

Knowledge, Attitudes, and Practices of General Dental Practitioners Regarding Composite Resin Restorations in Saudi Arabia

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Abstract

Introduction: Composite resin restorations are widely used for restoring permanent teeth due to their esthetic properties and conservative preparation. However, variations in clinical preferences and awareness among dentists and dental students, driven by training, experience, perceived longevity, cost, and technique sensitivity, may affect treatment choices and patient outcomes. **Objectives:** This study aimed to assess the level of awareness, attitudes, and clinical preferences of practicing dentists and dental students regarding the use of composite resin restorations for permanent teeth, and to identify practitioner- and practice-level factors associated with those preferences. **Methodology:** This cross-sectional study surveyed licensed dental students, general dentists and restorative specialists. The instrument covered demographics (age, years of practice, and specialty), knowledge (indications, material properties, and bonding protocols), attitudes (confidence and perceived longevity), and reported clinical preferences (choice of material for Class I–V restorations, posterior vs. anterior use, adhesive protocols). Items used Likert scales and multiple-choice questions; pilot testing was used to assess validity and reliability. Descriptive statistics summarized awareness and preference patterns. Associations between preferences and predictors (e.g., years in practice, specialty, and continuing education attendance) were tested using Chi-square tests and multivariable logistic regression; significance set at $P < 0.05$. **Results:** The study included 429 respondents. Females represented 58.7%; 45.5% were ≤ 25 years, and participants were mainly clinical students (41.0%) and general practitioners (40.6%). Most respondents reported being aware of composite resin properties very well (71.1%) and had encountered composite resin in clinical practice (62.7%). Awareness of failure causes was generally moderate, but secondary caries showed the lowest awareness (mean 2.99/5), with 34.3% rating low awareness (≤ 2), whereas post-operative sensitivity had the highest mean awareness (3.37/5) and 42.9% rating 4–5. Regarding determinants of longevity, 82.1% believed multi-surface cavities fail more, and 87.6% indicated oral hygiene has a significant impact; 54.5% believed age affects success. For study-based statements, 39.9% selected all correct options and 9.6% reported not knowing. Practice and perception items showed that 50.6% placed ≥ 3 composite restorations weekly; in follow-up scenarios, 38.5% considered plaque accumulation more acceptable than marginal discoloration, whereas 39.9% selected neither; 85.8% strongly endorsed integrating oral-hygiene instruction and risk-factor management into composite education. Using the predefined scoring system, high proficiency was observed in awareness of composite resin (42.4%), but low proficiency

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predominated for failure-cause awareness (54.1%) and for practice/professional perception (44.8%). **Conclusion:** Overall, 39.4% were categorized as low, 40.8% moderate, and 19.8% high (mean total score 23.0 ± 5.9 ; range 11.5–35.5). The overall score category was significantly associated with gender, age group, professional status, residential region, and institution type, but not nationality or recent continuing education. These findings indicate strong baseline familiarity with composites but important gaps in failure-related knowledge and practice-oriented decision-making.

Key words: Clinical preference, composite resin, dentist awareness, restorative dentistry, survey study

INTRODUCTION

Composite resin restorations have become an essential part of modern restorative dentistry because of their excellent esthetic outcomes, minimal invasiveness, and strong bonding ability to tooth structures.^[1] Over recent years, significant improvements in the optical, mechanical, and biological properties of composite resins have enhanced their durability and made them a favorable choice for both anterior and posterior restorations.^[2]

Patient perception and awareness play a key role in the acceptance and long-term success of composite restorations. Preferences are often influenced by esthetic expectations, the desire for tooth-colored fillings, cost considerations, and the perceived longevity of the material.^[3] Previous studies have highlighted that while composite restorations are popular for their esthetic advantages, patient knowledge about their maintenance and clinical performance varies significantly.^[4]

Resin-based composites have gained popularity as esthetic, tooth-colored restorations in posterior teeth. The shift away from amalgam, influenced by concerns about mercury safety and biocompatibility, has reinforced the search for alternative materials.^[5]

However, the awareness and attitudes among dentists, especially dental students and recent graduates, toward newer composite technologies such as bioactive or smart composites can significantly influence their clinical adoption. Educational exposure and clinical training shape these perceptions. A cross-sectional study among dental interns versus newly graduated dentists in Saudi Arabia revealed that interns demonstrated significantly higher understanding and acceptance of these smart composites compared to recent graduates.^[6]

