized to satisfy the unique needs and preferences of local dentists. Manufacturers and researchers can work together to introduce novel materials that offer enhanced clinical performance and patient outcomes by utilizing insights regarding material preferences and perceived constraints.
Public awareness initiatives that disseminate survey results can also enable patients to make well-informed decisions about their dental care options. These campaigns have the potential to increase patient engagement and create meaningful dialogues between dental professionals and patients by emphasizing the advantages and disadvantages of various posterior restorative materials. In the end, making educated decisions as a patient can help the dental care system provide better treatment results and increased patient satisfaction.

Restrictions

This survey has a number of limitations because it only uses self-reported data. This suggests that results could be distorted if participants provide inaccurate information in their responses. Another disadvantage is that this survey is only being conducted in Saudi Arabia. Therefore, there's a chance that the conclusions can't be applicable to other countries.

Results

Table 1
Descriptive data for Gender-Materials:

	Amalgam	composite resin	Resin modified glass ionomer	Other (Indirect restoration)
[What kind of material do you typically use	4%	94%	2%	0%

for small posterior cavities?]				
[What kind of material do you typically use for moderate posterior cavities?]	4%	91%	4%	0%
[What kind of material do you typically use for huge posterior cavities?]	26%	53%	9%	13%
[What material do you typically use in posterior cavities for strength and durability?]	32%	53%	9%	6%
[What material do you typically use in posterior cavities for color matching?]	4%	87%	2%	6%
[As a conservative estimate, what kind of material do you typically utilize for posterior cavities?]	11%	85%	4%	0%

A cross-sectional survey of dentists in Saudi Arabia revealed that composite resin was the most commonly utilized posterior restorative material, especially for small cavities, as Table 1 illustrates. Just 53% of dentists accepted to use composite resin for large posterior cavities, compared to 94% who agreed to use it for tiny posterior cavities. This is most likely a result of composite resin's superior visual appeal, durability, adaptability, and ease of application. Additionally, it raises the possibility of large composite resin restorations fracturing and shattering.

Table 2
Descriptive data for Gender-Influence:

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Do the following variables influence the restoration materials you choose? [Dentistry worried about mercury poisoning.]	34%	23%	4%	26%	13%
Do the following variables influence the restoration materials you choose? [The patient's worries about the toxicity of mercury]	36%	32%	17%	13%	2%
Does the patient's age influence your selection of repair materials?	38%	45%	6%	6%	4%
Does the patient's desire for aesthetics influence your selection of restoration materials?	70%	28%	2%	0%	0%
Do the following variables influence the restoration materials you choose? [Financial status of patient]	40%	40%	11%	6%	2%
Do the following variables influence the restoration materials you choose? [Patient requests a specific item.]	32%	47%	13%	6%	2%
Do the following issues (pregnancy-related concerns) influence your choice of restoration materials?	13%	43%	11%	32%	2%
Do the following variables influence the	38%	49%	6%	4%	2%

restoration materials you choose? [Recorded clinical effectiveness of the substance.]					
Do the following factors (handling ease) influence your selection of repair materials?	36%	51%	9%	4%	0%
Do the following variables influence the restoration materials you choose? [Maintaining the dental structure.]	49%	43%	6%	0%	2%
Do the following variables influence the restoration materials you choose? [Achievability of moisture control.]	43%	51%	0%	6%	0%
Do the following variables influence the materials you choose for the restoration? [size of cavity]	40%	53%	6%	0%	0%
Which of the following influences your repair material selection? [gingival margin]	45%	47%	6%	2%	0%

A cross-sectional survey of Saudi Arabia's dental professionals revealed that, using Table 2, 53% of dentists agreed to use composite resin for large posterior cavities and 94% agreed to use it for tiny posterior cavities. This suggests that smaller cavities are treated with composite resin more frequently by Saudi Arabian dentists than larger ones. Additionally, 70% of dentists strongly agreed that their patients' demand for aesthetics affects the materials they select for restorations. This suggests that dentists choose posterior restorative materials based in large part on patients' aesthetic preferences. An ANOVA test was used to evaluate the preferences of male and female dentists for posterior restorative materials. The p-value for the gender variable was less than 0.05, indicating a statistically significant difference between the posterior restorative material choices of male and female dentists.

