Original Article

Current Trends in Placing Posterior Composite Restorations: Perspectives from Palestinian General Dentists: A Questionnair Study

Naji Ziad Arandi

Department of Conservative Dentistry, Faculty of Dentistry, Arab American University, Jenin, Palestine

ABSTRACT

Aim: The success of composite restorations relies on material selection and practitioner-related factors that shape the overall outcome. This study explores the practices of Palestinian general dental practitioners in placing posterior composites, examining the impact of work sector, experience, and gender on their choices. **Materials and Methods:** The study was conducted as an online cross-sectional questionnaire and involved 351 participants, with a response rate of 69.8%. The survey comprised 18 closed-ended questions covering demographics, material selection, and composite placement in special cases, techniques, and factors influencing the choices. Statistical analyses included descriptive statistics, chi-squared tests, and Fisher's exact tests. **Results:** Composite was the predominant choice for small-size (83.7%) and large-size posterior cavities (60.4%). Practitioners commonly opted for composite restorations in cases involving occlusal parafunctional activity (60%), poor oral hygiene (78%), and subgingival cavities (72.2%). Only 19.6% and 5.3% reported occlusal and gingival beveling, respectively. Rubber dams for isolation stood at 30%, one-step self-etch adhesives at 44.9%, and the oblique layering technique at 51%. Light-emitting diode curing units were popular (97.55%), but monitoring output with a radiometer was infrequent (93.5%). Tofflemire metal matrix usage was 46.1%, whereas a sectional matrix system was employed by 29.8%. A 2 mm layer exposure to light curing for 20 s was reported by 62%, and 27.75% utilized additional light-curing postmatrix band removal. **Conclusion:** The study highlights the need for Palestinian dental professionals to update their clinical approaches in placing composite restorations in posterior teeth. Gender, work sector, and experience influence practitioners' choices, emphasizing the importance of tailored continuing education programs for improving clinical practices.

Keywords: *Composite resin, dental practitioners, posterior restorations*

Received : 15-Oct-2023
Revised : 25-Jan-2024
Accepted : 29-Jan-2024
Published: 29-Apr-2024

Introduction

Restorative dentistry primarily focuses on treating carious or fractured teeth to restore their structure, function, and aesthetics, with the restorative treatment of dental caries in posterior teeth constituting the primary daily workload for most general dental practitioners.[1,2]

Advancements in dental materials and techniques have changed how dentists approach restorative dentistry.[3] Adhesive dentistry led to a paradigm shift in dental

Access this article online

Quick Response Code:

Website: https://journals.lww.com/jpcd

DOI: 10.4103/jispcd.jispcd_157_23

Address for correspondence: Dr. Naji Ziad Arandi, Department of Conservative Dentistry, Faculty of Dentistry, Arab American University, P.O. Box 240, 13 Zababdeh, Jenin, Palestine. E-mail: naji.arandi@aaup.edu

How to cite this article: Arandi NZ. Current trends in placing posterior composite restorations: Perspectives from Palestinian general dentists: A questionnair study. J Int Soc Prevent Communit Dent 2024;14:112-20.

practice by allowing dentists to perform minimally invasive procedures, preserve tooth structure, and achieve superior aesthetic outcomes.[4,5] Composite has emerged as a favored choice for posterior restorations over traditional amalgam due to its enhanced esthetics and improved mechanical properties.[6,7] The shift towards using composite for posterior restorations is also influenced by growing concerns regarding amalgam's potential health and environmental risks. Amalgam restorations contain mercury, a substance known for its toxicity and environmental impact. While the dental community has long debated the safety of amalgam, the trend is moving towards more environmentally friendly and biocompatible materials.[8-10] As a result, resin composite, which does not contain mercury and poses minimal health and environmental risks, is gaining prominence as a safer and more socially responsible choice for dental restorations.

Nonetheless, the survival rate of composite restorations involves a complex interplay of factors beyond just the material used; it encompasses a multifactorial process in which operator-related and patient-related elements are combined with technical aspects.[11-13] Understanding the clinical technique of posterior composite restorations contributes significantly to achieving successful outcomes regarding functional durability, esthetic integration, and long-term patient satisfaction.[2,14]

While many international dental schools predominantly emphasize training dental students in placing posterior composite restorations,[15-17] several studies report that general practitioners and clinicians still have apprehensions and misconceptions regarding applying composite resins in posterior restorations.[18-22] Hence, it becomes imperative to ensure that dental practitioners continuously understand and adopt novel restorative materials and techniques as they emerge.

Several studies investigated the clinical practices of general dentists in performing posterior composite restorations, highlighting key findings and the trends and challenges in this field.[18,19,23-27] These studies highlight that variations persist in material selection, handling, adhesive protocols, and clinical techniques despite the growing adoption of adhesive techniques and composite materials. Moreover, these investigations emphasize the significance of continuing education, practical training, and staying updated with advancements in restorative dentistry.

Interestingly, no investigations have assessed the knowledge and practice of general dental practitioners in Palestine concerning the placement of posterior composite restorations. This study, therefore, sought to investigate the practice related to the placement of posterior composites among general dental practitioners in Palestine while also exploring whether factors, such as the nature of their practice, years of experience, and gender influence their preferences.