In Saudi Arabia, a cross-sectional study on 434 patients found that composite buildup (57.4%) was the most common esthetic treatment, followed by bleaching (36.5%), with most participants preferring permanent over temporary options; however, 29.1% reported complications such as sensitivity and bad odor.^[7]

In rural India, 436 participants showed a higher preference for tooth-colored restorations (60%) despite limited knowledge about composite materials (42%); absence of

post-operative pain was the main concern, whereas cost was least important.^[8]

In North Norway, an evaluation of 90,062 teeth revealed that only 3.3% required retreatment, with 25.3% suggested for repair and 74.7% for replacement; secondary caries and restoration fractures were the most common reasons, and composite was preferred in 74.2% of retreatments.^[9]

There are a few studies gathered data in Saudi Arabia that have been conducted to investigate the awareness and perception of composite resin restoration generally.

This study aimed to assess the understanding of general dental practitioners and dental students about composite filling and to identify the key elements that impact their decision to choose this restorative treatment option in dental care.

Objectives

The objectives of this study were to assess the level of awareness, attitudes, and clinical preferences of practicing dentists and dental students regarding the use of composite resin restorations for permanent teeth, and to identify practitioner- and practice-level factors associated with those preferences.

METHODOLOGY

Study design and setting

This is a cross-sectional questionnaire-based study conducted in Jeddah, Saudi Arabia. The study was performed in dental clinics across public and private sectors to evaluate adult patients' awareness and preferences regarding composite resin restorations. Data collection was conducted between July 2025 and September 2025.

Subject: Participants, recruitment, and sampling procedure

The study included adult patients (≥ 18 years old) visiting dental clinics in Jeddah during the study period. Participants were selected using a convenience sampling method, and all individuals provided informed consent before participation.

Sample size

The sample size was calculated using the Raosoft online calculator. To attain a 95% confidence level and a 5% margin of error, 384 individuals are required.

Inclusion and exclusion criteria

1. Dental practitioners working in both governmental and private dental clinics across Saudi Arabia were included in this study.
2. Both male and female dentists who are licensed and currently performing composite resin restorations in daily practice were included. Non-clinical dentists, such as those working only in administrative or academic positions and participants who did not complete the questionnaire were excluded.
3. Dentists who voluntarily agreed to participate and provided complete responses in the online questionnaire were included. Incomplete responses or those from individuals not meeting the inclusion criteria were excluded from the analysis.

Method for data collection, instrument

Data for this study were collected using a structured self-administered questionnaire specifically designed for dental students and practitioners. The questionnaire was developed based on findings from previous literature and adapted to meet the objectives of this study. It was distributed electronically via Google Forms to ensure wide accessibility and convenience for participants.

The questionnaire consisted of three main sections:

1. Demographic information (gender, age, academic/professional status, and years of experience).
2. Awareness and knowledge of composite resin restorations, including their properties, advantages, disadvantages, and clinical applicability.
3. Perceptions and professional practices, which included factors such as patient- and tooth-related considerations, awareness of common causes of restoration failure, knowledge of evidence-based findings, and professional opinions regarding the use of composite resin restorations.

The survey included a combination of multiple-choice, Likert-scale, and closed-ended questions. Specific items assessed participants' perceptions of factors influencing longevity (e.g., age, cavity type, and oral hygiene), knowledge of study-based findings (plaque control, decayed, missing, and filled teeth [DMFT], and restoration surfaces), and professional practices (frequency of placing composite restorations, acceptability of clinical findings, and importance of oral hygiene instruction).

Scoring system

Part 1: Awareness of composite resin restorations

This part includes the two questions assessing general knowledge and experience with composite resin (Q2). For each item, assign 1 for the highest or most appropriate response and 0 for the lowest or incorrect response (e.g., "Yes-very well" = 1, "Yes-moderately" = 0.5, and "Not much" = 0). Sum the scores (total possible = 0–2). Using Bloom's original cutoff points (80–100%, 60–79%, and 0–59%), classify the results as:

- High level: 2
- Moderate level: 1
- Low level: 0.

Part 2: Awareness of failures and causes

This part contains the five items rating awareness of composite restoration failure causes (Q3). Each item is rated from 1 to 5. Add the scores for all five items (minimum total = 5, maximum total = 25). Classify the total as:

- High level: 21–25
- Moderate level: 16–20
- Low level: 5–15.