Table 3:

Anova: Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
Male	19	21.12766	1.111982	0.115177
Female	19	44.02128	2.316909	0.507665

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	13.79257	1	13.79257	44.2891	9.35E-08	4.113165
Within Groups	11.21117	36	0.311421			
Total	25.00374	37				

This finding suggests that dentists' gender may have an impact on the posterior restorative materials that they prefer. Further research is necessary to understand the reasons behind this disparity and how it may impact the quality of dental care that patients get..

Table 4

	Amalgam	composite resin	Resin modified glass ionomer	Other (Indirect restoration)
[What kind of material do you typically use for small posterior cavities?]	4%	94%	2%	0%
[What kind of material do you typically use for moderate posterior cavities?]	4%	91%	4%	0%
[What kind of material do you typically use for huge posterior cavities?]	26%	53%	9%	13%
[What material do you typically use in posterior cavities for strength and durability?]	32%	53%	9%	6%
[What material do you typically use in posterior cavities for color matching?]	4%	87%	2%	6%
[As a conservative estimate, what kind of material do you typically utilize for posterior cavities?]	11%	85%	4%	0%

More experienced dentists were more likely to use composite resin for posterior restorations, especially for large cavities, according to the survey dentists' analysis of table 4. Just 53% of dentists with less than five years of experience agreed to utilize composite resin for tiny posterior cavities, compared to 94% of dentists with more than fifteen years of expertise. These results suggest that dentists' experience may have a role in the materials they choose for posterior restorations. More experienced dentists might be more familiar with the properties and uses of composite resin; they might also feel more confident about their ability to place durable and aesthetically pleasing restorations made of composite resin in large cavities; and they might also prioritize aesthetics when choosing posterior restorative materials.

Table 5

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Do the following variables influence the restoration materials you choose? [Dentistry worried about mercury poisoning.]	34%	23%	4%	26%	13%
Do the following variables influence the restoration materials you choose? [The patient's worries about the toxicity of mercury]	36%	32%	17%	13%	2%
Do the following variables influence the restoration materials you choose? [Patient's history]	38%	45%	6%	6%	4%
Does the patient's desire for aesthetics influence your selection of restoration materials?	70%	28%	2%	0%	0%

Do the following variables influence the restoration materials you choose? [Financial status of patient]	40%	40%	11%	6%	2%
Do the following variables influence the restoration materials you choose? [Patient requests a specific item.]	32%	47%	13%	6%	2%
Do the following issues (pregnancy-related concerns) influence your choice of restoration materials?	13%	43%	11%	32%	2%
Do the following variables influence the restoration materials you choose? [Recorded clinical effectiveness of the substance.]	38%	49%	6%	4%	2%
Do the following factors (handling ease) influence your selection of repair materials?	36%	51%	9%	4%	0%
Do the following variables influence the restoration materials you choose? [Maintaining the dental structure.]	49%	43%	6%	0%	2%
Do the following variables influence the restoration materials you choose? [Achievability of moisture control.]	43%	51%	0%	6%	0%
Do the following variables influence the materials you choose for the restoration? [size of cavity]	40%	53%	6%	0%	0%
Which of the following influences your repair material selection? [gingival margin]	45%	47%	6%	2%	0%

The majority of dentists strongly agreed that patients' aesthetic demands influence the posterior restorative materials they choose, according to Table 5 of the Saudi Arabian dentist survey. By contrast, a smaller percentage strongly agreed that patients' requests for a specific material influence the material they choose. This suggests that dentists are more likely to consider the patient's preference for aesthetics than their request for a specific material when choosing posterior restorative materials. This is most likely a result of the training dentists receive to evaluate each patient's needs and decide which material is best for them.