Materials and Methods

Setting and design

This cross-sectional study was conducted in Palestine from January to March 2023. Participants were recruited from the approximately 4000 registered dental practitioners based on records from the Palestinian Dental Association in 2022. Data collection utilized an online questionnaire via Google Forms, comprising 18 closed-ended questions focused on the placement of posterior direct composite restorations in occlusal class I and II cases. The questionnaire was distributed to general dentists through dental-related social media groups and individual channels.

Ethical approval and informed consent

This study received ethical approval from the Institutional Review Board at the Arab American University in Palestine (2022/A/1/N) and was conducted following the Declaration of Helsinki guidelines. The questionnaire was accompanied by a cover letter explaining the study's objectives, the voluntary and anonymous nature of participation, and the confidential handling of the collected data. All participants were duly informed that, by clicking "Submit," they were providing their consent to take part in the study.

Sampling criteria

All actively practicing general practitioners in Palestine were invited to participate in this study. The questionnaire was shared with the participants through dental-related social media groups and individual distribution. The sample size of 351 was determined using the Raosoft.com sample size calculator, with a 95% confidence interval and a 5% margin of error.

Data collection

The questionnaire, adapted from a previously published study,[23] underwent a pilot study involving 20 general practitioners not part of the final survey to verify its clarity and simplicity. After evaluating the responses, the questionnaire was finalized, introducing the study's background, objectives, voluntary participation, confidentiality, anonymity, instructions, and a consent statement. Participation in the survey indicated agreement with the consent statement. The questionnaire comprised 18 closed-ended questions regarding the placement of posterior

direct composite restorations in occlusal class I and II cases. It was divided into four sections: The first section included information about the demographics (Questions 1–3), the second section included questions about material selection and composite placement in special cases (Questions 4–8), the third part of the questionnaire included questions about the use of composite use in specific situations (Questions 9–10), and in the final part of the questionnaire, participants were questioned about their techniques for posterior composite restoration (Questions 11–18).

Statistical analysis

Data analysis was performed using the IBM SPSS Statistics, version 28 (IBM, Armonk, New York, USA), with descriptive statistics presented as frequency and percentage. Statistical associations among dentists' demographic characteristics were examined using the chi-square test, with Fisher's exact test used for table cell counts less than 5. P value < 0.05 was considered statistically significant.

Results

The survey included 245 dental professionals, with a participation rate of 69.8%. Of these, 52 (21.22%) had less than 5 years of experience, whereas 100 (40.8%) had 5–19 years of experience, and 93 (38%) had over 10 years of experience. Thirty-three respondents worked in public dental clinics, whereas 212 (86.53%) worked in the private sector. Table 1 shows the distribution of respondents according to gender, work sector, and years of experience.

Composite was the preferred material for direct posterior restorations, with 83.7% using it for small-size one- or two-surface cavities and 60.4% for large cavities involving three or more tooth surfaces. It was commonly used for patients with parafunctional activity (60%), poor oral hygiene (78%), and cavities with subgingival margins (72.2%). Table 2 shows the selection preference of restorative material and placement of composite in special cases according to gender, practice type, and years of experience.

Only 19.6% and 5.3% of practitioners reported beveling occlusal and gingival margins, respectively. Specifications of the cavity preparation for posterior composite restorations are shown in Table 3.

Rubber dam usage was reported by 29.8% of participants. The one-step self-etch adhesive approach was used by 44.9%, and the oblique layering technique was employed by 51%. Around 62% indicated that they exposed a 2 mm composite layer (increment) to light curing for 20 s. Light-emitting diode (LED) curing units were used by 97.55%, and 6.53% regularly assessed their light-curing units with a radiometer. Additional light-curing intervals after removing the metal matrix band were employed by 27.75% of practitioners. For restoring proximal contact with posterior composite restorations, 46.1% used a Tofflemire metal matrix system, whereas 29.8% and 21.63% opted for sectional or preformed circumferential matrix systems, respectively. Table 4 provides an overview of the restorative techniques employed for placing posterior composite restorations based on factors like gender, sector, and experience level.

Discussion

The assessment of trends in posterior composite placement is crucial for the advancement of dental education and practice. This analysis informs curriculum development and continuous dental education and propels research in restorative dentistry. Standardized operative approaches for posterior composites contribute to procedural harmonization, benefiting clinicians and patients through consistent protocols.

The increasing preference for composite materials in posterior teeth restorations reflects a significant shift driven by material advancements, heightened esthetic expectations, and a preference for minimally invasive treatments. In this study, composite resin emerged as the predominant choice, aligning with global trends reported in studies from various countries.[7,19,28-31]

Composite restorations have shown favorable performance in posterior teeth, with 1%–3% annual

Table 1: Distribution of respondents according to gender, work sector, and years of experience

Gender	Sector				Years of experience						Total
	Public		Private		0–5 years		6–9 years		More than 10 years		
	Number	%	Number	%	Number	%	Number	%	Number	%	
Male	19	20.2	75	79.8	15	16	33	35.1	46	48.9	94 (38.36)
Female	14	9.3	137	90.7	37	24.5	67	44.4	47	31.1	151 (61.63)
	33	13.5	212	86.5	52	21.22	100	40.81	93	37.96	245