Part 3: Knowledge of patient- and tooth-related factors and study-based findings

This part combines the three questions on patient and tooth factors (Q4) with the three statements on study-based findings (Q5), for a total of six items. Assign 1 for each correct answer and 0 for an incorrect answer. Sum the scores (range 0–6) and classify as:

- High level: 5–6
- Moderate level: 4
- Low level: 0–3

Part 4: Practice and professional perception

This part includes three questions about weekly practice frequency, clinical acceptability in follow-ups, and the importance of oral hygiene instruction in composite restoration education (Q6). Assign 1 for the most appropriate or recommended response and 0 for other options. Sum the scores (range 0–3) and classify as:

- High level: 3
- Moderate level: 2
- Low level: 0–1.

Pilot test

The pilot test consisted of training and calibrating 17 dentists with 10–20 selected patient cases before the main data collection.

It aimed to achieve consistent and reliable evaluations among examiners, assessed through Cohen's kappa values. This preliminary phase was conducted to fine-tune the procedures

and verify examiner agreement before implementing them in the full study.

Analyze and entry method

The collected data were entered into Microsoft Excel 2024 for Windows. Subsequently, the data were transferred to the Statistical Package for the Social Sciences software, version 31, for statistical analysis.

RESULTS

A total of 429 completed questionnaires were analyzed. Table 1 summarizes the sociodemographic characteristics. Females represented 58.7% ($n = 252$). Most respondents were ≤ 25 years (45.5%) or 26–30 years (25.6%). Clinical dental students (41.0%) and general practitioners (40.6%) formed the largest groups, followed by specialists (11.0%)

Table 1: Sociodemographic characteristics ($n=429$)

Parameter	No.	Percentage
Gender		
Female	252	58.7
Male	177	41.3
Age group (years)		
≤ 25	195	45.5
26–30	110	25.6
31–35	75	17.5
> 35	49	11.4
Status		
Pre-clinical dental student	32	7.5
Clinical dental student	176	41.0
General practitioner	174	40.6
Specialist	47	11.0
Residential area		
Southern region	97	22.6
Eastern region	26	6.1
Northern region	21	4.9
Western region	145	33.8
Central region	140	32.6
Nationality		
Saudi	406	94.6
Non-Saudi	23	5.4
Type of institution		
Government	287	66.9
Private	142	33.1
Continuing dental education/training in the past 2 years		
Yes	354	82.5
No	75	17.5

and pre-clinical students (7.5%). Residence was mainly in the Western (33.8%) and Central regions (32.6%). Most participants were Saudi (94.6%) and affiliated with government institutions (66.9%). Regarding professional development, 82.5% reported receiving continuing dental education (CDE) or training related to composite resin restorations in the past 2 years.

Awareness and exposure to composite resin restorations are shown in Table 2. A large majority reported being aware of composite resin properties “very well” (71.1%), whereas 24.2% were aware “moderately” and 4.7% reported “not much” awareness. Practical exposure was substantial: 62.7% had practiced or encountered composite resin in clinical practice, 33.6% had exposure limited to pre-clinical/laboratory settings, and only 3.7% reported no exposure.

Table 3 presents perceived awareness of failure causes using a 1–5 scale (1 = not aware, 5 = highly aware). Across the five causes, responses clustered around rating of “3,” indicating overall moderate awareness rather than uniformly high awareness. Post-operative sensitivity showed the strongest profile (mean 3.37), with 42.9% rating their awareness as 4–5. In contrast, secondary caries showed the lowest mean awareness (2.99) and the largest share of low ratings (≤ 2 : 34.3%), highlighting a knowledge gap related to caries-associated failure mechanisms.

Patient- and tooth-related determinants are summarized in Table 4. More than half of respondents (54.5%) believed age affects composite restoration success, although 17.0% were unsure. A strong majority (82.1%) believed cavity type/number of surfaces influences longevity, specifically endorsing that multi-surface cavities fail more. Oral hygiene was widely recognized as critical, with 87.6% reporting a significant impact on composite restoration longevity.

