

Original article

Anterior Composite Restorations in Clinical Practice Among Dentists in Libya: A Survey Study

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ABSTRACT

Currently, dental composite is the most popular material to restore anterior and posterior teeth. A high demand for restorative procedures in clinical dentistry is still observed, with restoration placement considered one of the most frequently performed dental procedures, accounting for a significant part of dentists' working time. This study aims to assess the knowledge, attitude, and practice of class III, IV, and V direct anterior composite restorations among dentists in Libya. This study was a descriptive cross-sectional study. A total of 214 completed questionnaires were collected through an online survey. The questionnaire consisted of three parts. The first part collected demographic characteristics of the participants. The second and third parts comprised multiple-choice questions where participants could select more than one answer. The second part assessed participants' knowledge and information about resin composite materials. The third part focused on the techniques used during anterior composite restorations. The response rate was 71.33 %. Among the 73.8 % were females. Amongst the participants, 50% were specialists. 39.3% of participants used nanohybrid, and 34.1% used nanocomposite. In relation to the method of isolation, the majority of respondents 64.9% reported cotton roll and saliva ejector, while 19.2% indicated rubber dam. 43% reported the three-step: etch and rinse adhesive system. Regarding the technique to restore the palatal wall for class IV, 64.5% of participants used matrix band support with the index finger. The light-emitting diode was the light unit chosen for 71.5% of participants. 57% of participants used polishing strips, while 56.5% used diamond burs. This survey study revealed that dentists have good knowledge regarding anterior composite restorations. However, the use of rubber dam isolation, self-etch adhesive, and silicon template to restore the palatal wall for class IV was limited.

Keywords:

Anterior Composite Restoration, Survey, Adhesive, finishing, and polishing.

Introduction

A continuous development in dental composite technology has occurred over the last few decades. Currently, dental composite is the most popular material to restore anterior and posterior teeth, due to its aesthetic properties and conservation of sound tooth structure. A high demand for restorative procedures in clinical dentistry is still observed, with restoration placement considered one of the most frequently performed dental procedures, accounting for a significant part of the dentists' working time [1]. Since their introduction, dental composites have undergone remarkable changes in composition, resulting in significant improvement in material properties [2]. The central focus for dental practitioners, researchers, and patients constitutes the optimization of procedural results when restoring defective anterior teeth into esthetically satisfying, biologically healthy, and mechanically sound integral units of the dental arch [3]. The quality of the restoration is directly related to the materials used, the dental clinician's skills and preferences, as well as the patient's oral environment.

Dental clinicians' related factors have been considered as being contributory in determining the quality and clinical performance of anterior composite restorations. These include variations in procedural excellence, clinical decisions, and differences between operators concerning cavity design, material choice, and handling [4]. A wide range of composite products is currently available in the market with variations in composition, clinical performance, and application technique as recommended by manufacturers [5]. Restoring the shape and optical properties of anterior teeth involves several procedural techniques, which are determined by the material utilized, the extent of the defect, and operator preference [3]. Reproducing the color of a natural tooth with an artificial restoration remains a great challenge in restorative dentistry. Shade selection plays a significant role in achieving a good esthetic outcome [6]. Anterior teeth defects may be small or extensive, caused by caries or non-carious lesions. Freehand, palatal putty index, and different matricing techniques have been indicated for restoring anterior teeth defects. Dentists differ in their decision regarding the selection of a particular type of dental composite restorative material and a specific restoration technique

for a particular clinical situation when restoring anterior teeth lesions [3]. There is a deficit in the literature which highlighting common practices regarding the use of anterior composite filling material among dentists in Libya. Therefore, the aim of this survey study was to assess the knowledge, attitude, and practice of dentists in Libya regarding class III, IV, and V direct anterior composite restorations.

Methods

This study is a descriptive cross-sectional survey study. The study received approval from the Research Ethics Committee of the Faculty of Dentistry, University of Benghazi (approval No.0119). A convenience sample of 300 dentists practicing in Benghazi, Libya, who were registered as members of the Libyan Dental Association, was invited to participate. The sample included both general practitioners and specialists. The questionnaire was developed after reviewing the literature on anterior composite restorations and was adapted from previous questionnaires [2,3,7]. The questionnaire was first piloted on a small group of local dentists, and minor modifications were made before its final use.