Table 2: The selection preference of restorative material and placement of composite in special cases according to gender, practice type, and years of experience

Questions			Gender			Practice sector			Years of experience			
			Male	Female	*P* value	Public 33	Private 212	*P* value	0–5 years	6–9 years	>10 years	*P* value
Which material do often you use in a posterior small cavity (one or two surfaces)?	Amalgam	40 (16.3%)	27 (28.7)	13 (8.6)		10 (30.3)	30 (14.2)		5 (9.6)	27 (27.0)	8 (8.6)	
	Composite	205 (83.7%)	67 (71.3)	138 (91.4)	<0.001	23 (69.7)	182 (85.8)	0.020	47 (90.4)	73 (73.0)	85 (91.4)	0.001
	RMGI	0	0	0		0	0		0	0	0	
Which material do you often use in a posterior large cavity (three or more surfaces)?	Amalgam	95 (38.7%)	54 (57.4)	41 (27.2)		15 (45.5)	80 (37.7)		14 (29.9)	41 (41.0)	40 (43.0)	
	Composite	148 (60.4%)	40 (42.6)	108 (71.5)		18 (54.5)	130 (61.3)		38 (73.1)	57 (57.0)	53 (57.0)	
	Indirect Restoration	2 (0.9%)	0	2 (1.3)	<0.001	0	2 (0.9)	0.586	0	2 (2.0)	0	0.127
Do you often place direct posterior composite restorations in patients with oral parafunctional activity?	Yes	147 (60%)	52 (55.3)	95 (62.9)		11 (33.3)	136 (64.2)		32 (61.5)	81 (81.0)	34 (36.6)	
	No	98 (40%)	42 (44.7)	56 (37.1)	0.238	22 (66.7)	76 (35.8)	0.001	20 (38.5)	19 (19.0)	59 (63.4)	<0.001
Do you often place direct posterior composite restorations in patients with poor oral hygiene?	Yes	191 (78%)	45 (47.9)	146 (96.7)		16 (48.5)	175 (82.5)		50 (96.2)	84 (84.0)	57 (31.3)	
	No	54 (22%)	49 (52.1)	5 (3.3)	<0.001	17 (51.5)	37 (17.5)	<0.001	2 (3.8)	16 (16.0)	36 (38.7)	<0.001
Do you often place direct posterior composite restorations in posterior cavities with 1–2 mm subgingival margins?	Yes	177 (72.2)%	46 (78.9)	131 (86.8)		16 (48.5)	161 (75.9)		41 (78.8)	87 (87.0)	49 (52.7)	
	No	68 (27.8%)	48 (51.1)	20 (13.2)	<0.001	17 (51.5)	51 (24.1)	0.001	11 (21.2)	13 (13.0)	44 (47.3)	<0.001

Table 3: Comparison between dental practitioners according to gender, workplace, and experience about the specifications of the cavity preparation for posterior composite restorations

Questions			Gender			Practice sector			Years of experience			
			Male	Female	*P* value	Public 33	Private 212	*P* value	0–5 years	6–9 years	>10 years	*P* value
Do you bevel the occlusal margins of the cavity?	Yes	48 (19.6%)	20 (21.3)	28 (18.5)		10 (30.3)	38 (17.9)		20 (38.5)	21 (21.0)	7 (7.5)	
	No	197 (80.4%)	74 (78.7)	123 (81.5)	0.600	23 (69.7)	174 (82.1)	0.051	32 (61.5)	74 (74.0)	86 (92.5)	<0.001
Do you bevel the gingival margin of the cavity?	Yes	13 (5.3%)	2 (2.1)	11 (7.3)		5 (15.2)	8 (3.8)		7 (13.5)	4 (4.0)	2 (2.2)	
	No	232 (94.7%)	92 (97.9)	140 (92.7)	0.140	28 (84.8)	204 (96.2)	0.007	45 (86.5)	96 (96.0)	91 (97.8)	0.021

Table 4: Comparison between dental practitioners according to gender, workplace, and experience about the restorative technique applied during the placement of posterior composite restorations