Table 5 consolidates knowledge of study-based findings and practice/professional perception. The study-based findings item allowed multiple selections; therefore, option-level

Table 2: Awareness and knowledge of composite resin restorations ($n=429$)

Parameter	No.	Percentage
Are you aware of the properties of composite resin restorations (e.g., esthetics, adhesion, conservative preparation)?		
Yes - very well	305	71.1
Yes - moderately	104	24.2
Not much	20	4.7
Have you ever practiced or encountered the use of composite resin in your study/practice?		
Yes - in pre-clinical/lab setting only	144	33.6
Yes - in clinical practice	269	62.7
No	16	3.7

Table 3: Awareness of failures and causes (n=429)

Parameter	No.	Percentage
Marginal adaptation issues		
1	89	20.7
2	30	7.0
3	144	33.6
4	60	14.0
5	106	24.7
Retention deficiencies		
1	68	15.9
2	58	13.5
3	151	35.2
4	58	13.5
5	94	21.9
Secondary caries		
1	110	25.6
2	37	8.6
3	123	28.7
4	65	15.2
5	94	21.9
Anatomical form deviation		
1	74	17.2
2	34	7.9
3	190	44.3
4	43	10.0
5	88	20.5
Post-operative sensitivity		
1	62	14.5
2	39	9.1
3	144	33.6
4	45	10.5
5	139	32.4

Response scale ranges from 1 (not aware) to 5 (highly aware)

percentages represent the proportion selecting each statement. Overall, 42.2% endorsed all three evidence-based statements, whereas 9.6% selected “I don’t know.” In practice, 50.6% reported placing ≥ 3 composite restorations/week (3–5 or >5), 40.8% placed 1–2/week, and 8.6% placed none. For follow-up findings, 21.7% considered marginal discoloration more clinically acceptable, 38.5% selected plaque accumulation, and 39.9% selected neither. Finally, 85.8% agreed that oral hygiene instruction and management of risk factors should definitely be part of composite restoration education (14.2% responded “Maybe”).

Proficiency levels derived from the proposal scoring systems are summarized in Table 6. Awareness of composite resin restorations was favorable (42.4% high; 46.6% moderate; 11.0% low). In contrast, awareness of failures and causes

Table 4: Patient- and tooth-related factors (n=429)

Parameter	No.	Percentage
Do you think age affects the success of composite restorations?		
Yes	234	54.5
No	122	28.4
Not sure	73	17.0
Do you believe that cavity type/number of surfaces (e.g., Class I, II, V, MOD) influences longevity?		
Yes - multi-surface cavities fail more	352	82.1
No	35	8.2
Not sure	42	9.8
How much do you think oral hygiene impacts the longevity of composite restorations?		
Significant impact	376	87.6
Moderate impact	43	10.0
Little to no impact	10	2.3

Table 5: Knowledge of study-based findings and practice/professional perception (n=429)

Parameter	No.	Percentage
Which of the following statements do you think are correct?		
Restorations in patients with better plaque control (Plaque index=0) last longer	195	45.5
Older age and higher decayed, missing, and filled teeth are associated with higher failure rates	63	14.7
Multi-surface (MOD) restorations show reduced longevity	81	18.9
All of the above	171	39.9
I don't know	41	9.6
How often do you place composite resin restorations/week?		
0	37	8.6
1–2	175	40.8
3–5	119	27.7
>5	98	22.8
In your opinion, which is more clinically acceptable in follow-ups?		
Marginal discoloration	93	21.7
Plaque accumulation	165	38.5
Neither	171	39.9
Do you think oral hygiene instruction and management of risk factors (e.g., bruxism, tooth wear) should be part of composite restoration education?		
Yes, definitely	368	85.8
Maybe	61	14.2
No	0	0.0

The study-based findings item permitted multiple responses; percentages for that item may exceed 100% when summed

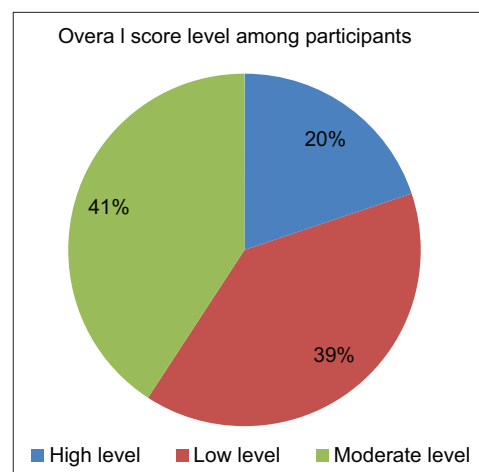
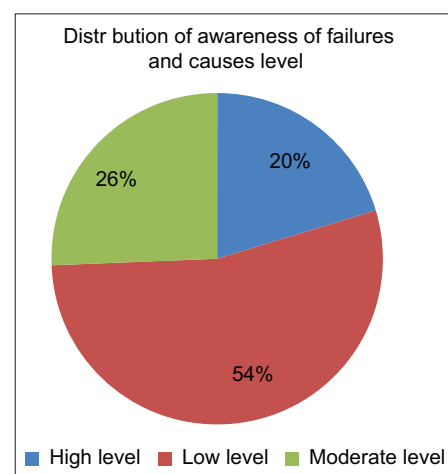
Table 6: Proficiency levels by scoring system and overall score ($n=429$)