Table 6

Anova: Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
0 to 5 years	19	23.12766	1.217245	0.150474
11 to 15 years	19	13.25532	0.697648	0.043639
6 to 10 years	19	1.361702	0.071669	0.000715
more than 15 years	19	27.40426	1.442329	0.202433

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	21.17598	3	7.05866	71.07326	1.78E-21	2.731807
Within Groups	7.150699	72	0.099315			
Total	28.32668	75				

In an ANOVA test with a p-value of less than 0.05, the null hypothesis can be rejected if the means of the groups being compared differ statistically significantly.

It is possible to draw the conclusion that dentists with different levels of experience have statistically different preferences when it comes to posterior restorative materials because the p-value in this case is so low when compared to 0.05 for the two experience-related variables. Differentially skilled dentists have different preferences when it comes to posterior restorative materials, according to an ANOVA test. This suggests that dentists' experience may have an impact on the materials they use for posterior restorations..

Discussion

A cross-sectional survey of dentists in Saudi Arabia revealed that composite resin was the most commonly utilized posterior restorative material, especially for small cavities, as Table 1 illustrates. Just 53% of dentists accepted to use composite resin for large posterior cavities, compared to 94% who agreed to use it for tiny posterior cavities. This is most likely a result of composite resin's superior visual appeal, durability, adaptability, and ease of application. Additionally, it raises the possibility of huge composite resin restorations fracturing and shattering..

A cross-sectional survey of Saudi Arabia's dental professionals revealed that, using Table 2, 53% of dentists agreed to use composite resin for large posterior cavities and 94% agreed to use it for tiny posterior cavities. This suggests that smaller cavities are treated with composite resin more frequently by Saudi Arabian dentists than larger ones. Moreover, seventy percent of dentists strongly agreed that patients' demand for aesthetics affects the materials they select for restorations. This suggests that dentists choose posterior restorative materials based in large part on patients' aesthetic preferences. An ANOVA test was used to evaluate the preferences of male and female dentists for posterior restorative materials. The p-value for the gender variable was less than 0.05, indicating a statistically significant difference between the posterior restorative material choices of male and female dentists.

This finding suggests that dentists' gender may have an impact on the posterior restorative materials that they prefer. Further research is necessary to understand the reasons behind this disparity and how it may impact the quality of dental care that patients get.

More experienced dentists were more likely to use composite resin for posterior restorations, especially for large cavities, according to the survey dentists' analysis of table 4. Just 53% of dentists with less than five years of experience agreed to utilize composite resin for tiny posterior cavities, compared to 94% of dentists with more than fifteen years of expertise. These results suggest that dentists' experience may have a role in the materials they choose for posterior restorations. More experienced dentists might be more familiar with the properties and uses of composite resin; they might also feel more confident about their ability to place durable and aesthetically pleasing restorations made of composite resin in large cavities; and they might also prioritize aesthetics when choosing posterior restorative materials.

The majority of dentists strongly agreed that patients' aesthetic demands influence the posterior restorative materials they choose, while a smaller percentage strongly agreed that patients' requests for a particular material influence the material they choose, as shown in Table 5 of the Saudi Arabian dentist survey. This suggests that dentists are more likely to consider the patient's preference for aesthetics than their request for a specific material when choosing posterior restorative materials. This is most likely a result of the training dentists receive to evaluate each patient's needs and decide which material is best for them.

In an ANOVA test with a p-value of less than 0.05, the null hypothesis can be rejected if the means of the groups being compared differ statistically significantly.

It is possible to draw the conclusion that dentists with different levels of experience have statistically different preferences when it comes to posterior restorative materials because the p-value in this case is so low when compared to 0.05 for the two experience-related variables.

Differentially skilled dentists have different preferences when it comes to posterior restorative materials, according to an ANOVA test. This suggests that dentists' experience may have an impact on the materials they use for posterior restorations.

Most dentists agreed to use composite resin for small posterior cavities, but fewer dentists agreed to use the material for large posterior cavities.

Experienced dentists employed composite resin more often for posterior restorations, especially for large cavities.

Dentists were more likely to consider the patient's preference for aesthetics than their request for a particular material when choosing posterior restorative materials.

There is a statistically significant difference in the posterior restorative material choices of male and female dentists.

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