Questions			Gender			Practice sector			Years of experience			
			Male	Female	*P* value	Public	Private	*P* value	0–5 years	6–9 years	>10 years	*P* value
How often do you achieve the operative field isolation?	Rubber dam	73 (29.8%)	31 (33)	42 (27.8)		6 (18.2)	67 (31.6)		14 (26.9)	30 (30)	29 (31.2)	
	Cotton rolls and intraoral suction	172 (70.2%)	63 (67)	109 (72.2)	0.390	27 (81.8)	145 (68.4)	0.117	38 (73.1)	70 (70)	64 (68.8)	0.864
	Other	0	0 (0)	0 (0)		0 (0)	0 (0)		0 (0)	0 (0)	0 (0)	
Which adhesive strategy do you use more often?	Two-step etch-and-rinse adhesives	76 (31%)	30 (31.9%)	46 (30.5)		17 (51.5)	59 (27.8)		8 (15.4)	53 (53)	15 (16.1)	
	One-step self-etch adhesive	110 (44.9%)	45 (47.9%)	65 (43)		16 (48.5)	94 (44.3)		26 (50)	25 (25)	59 (63.4)	
	Two-step self-etch adhesives	14 (5.7%)	2 (2.1%)	12 (7.9)		0 (0)	14 (6.6)		4 (7.7)	7 (7)	3 (3.2)	
	Universal adhesives	45 (18.4%)	17 (18.1%)	28 (18.5)	0.297	0 (0)	45 (21.2)	0.001	14 (26.9)	15 (15)	16 (17.2)	<0.001
Which placement technique do you often apply for the placement of composite restorations?	Horizontal layering	43 (17.5%)	24 (25.5%)	20 (13.2)		12 (36.4)	32 (15.1)		19 (36.5)	14 (14)	11 (11.8)	
	Oblique layering	125 (51%)	38 (40.4%)	86 (57)		4 (12.1)	120 (56.6)		27 (51.9)	51 (51)	46 (49.5)	
	Bulk-fill	77 (31.5%)	32 (34%)	45 (29.8)	0.016	17 (51.5)	60 (28.3)	<0.001	6 (11.5)	35 (35)	36 (38.7)	<0.001
Which light-curing unit do you often use to light-cure posterior restorations?	QTH	6 (2.45%)	4 (4.3)	2 (1.3)		5 (15.2)	1 (0.5)		0 (0)	1 (1)	5 (5.4)	
	LED	239 (97.6%)	90 (95.7)	149 (98.7)	0.207	28 (84.8)	211 (99.5)	<0.001	52 (100)	99 (99)	88 (94.6)	0.108
	Other	0 (0)	0 (0)		0 (0)	0 (0)		0 (0)	0 (0)	0 (0)	0 (0)	
Do you regularly monitor the output of the light-curing unit with a radiometer?	Yes	16 (6.53)	8 (8.5)	8 (5.3)		2 (6.1)	14 (6.6)		4 (7.7)	9 (9)	3 (3.2)	
	No	229 (93.5%)	86 (91.5)	143 (94.7)	0.322	31 (93.9)	188 (88.7)	1.000	48 (92.3)	91 (91)	90 (96.8)	0.222
How long do you light-cure composite increments of 2 mm thickness?	10 s	0	0 (0)	0 (0)		0 (0)	0 (0)		0 (0)	0 (0)	0 (0)	
	15 s	7 (2.9%)	2 (2.1)	5 (3.3)		2 (6.1)	5 (2.4)		2 (3.8)	3 (3)	2 (2.2)	
	20 s	151 (61.6%)	52 (55.3)	99 (65.6)		2 (6.1)	149 (70.3)		26 (50)	47 (47)	78 (83.9)	
	40 s	87 (35.5%)	40 (42.6)	47 (31.1)	0.199	29 (87.9)	60 (28.3)	0.21	24 (46.2)	50 (50)	13 (14)	<0.001
For class II composite restorations, after removal of the matrix band, do you often perform additional light-curing from the buccal and lingual directions?	Yes	68 (27.7%)	36 (38.3)	32 (21.2)		20 (60.6)	48 (22.6)		16 (30.8)	24 (24)	28 (30.1)	
	No	177 (72.3%)	58 (61.7)	119 (78.8)	0.004	13 (39.4)	164 (77.4)	<0.001	36 (69.2)	76 (76)	65 (69.9)	0.550
Which matrix system do you often use to restore the proximal contact with composite restoration?	Sectional matrix	74 (30.2)	27 (28.7)	47 (31.1)		3 (9.1)	71 (33.5)		12 (23.1)	42 (42)	20 (21.5)	
	Tofflemire matrix	114 (46.5)	34 (36.2)	80 (53)		25 (75.8)	89 (42)		21 (40.4)	37 (37)	56 (60.2)	
	Preformed circumferential matrix	53 (21.6)	32 (34)	21 (13.9)		5 (15.2)	48 (22.6)		17 (32.7)	20 (20)	16 (17.2)	
	Other	4 (1.6)	1 (1.1)	3 (2)	0.001	0 (0)	4 (1.9)	0.003	2 (3.8)	1 (1)	1 (1.1)	0.002

LED = light-emitting diode QTH = quartz–tungsten–halogen

failure rates.[11,32,33] However, the risk of failure increases with restoration size, number of restored surfaces, and caries prevalence, making composites less suitable for extensive posterior restorations.[11,34-36] Despite this, around 60% of participants in this study chose composite restorations for cavities with three or more surfaces, possibly influenced by aesthetic considerations and the availability of high-quality materials.

Patient-related factors, such as parafunctional habits and oral hygiene status, can influence the durability of composite restorations.[37-39] Despite recommendations to avoid composites in patients with parafunctional activity or high caries risk, many practitioners in this study still used them.[20,34,38-40] This discrepancy in adherence to evidence-based practices underscores the need for improved awareness and education. Additionally, many respondents did not consider subgingival margins a contraindication for direct composites. Subgingival margins pose challenges due to poor enamel quality, limited access, difficulty placing the rubber dam, and subsequent fluid leakage. Alternative approaches have been proposed, such as deep margin elevation and indirect restorations.[41]

Gender played a role in material selection, with more females favoring composites, especially in cases of poor oral hygiene or subgingival margins. Private sector practitioners exhibited greater autonomy in material selection, favoring composite placements in various scenarios. Experience levels also influenced material preferences, with newer and more experienced dentists displaying different selection patterns.