Parameter	Frequency	Percentage
Awareness of composite resin restorations		
High level	182	42.4
Low level	47	11.0
Moderate level	200	46.6
Awareness of failures and causes		
High level	87	20.3
Low level	232	54.1
Moderate level	110	25.6
Knowledge of patient- and tooth-related factors and study-based findings		
High level	188	43.8
Low level	125	29.1
Moderate level	116	27.0
Practice and professional perception		
High level	42	9.8
Low level	192	44.8
Moderate level	195	45.5
Overall score (sum of all scores)		
High level	85	19.8
Low level	169	39.4
Moderate level	175	40.8

was predominantly low (54.1% low; 25.6% moderate; 20.3% high). Practice and professional perception showed the weakest profile overall (44.8% low; 45.5% moderate; 9.8% high). Using the overall score (sum of all domains), participants were most commonly categorized as moderate (40.8%) or low (39.4%), whereas 19.8% were categorized as high. Overall scores ranged from 11.5 to 35.5 (mean 23.0 ± 5.9).

Figures 1 and 2 visualize the distributions of overall proficiency and awareness of failures/causes, emphasizing failure-cause awareness as the most prominent gap relative to the study objectives.

Associations between the overall score category and participant characteristics are presented in Table 7. Overall score category was significantly associated with gender ($P = 0.016$), age group ($P < 0.001$), professional status ($P = 0.001$), residential area ($P = 0.001$), and institution type ($P = 0.037$), but not with nationality ($P = 0.388$) or recent CDE/training ($P = 0.114$). Higher overall scores were proportionally more frequent among participants aged >35 years and among specialists, and participants from the Western region and private institutions contributed a larger proportion of the high overall score group. Despite the high uptake of CDE/training, the overall category did not differ significantly, which may reflect variability in training content, depth, or emphasis on failure mechanisms.

**Figure 1:** Distribution of overall score categories ($n = 429$)**Figure 2:** Distribution of awareness of failures and causes categories ($n = 429$)

DISCUSSION

Composite resin restorations are now central to contemporary restorative dentistry, but clinical success with these restorations depends not only on the material itself but also on the technique of the operator and risk factors related to the patient and appropriate subsequent decisions. The aim of the present study was to evaluate the awareness, knowledge and practice/professional perception of dental students and dentists in Saudi Arabia about composite resin restorations and to identify factors related to the overall proficiency.

In this survey of 429 respondents, general awareness of composite resin properties and exposure was favorable, with 71.1% respondents indicating that they were aware of composite resin properties “very well,” and almost two-thirds (62.7%) having encountered composite resin in clinical practice. This pattern is congruent with the general international trend toward resin-based composites as the alternative of choice for direct restorations and the concomitant expansion of undergraduate and continuing education programs in the field of adhesive dentistry. Contemporary

Table 7: Association between sociodemographic characteristics and overall score category (*n*=429)

Parameters	Overall score			Total (<i>n</i> =429)	<i>P</i> -value*
	High	Low	Moderate		
Gender					
Female	47	88	117	252	0.016*
	55.3	52.1	66.9	58.7	
Male	38	81	58	177	
	44.7	47.9	33.1	41.3	
Age group (years)					
≤25	27	93	75	195	0.0001*
	31.8	55.0	42.9	45.5	
26–30	28	27	55	110	
	32.9	16.0	31.4	25.6	
31–35	12	31	32	75	
	14.1	18.3	18.3	17.5	
>35	18	18	13	49	
	21.2	10.7	7.4	11.4	
Status					
Pre-clinical dental student	9	19	4	32	
	10.6	11.2	2.3	7.5	
Clinical dental student	25	77	74	176	
	29.4	45.6	42.3	41.0	
General practitioner	36	58	80	174	
	42.4	34.3	45.7	40.6	
Specialist	15	15	17	47	
	17.6	8.9	9.7	11.0	
Residential area					
Southern region	17	39	41	97	0.001*
	20.0	23.1	23.4	22.6	
Eastern region	3	16	7	26	
	3.5	9.5	4.0	6.1	
Northern region	0	12	9	21	
	0.0	7.1	5.1	4.9	
Western region	44	43	58	145	
	51.8	25.4	33.1	33.8	
Center region	21	59	60	140	
	24.7	34.9	34.3	32.6	
Nationality					
Saudi	78	162	166	406	0.388
	91.8	95.9	94.9	94.6	
Non-Saudi	7	7	9	23	
	8.2	4.1	5.1	5.4	
Type of institution					
Government	51	125	111	287	0.037*
	60.0	74.0	63.4	66.9	
Private	34	44	64	142	
	40.0	26.0	36.6	33.1	
CDE/training (past 2 years)					
Yes	64	145	145	354	0.114
	75.3	85.8	82.9	82.5	
No	21	24	30	75	
	24.7	14.2	17.1	17.5	