The occlusal and gingival cavosurface angles in posterior composite restorations require careful consideration to ensure optimal outcomes. Avoiding beveling on the occlusal cavosurface angle is crucial to preventing the fracture of thin restoration margins under occlusal loads, reducing the risk of cavosurface margin staining and maintaining marginal integrity.[42-45] Similarly, beveling on the gingival cavosurface angle should be avoided, as it may lead to the complete removal of remaining enamel, posing challenges to achieving good marginal adaptation.[43,45,46] Many respondents avoid utilizing beveling at the cavosurface angles for posterior cavities, possibly influenced by literature, guidelines, and professional consensus.[44,46] Experience levels play a role, with a decrease in beveling utilization as practitioners gain more experience, reflecting the evolution of clinical strategies and priorities throughout their careers.

Proper isolation is crucial for posterior composite restorations, whereas rubber dams are effective, alternatives like cotton rolls and matrix bands can yield similar survival rates.[47,48] Limited patient acceptance, extended appointment durations, and operator preference may contribute to the low adoption of rubber dams.[49,50] In the present study, only 29.8% reported using a rubber dam to isolate the operative field, whereas 70.2% opted for cotton rolls and intraoral suction. These findings align with previous studies, which also revealed low rates of rubber dam usage among general dentists.[18-20,51,52]

In general, the selection of bonding agents for posterior composites varies among practitioners.[18,22,23,27,53,54] One-step self-etch adhesives, despite their drawbacks,[55] are preferred by a considerable percentage of respondents, likely due to a trend toward simpler materials. The choice of bonding agents in the present study may reflect the desire for user-friendly materials and techniques.

Various restorative techniques aim to reduce polymerization shrinkage effects. The incremental layering technique, especially oblique layering, is commonly employed, which suggests that a substantial portion of the dentists in the study are well-informed about managing polymerization shrinkage stress.[56-59]

Due to the limited depth of cure in composites, a 2 mm incremental layering technique is recommended, with a standard 20-s exposure time for curing a light shade to 2–2.5 mm. Challenges in positioning the light guide close to the restoration surface often necessitate extending the exposure time to 40 s for a more thorough cure at all depths.[60,61] In our study, 61.6% used a 20-s duration for a 2 mm layer, whereas 35.5% opted for a 40-s cure. Haridy *et al*.[62] found that only 25% of the participants used a 40-s time, with 12.8% and 4.5% choosing 30 and 10 s, respectively.

Proper light curing is crucial for the effective polymerization of composites, as inadequate polymerization can adversely affect resin properties. Various light-curing units are available, including quartz–tungsten–halogen (QTH), plasma arc curing, LED, and argon laser. In our study, 97.55% of participants preferred LED units, possibly due to their portability and efficiency, consistent with previous research.[23,62,63] This preference contrasts with the findings of Al-Senan *et al*.[64]who reported that only 36.9% favored LED units.

Light quality diminishes over time due to heat, bulb deterioration, resin remnants, and sterilization challenges.[64] It is crucial to use a radiometer to regularly assess the intensity of a light-curing unit to ensure the quality of restorative procedures. Regular radiometer use to assess light intensity was reported by only 7%, consistent with previous studies.[23,64,65]

Extra buccal and lingual light-curing is crucial for complex cases, but 27.7% engage in this practice. This indicates a limited understanding of factors affecting light penetration and effectiveness, contrary to a prior study reporting 65.9% implementing additional light-curing.[23]

A suitable matrix system is essential for achieving ideal contact points in proximal composite restorations.[66] While circumferential matrix systems, typically preferred for amalgam restorations, may result in flat proximal surfaces and shifting of contact areas when used with composites, employing a sectional matrix band with a separation ring offers a reliable method for achieving desired proximal contacts.[67] Our study shows 46.5% using Tofflemire matrices and 21.6% using preformed circumferential matrices. This trend, driven by factors like cost-effectiveness and familiarity, aligns with previous research emphasizing the impact of matrix system choice on composite restoration effectiveness.[18,23,68]

Gender differences in dental practices were not observed using rubber dams, light-curing devices, radiometric monitoring, curing duration, adhesive strategies, or sectional matrices. Males favored horizontal layering and preformed circumferential matrices, whereas females preferred oblique layering and Tofflemire matrices.

Private and public sector practitioners differed in the bonding agents they opted for, the filling techniques, and the matrix choices. Private practitioners leaned towards LED units, whereas public practitioners favored bulk-fill and Tofflemire matrices.

Experience levels influenced bonding methods, adhesive choices, layering techniques, and curing durations. Dentists with ten or more years of experience preferred the 20-s cure time and Tofflemire matrices. Dentists with 6–9 years of clinical experience favored sectional matrices and the oblique technique. Dentists with 0–5 years of experience preferred one-step self-etch adhesives and preferred circumferential matrices. However, the experience level did not correlate with variations in the use of additional light-curing from buccal and lingual directions in class II composite restorations.

Caution should be exercised when interpreting this study's findings due to methodological limitations. Being a self-reported questionnaire, responses were subjective and may not accurately reflect respondents' knowledge and practices. Additionally, the 69.8% response rate may limit the generalizability to all Palestinian dentists. Future studies should prioritize larger sample sizes to enhance statistical robustness and overcome response rate limitations. Despite these constraints, this study serves as an initial exploration, laying the groundwork for more comprehensive investigations. Therefore, while valuable as a starting point, caution is advised when extrapolating its findings to a broader context.

Conclusion

The study underscores the need for Palestinian dental professionals to reassess and update their clinical approaches in placing composite restorations in posterior teeth. The findings highlight the influence of gender, work sector, and years of experience on practitioners' choices, emphasizing the importance of tailored continuing education programs to enhance clinical practices.

Acknowledgement

Not applicable.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

Authors contributions

All Authors have contributed equally in presented research.

Ethical policy and Institutional Review Board statement

Ethical approval was obtained from the Institutional Review Board at the Arab American University, Palestine (2022/A/1/N).

Patient declaration of consent

Not applicable.

Data availability statement

Not applicable.

References

1. Cardoso J, Almeida P, Negrao R, Oliveira J, Venuti P, Taveira T, *et al.* Clinical guidelines for posterior restorations based on coverage, adhesion, resistance, esthetics, and subgingival management The CARES concept: Part I – Partial adhesive restorations. Int J Esthet Dent 2023;18:244-65.
2. O´Connor C, Gavriil D. Predictable bonding of adhesive indirect restorations: Factors for success. Br Dent J 2021;231:287-93.
3. Desai H, Stewart CA, Finer Y. Minimally invasive therapies for the management of dental caries—A literature review. Dent J 2021;9:147-27.
4. Alyahya Y. A narrative review of minimally invasive techniques in restorative dentistry. Saudi Dent J 2023. Doi: 10.1016/j.sdentj.2023.11.005.
5. Perdigão J. Current perspectives on dental adhesion: (1) Dentin adhesion – Not there yet. Jpn Dent Sci Rev 2020;56:190-207.
6. Al-Asmar AA, Al-Khatib KM, Al-Amad TZ, Sawair FA. Has the implementation of the Minamata Convention had an