**P*-value was considered significant if ≤ 0.05

reviews focus on resin composite formulations and adhesive strategies to cementate the position of composites as first-line materials for posterior and anterior indications, especially with an eye to minimally invasive strategies.^[10] Similarly, narrative and evidence syntheses refer to resin composites as versatile materials that can be adapted to different clinical situations based on incremental or bulk-fill approaches and technique refinements, pertaining to curing, layering, and occlusal management.^[11] In this context, the high level of self-reported general awareness found in the present study seems in line with the standard of care that prevails.

Despite great baseline familiarity, awareness of failure mechanisms was a great gap. Across five causes of failure, the response was clustered around the middle of the awareness scale, and more than 50% were classified as having a low awareness of failures and causes. Notably, secondary caries had the lowest mean awareness and had the highest percentage of low ratings. This finding is clinically important since recurrent/secondary caries has been repeatedly identified as one of the leading reasons for replacement of resin composite restorations, together with bulk or marginal fracture.^[10,12] In a meta-analysis of clinical studies on posterior composites, caries and fracture were the primary causes of failure, and the risk of caries was a hazard factor for fracture.^[12] Long-term practice-based data up to three decades of service also reported fracture and secondary caries as the leading cause of failure, and indicated that restorations with three or more surfaces are higher risk.^[13] The discordance between the literature's focus on caries-associated failure and the relatively lower level of awareness for secondary caries among the current sample suggests that education and training may be more effective in communicating the material handling and esthetic benefits than in reinforcing disease-based pathways for failure and risk-based maintenance approaches.

The study also found that post-operative sensitivity was the domain with the greatest awareness profile of failures. This is a plausible reason for the reason that post-operative sensitivity is an immediate outcome experienced by the patient and perceived by the patient; this can lead to urgent re-attendance, which increases salience for both students and practitioners. While post-operative sensitivity with adhesive restorative procedures may occur, there is now modern thought that careful adhesive strategies, field isolation, and operative strategies can reduce the incidence and intensity of post-operative sensitivity.^[14] In an open access clinical evaluation of immediate failures of resin composite restorations, some causative factors such as rushed application, compromised isolation and poor oral hygiene were highlighted as contributory factors to early failure and therefore underscoring the interdependence of operator-related and patient-related determinants.^[14] These mechanisms may overlap with the complaints arising from sensitivity, with the inadequate sealing, polymerization stress or the contamination contributing to the sensitivity as well

as to the marginal breakdown. Therefore, the comparably higher awareness of sensitivity in this cohort may represent frequent clinical encounters. In contrast, the comparably lower awareness of secondary caries may represent delayed manifestation and the need for longitudinal risk-oriented thinking.

Patient and tooth-related determinants were better recognized than failure etiologies. Most of the participants supported the role of cavity type/number of surfaces and oral hygiene on longevity, and there was a majority of participants who thought that multi-surface cavities fail more. These views are highly backed by clinical evidence. Meta-analytic results have shown that the greater the number of restored surfaces, the greater the risk of failure, and the greater the high caries risk, the greater the annual rate of failure for posterior composites.^[12] Likewise, long-term observational data have shown that restorations with three or more surfaces have a higher risk of failure than single surface restorations.^[13] Such evidence is consistent with the result of this present study, which found that 82.1% of the respondents were aware of the shortened longevity of multi-surface restorations.

However, when the questionnaire examined knowledge of specific statements from the risk-factor literature that were supported by evidence, patterns of endorsement were consistent with incomplete integration of risk-factor literature. While 45.5% chose the plaque control statement and 39.9% chose all of the correct statements, only 14.7% endorsed the statement that increased age and higher DMFT are linked with increased rates of failure, and 9.6% chose "I don't know." The literature shows that caries experience and continuing disease activity are major drivers of failure, though the chronic versus age relationship between restoration failure is complex and is often mediated by caries risk, restorative burden, and other characteristics at the patient level.^[10,12] In real-world contexts, age may serve as a surrogate for cumulative restorative history and risk exposure instead of serving as an independent mechanism. The current results may indicate that the participants are most likely to be aware of clinical risk factors when presented as behavioral (plaque control) or procedural (restoration size), and that epidemiologic constructs such as DMFT may be less consistently appreciated as a surrogate of cumulative disease challenge and restorative complexity.