impact on the practice of operative dentistry in Jordan? J Int Med Res 2019;47:361-9.
7. Rabi T, Arandi NZ. Restorative treatment decisions regarding approximal and occlusal carious lesions among general dental practitioners in Palestine. Brazilian J Oral Sci. 2021;20:e212755-11.
8. Alexander G, Hopcraft MS, Tyas MJ, Wong RHK. Dentists' restorative decision-making and implications for an "amalgamless" profession. Part 1: A review. Aust Dent J 2014;59:408-19.
9. Alexander G, Hopcraft MS, Tyas MJ, Wong RHK. Dentists' restorative decision-making and implications for an "amalgamless" profession. Part 3: Dentists' attitudes. Aust Dent J 2016;61: 502-13.
10. Alexander G, Hopcraft MS, Tyas MJ, Wong RHK. Dentists' restorative decision-making and implications for an "amalgamless" profession. Part 2: A qualitative study. Aust Dent J 2014;59:420-31.
11. Opdam NJM, van de Sande FH, Bronkhorst E, 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.
12. De Andrade AKM, Duarte RM, Medeiros e Silva FDSC, Batista AUD, Lima KC, De Melo Monteiro GQ, *et al*. Resin composite class I restorations: A 54-month randomized clinical trial. Oper Dent 2014;39:588-94.
13. Opdam NJM, Collares K, Hickel R, Bayne SC, Loomans BA, Cenci MS, *et al*. Clinical studies in restorative dentistry: New directions and new demands. Dent Mater 2018;34:1-12.
14. Zhao Z, Wang Q, Zhao J, Zhao B, Ma Z, Zhang C. Adhesion of teeth. Front Mater 2021;7:1-11.
15. Loch C, Liaw Y, Metussin AP, Lynch CD, Wilson N, Blum IR, *et al*. The teaching of posterior composites: A survey of dental schools in Oceania. J Dent 2019;84:36-43.
16. Sidhu P, Sultan OS, Math SY, Malik NA, Wilson NHF, Lynch CD, *et al*. Current and future trends in the teaching of direct posterior resin composites in Malaysian dental schools: A cross-sectional study. J Dent 2021;110:1-6.
17. Kanzow P, Büttcher AF, Wilson NHF, Lynch CD, Blum IR. Contemporary teaching of posterior composites at dental schools in Austria, Germany, and Switzerland. J Dent 2020;96:1-6.
18. Gilmour ASM, Latif M, Addy LD, Lynch CD. Placement of posterior composite restorations in United Kingdom dental practices: Techniques, problems, and attitudes. Int Dent J 2009;59:148-54.
19. Nascimento GG, Correa MB, Opdam N, Demarco FF. Do clinical experience time and postgraduate training influence the choice of materials for posterior restorations? Results of a survey with Brazilian general dentists. Braz Dent J 2013;24:642-6.
20. Awad MM, Salem WS, Almuhaizaa M, Aljeaidi Z. Contemporary teaching of direct posterior composite restorations in Saudi dental schools. Saudi J Dent Res 2017;8:42-51.
21. Naz F, Khan S, Chatha M, Tariq U. Trends for choosing composites for posterior restorations by the dentists in Lahore. Pakistan Oral Dent J 2012;32:508-12.
22. Arandi NZ, Thabet M. Knowledge and attitudes of dentists toward adhesive system selection: A cross-sectional study from Palestine. J Int Soc Prev Community Dent 2020;10:107-15.
23. 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;18:12408-14.
24. Akbar I. Knowledge and attitudes of general dental practitioners towards posterior composite restorations in northern Saudi Arabia. J Clin Diagnostic Res 2015;9:61-4.
25. Ali S, Iqbal K, Asmat M, Farooq I, Khan AM, Alam MK. Dental resin composite restoration practices amongst general dental practitioners of Karachi, Pakistan. World J Dent 2019;10:129-34.
26. Aziz AAAA, Ahmad AA, Jaafar A, Mohammad N, Al-Kadhim AHA. Posterior restoration selection among general dental practices in Malaysia: A preliminary study. IIUM Med J Malaysia 2019;18:53-8.
27. Alsheikh R, Almulhim KS, Abdulkader M, Haridy R, Bugshan AS, Aldamanhouri R, *et al*. Toward a clinically reliable Class II resin composite restoration: A cross-sectional study into the current clinical practice among dentists in Saudi Arabia. Int J Dent 2022;2022:1-8.
28. Doméjean S, Léger S, Maltrait M, Espelid I, Tveit AB, Tubert-Jeannin S. Changes in occlusal caries lesion management in France from 2002 to 2012: A persistent gap between evidence and clinical practice. Caries Res 2015;49:408-16.
29. Chana P, Orlans MC, O'Toole S, Domejean S, Movahedi S, Banerjee A. Restorative intervention thresholds and treatment decisions of general dental practitioners in London. Br Dent J 2019;227:727-32.
30. Khalaf ME, Alomari QD, Ngo H, Doméjean S. Restorative treatment thresholds: Factors influencing the treatment thresholds and modalities of general dentists in Kuwait. Med Princ Pract 2014;23:357-62.
31. Suliman A, Abdo A, Elmasmari H. Restorative treatment decisions on approximal caries among practicing dentists in the College of Dentistry Clinics, Ajman University, United Arab Emirates. Open Dent J 2020;14:97-102.
32. Demarco FF, Collares K, Correa MB, Cenci MS, de Moraes RR, Opdamz NJ. Should my composite restorations last forever? Why are they failing? Braz Oral Res 2017;31:92-9.
33. Moraschini V, Fai CK, Alto RM, Dos Santos GO. Amalgam and resin composite longevity of posterior restorations: A systematic review and meta-analysis. J Dent 2015;43:1043-50.
34. Demarco FF, Cenci MS, Montagner AF, de Lima VP, Correa MB, Moraes RR, *et al*. Longevity of composite restorations is definitely not only about materials. Dent Mater 2023;39:1-12.
35. da Rosa Rodolpho PA, Cenci MS, Donassollo TA, Loguércio AD, Demarco FF. A clinical evaluation of posterior composite restorations: 17-year findings. J Dent 2006;34:427-35.
36. Montagner AF, van de Sande FH, Müller C, Cenci MS, Susin AH. Survival, reasons for failure and clinical characteristics of anterior/ posterior composites: 8-year findings. Braz Dent J 2018;29:547-54.
37. Pallesen U, Van Dijken JWV. A randomized controlled 27 years follow up of three resin composites in Class II restorations. J Dent 2015;43:1547-58.
38. Van de Sande FH, Opdam NJ, da Rosa Rodolpho PA, Correa MB, Demarco FF, Cenci MS. Patient risk factors– Influence on survival of posterior composites. J Dent Res 2013;92: S78-83.
39. Laske M, Opdam NJM, Bronkhorst EM, Braspenning JCC, Huysmans MCDNJM. Risk factors for dental restoration survival: A practice-based study. J Dent Res 2019;98:414-22.
40. Kubo S. Longevity of resin composite restorations. Jpn Dent Sci Rev 2011;47:43-55.