Practice and professional perception were the weakest areas of the overall scoring, with almost half of it being low. This is interesting given that the frequency of performing a procedure does not necessarily mean one is adept at evidence-based decision-making in the literature related to this procedure. Over half of the respondents reported that they placed three or more composite restorations in a week, but the overall score distribution was mainly low to moderate. This apparent disconnection is in line with evidence elsewhere in the wider educational literature on the lack of evidence that continuing

education and workshops produce substantial behavior change on average,^[15] and effects are differentiated by the format, interactivity, and reinforcement.^[15]

In the present study, 82.5% reported receiving CDE or training related to composite resin restorations in the past 2 years, but training was not significantly associated with the overall score category. A plausible explanation is that “CDE/training” in routine settings may be heterogeneous, ranging from didactic sessions to hands-on workshops and may prioritize new materials and techniques over structured content on failure modes, caries-risk assessment, and long-term maintenance planning.

Associations between overall proficiency and demographic/professional characteristics further support the role of clinical maturity and contextual exposure. Higher overall scores were more frequent among older participants and specialists, and the overall score was associated with region and institution type. These findings are compatible with the concept that experience and repeated exposure to restoration aging, failure diagnosis, and retreatment decisions refine clinicians’ mental models beyond initial material familiarity. International surveys on direct composite restorations have highlighted technique sensitivity and procedural challenges as persistent issues even among experienced clinicians, reinforcing the need for competency-based training that addresses each procedural step and its potential clinical consequences.^[16] Taken together, the present results suggest that while foundational awareness of composite resin is widespread, targeted education is needed to strengthen clinicians’ understanding of why restorations fail and how patient-level risks should guide prevention, monitoring, repair, or replacement.

Finally, respondents’ views on follow-up acceptability provide a clinically relevant signal about decision-making priorities. A sizeable proportion considered plaque accumulation more clinically acceptable than marginal discoloration, whereas others chose neither. Evidence-based restorative care increasingly promotes minimally invasive strategies, including repair rather than wholesale replacement when defects are localized, and the remaining restoration is serviceable. International policy statements emphasize that restoration repair should be considered case-by-case, integrating lesion activity, defect type, and patient risk profile.^[17] Empirical work also suggests that repaired restorations may have a risk of failure similar to replacement in selected circumstances, supporting repair as a tooth-preserving option within minimum intervention dentistry.^[18] From this perspective, the strong agreement (85.8%) that oral hygiene instruction and management of risk factors should be part of composite restoration education is encouraging, but the low awareness of secondary caries indicates that educational messaging should more explicitly link plaque control and caries-risk management to the dominant long-term causes of composite failure.

This study has limitations. Its cross-sectional design precludes causal inference, and findings rely on self-reported awareness and practices, which are susceptible to recall and social desirability bias. The convenience sampling approach and geographic clustering may limit generalizability to all dentists and students in Saudi Arabia. Additionally, while the scoring system enables proficiency profiling, it may not capture nuanced clinical competence or objective performance. Future work could incorporate validated knowledge tests, scenario-based decision-making, and longitudinal evaluation of educational interventions focused on failure mechanisms and risk-based maintenance.

CONCLUSION

In this sample of Saudi dental students and dentists, awareness of composite resin properties and clinical exposure were high, yet knowledge of restoration failure mechanisms, particularly secondary caries, was insufficient for many participants. Most respondents recognized key determinants of longevity, including oral hygiene and restoration size/number of surfaces, and strongly supported incorporating risk-factor management and oral-hygiene instruction into composite education. However, practice and professional perception scores were the weakest domain, and overall proficiency was most commonly low-to-moderate, despite frequent placement of composite restorations and high uptake of continuing education. Significant associations with age, professional status, region, and institution type suggest that clinical maturity and contextual experience influence proficiency. Targeted, competency-based training emphasizing failure diagnosis, caries-risk assessment, and evidence-informed follow-up decisions is recommended.

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ETHICAL APPROVAL

The study was fully explained to all participants, and it was emphasized that participation was voluntary. Written informed consent was obtained from each participant prior to enrollment. All collected information was securely stored and used exclusively for research purposes.

INFORMED CONSENT

Written informed consent was obtained from all study participants.

DATA AND MATERIALS AVAILABILITY

All data generated or analyzed during this study are included in this published article.

REFERENCES

- Miletic V, Stasic JN, Komlenic V, Petrovic R. Multifactorial analysis of optical properties, sorption, and solubility of sculptable universal composites for enamel layering upon staining in colored beverages. *J Esthet Restor Dent* 2021;33:943-52.
- Ferracane JL, Lawson NC. Probing the hierarchy of evidence to identify the best strategy for placing Class II dental composite restorations using current materials. *J Esthet Restor Dent* 2021;33:39-50.
- Awad MM, Alradan M, Alshalan N, Alqahtani A, Alhalabi F, Salem MA, *et al.* Placement of posterior composite restorations: A cross-sectional study of dental practitioners in Al-Kharj, Saudi Arabia. *Int J Environ Res Public Health* 2021;18:12408.
- Dionysopoulos D, Gerasimidou O. Wear of contemporary dental composite resin restorations: A literature review. *Restor Dent Endod* 2021;46:e18.
- Von Gehren MO, Rüttermann S, Romanos GE, Herrmann E, Gerhardt-Szép S. A 23-year observational follow-up clinical evaluation of direct posterior composite restorations. *Dent J (Basel)* 2023;11:69.
- Hasanain F, Yeslam H, Khaleefa S. Knowledge and attitude of recent dental graduates towards smart/bioactive dental composites. *J Pharm Res Int* 2021;33:34-44.
- Al Otaibi FL, Althumairy AF, Al Ahmadi BT, Alkhamis NM. Patients' preferences on different types of esthetic treatment in Saudi Arabia. *J Contemp Dent Pract* 2020;21:62-7.
- Agrawal DM, Cirigiri DS, Burande DA, Goenka DS, Aslam DB, Soni DP. Evaluation of knowledge, approach and perception of the rural population regarding amalgam and tooth-colored composite material: A questionnaire-based study. *Int J Appl Dent Sci* 2022;8:254-8.
- Staxrud F, Mulic A, Kopperud SE. Dentists' treatment decisions concerning restorations in adult patients in North Norway: A cross-sectional Tromsø 7 study. *Caries Res* 2024;59:151-62.
- Moraes RR, Cenci MS, Moura JR, Demarco FF, Loomans B, Opdam NJ. Clinical performance of resin composite restorations. *Curr Oral Health Rep* 2022;9:22-31.
- Demarco FF, Corrêa MB, Cenci MS, Moraes RR, Opdam NJ. Longevity of posterior composite restorations: Not only a matter of materials. *Dent Mater* 2012;28:87-101.
- Opdam NJ, Van De Sande FH, Bronkhorst EM, Cenci MS, Bottenberg P, Pallesen U, *et al.* Longevity of posterior composite restorations: A systematic review and meta-analysis. *J Dent Res* 2014;93:943-9.
- Da Rosa Rodolpho PA, Rodolfo B, Collares K, Corrêa MB, Demarco FF, Opdam NJ, *et al.* Clinical performance of posterior resin composite restorations after up to 33 years. *Dent Mater* 2022;38:680-8.
- Lehmann A, Nijakowski K, Jankowski J, Donnermeyer D, Ramos JC, Drobac M, *et al.* Clinical difficulties related to direct composite restorations: A multinational survey. *Int Dent J* 2025;75:797-806.
- Forsetlund L, O'Brien MA, Forsén L, Reinart LM, Barnes D, Odgaard-Jensen J, *et al.* Continuing education meetings and workshops: Effects on professional practice and healthcare outcomes. *Cochrane Database Syst Rev* 2021;2009:CD003030.
- Al-Asmar AA, Al-Rawi NH, Al-Khabbaz AK. Immediate composite restoration failure: A retrospective study. *Open Dent J* 2023;17:e187421062304181.
- FDI World Dental Federation. Repair of Restorations: Minimal Intervention Dentistry; 2019. Available from: https://www.fdiworlddental.org/sites/default/files/2020-11/fdi_world_dental_federation_-_repair_of_restorations_-_2019-10-22.pdf [Last accessed on 2026 Jul 28].
- Mendes LT, Pedrotti D, Casagrande L, Lenzi TL. Risk of failure of repaired versus replaced defective direct restorations in permanent teeth: A systematic review and meta-analysis. *Clin Oral Investig* 2022;26:4917-27.

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