41. Samartzi TK, Papalexopoulos D, Ntovas P, Rahiotis C, Blatz MB. Deep margin elevation: A literature review. Dent J 2022;10:48-17.
42. Soliman S, Preidl R, Karl S, Hofmann N, Krastl G, Klaiber B. Influence of cavity margin design and restorative material on marginal quality and seal of extended Class II resin composite restorations in vitro. J Adhes Dent 2016;18:7-16.
43. Heymann H, Swift EJ, Ritter AV, Sturdevant CM. Sturdevant's Art and Science of Operative Dentistry. USA, Missouri: Elsevier/Mosby; 2013. p.548.
44. Lynch CD, Shortall AC, Stewardson D, Tomson PL, Burke FJT. Teaching posterior composite resin restorations in the United Kingdom and Ireland: Consensus views of teachers. Br Dent J 2007;203:183-7.
45. Torres CRG. Modern Operative Dentistry: Principles for Clinical Practice. [Internet]. Switzerland AG: Springer; 2020.
46. Lynch CD, Opdam NJ, Hickel R, Brunton PA, Gurgan S, Kakaboura A, *et al*; Academy of Operative Dentistry European Section. Guidance on posterior resin composites: Academy of Operative Dentistry European Section. J Dent 2014;42:377-83.
47. Miao C, Yang X, Wong MCM, Zou J, Zhou X, Li C, *et al*. Rubber dam isolation for restorative treatment in dental patients. Cochrane Database Syst Rev 2021;2021:1-42.
48. Olegário IC, Moro BLP, Tedesco TK, Freitas RD, Pássaro AL, Garbim JR, *et al*. Use of rubber dam versus cotton roll isolation on composite resin restorations' survival in primary molars: 2-year results from a non-inferiority clinical trial. BMC Oral Health 2022;22:1-13.
49. Boreak N, Hanbashi A, Otayf H, Alshawkani H, Mashyakhy M, Chourasia H. Dentist's attitudes, practice, and barriers toward the use of rubber dam during operative and endodontic treatments: An online questionnaire survey. World J Dent 2021;12:306-10.
50. Awooda EM, Alwan MS. Knowledge, attitudes and practice of rubber dam use among dentists working in private clinics in Khartoum City. Saudi J Oral Dent Res 2016;1:19-23.
51. Abraham S, Ali Mahmoud AW, Danielle Q, Istarabadi A, Rahman B. Attitudes towards use of rubber dam in private practices in the United Arab Emirates. Saudi Endod J 2012;2:142-6.
52. Ali AlQarni M. A survey on usage of rubber dam during composite restorative procedures by general and specialist dental practitioners in Saudi Arabia. J Orofac Res 2013;3:1-43.
53. Lynch CD, Farnel DJJ, Stanton H, Chestnutt IG, Brunton PA, Wilson NHF. No more amalgams: Use of amalgam and amalgam alternative materials in primary dental care. Br Dent J 2018;225:171-6.
54. Blum IR, Younis N, Wilson NHF. Use of lining materials under posterior resin composite restorations in the UK. J Dent 2017;57:66-72.
55. Arandi NZ. The classification and selection of adhesive agents; An overview for the general dentist. Clin Cosmet Investig Dent 2023;15:165-80.
56. Chandrasekhar V, Rudrapati L, Badami V, Tummala M. Incremental techniques in direct composite restoration. J Conserv Dent 2017;20:386-91.
57. Somani R, Som NK, Jaidka S, Hussain S. Comparative evaluation of microleakage in various placement techniques of composite restoration: An in vitro study. Int J Clin Pediatr Dent 2020;13:264-8.
58. Chisnoiu AM, Moldovan M, Sarosi C, Chisnoiu RM, Rotaru DI, Delean AG, *et al*. Marginal adaptation assessment for two composite layering techniques using dye penetration, AFM, SEM and FTIR: An in-vitro comparative study. Appl Sci 2021;11:5657-14.
59. Baig MM, Mustafa M, Al Jeaidi ZA, Al-Muhaiza M. Microleakage evaluation in restorations using different resin composite insertion techniques and liners in preparations with high c-factor – An in vitro study. King Saud Univ J Dent Sci 2013;4:57-64.
60. Rodriguez A, Yaman P, Dennison J, Garcia D. Effect of light-curing exposure time, shade, and thickness on the depth of cure of bulk fill composites. Oper Dent 2017;42:505-13.
61. Jabr NAB, , Al-Saidi WN, Jabr IAB, , Al-Bounni RS. Effect of polymerization time and shade on the depth of cure of nano-hybrid resin composites. Eur Dent Res Biomater J 2021;2:28-33.
62. Haridy R, Abdalla MA, Alkhalaf R, Albishri R, Alenizy AM, Zeeshan M, *et al*. Toward optimum light curing of resin composite restorations: A survey on current awareness and practice among general dentists in Saudi Arabia. Open Dent J 2023;17:1-10.
63. Tüloğlu N, Özer S, Tunç ES, Canbaz S, Bayrak S. Knowledge and attitudes of dental clinicians regarding light-curing units in northern Turkey. J Hacettepe Fac Dent 2016;40:26-34.
64. Al-Senan D, Ageel F, Aldosari A, Maktabi H. Knowledge and attitude of dental clinicians towards light-curing units: A cross-sectional study. Int J Dent 2021;2021:1-8.
65. Alqabbaa LM, Alsenani MS, Alsaif NS, Alsaif RA, Binalrimal SR. Light intensity output of visible light communication units and clinicians' knowledge and attitude among Riyadh private clinics. J Conserv Dent 2018;21:667-70.
66. Owens BM, Phebus DDSJG. An evidence-based review of dental matrix systems. Gen Dent 2016;64:64-70.
67. Tolba ZO, Oraby E, Abd El Aziz PM. Impact of matrix systems on proximal contact tightness and surface geometry in class II direct composite restoration in-vitro. BMC Oral Health 2023;23:535-41.
68. Naz F, Shirazi U-E-R, Khan SR, Tariq U. Choice of matrix system for direct posterior composites by the dentists in Lahore. Pak Oral Dent J 2013;33:141-4.