Participants were invited to join the survey via email. The email explained the study objectives, provided necessary information, and stated that participation was anonymous. Participants were informed that the collected data would be used for research purposes. A total of 214 completed questionnaires were collected through an online survey. The questionnaire consisted of three parts. The first part collected demographic characteristics of the participants. The second and third parts comprised multiple-choice questions where participants could select more than one answer. The second part assessed participants' knowledge and information about resin composite materials. The third part focused on the techniques used during anterior composite restorations. The collected data were statistically analyzed using descriptive statistics with SPSS.

Results

There were 214 respondents out of 300, obtaining a response rate of 71.33 %. Among the participants ,73.8 % were female. Regarding the age of participants, 57.5 % of them were 25-34 years, 30.4 % had 35-44 years, 11.2% had 45-55 years, 0.9 % above 55 years. In relation to nationality,99.5 % were Libyan. Amongst the participants, 50% were specialists. In relation to the university of graduation of the last dental degree, 79.4% of respondent Libyan universities, 9.3% Arab countries universities,7.5 % Western universities, 1.9% Eastern Europe or Russian universities,1.4 % Turkish universities, and 0.5% South Africa University. In relation to the place of work, 27.6 % of participants worked in the government sector,24.8 % worked in the private sector, and 47.6 % were worked in both sectors.

Regarding the years of experience practicing anterior resin composite restorations, 36.9% of respondents had less than 5 years, 31.3 % had 5-10 years, 14% had 10 -15 years,8.9 % had 15-20 years, and 8.9% less than 20 years. As shown in (Figure 1), the type of composite used for anterior teeth, the highest percentage of participants 39.3% used nanohybrid, followed by nanocomposite, 34.1%. And the low percentage 12.1% did not know the type of composite.

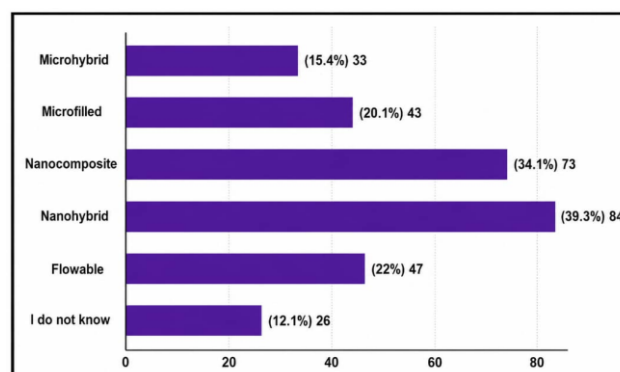


Figure 1. Distribution of the type of composite usage among participants

The most commonly utilized method of storage used by the survey respondents was the storage of the composite at room temperature, 92.1%, where as 7% of respondents kept the composite in a refrigerator, and 0.9% reported both at room temperature and in a refrigerator. The high percentage of participants 90.2% do not use preheating composites. In relation to the usage of flowable composite, more than half of the participants 57.9% used it for class V, and almost half 40.7% used it for non-cariou lesions, as shown in (Figure 2).

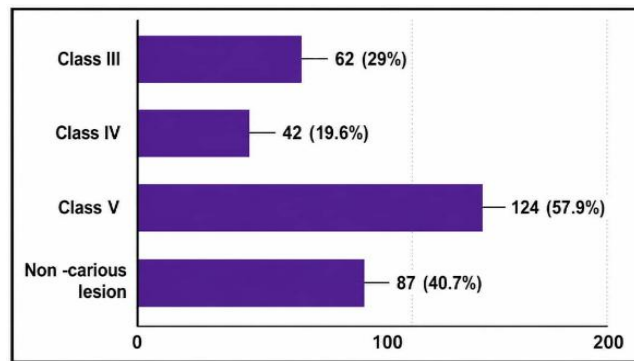


Figure 2. Distribution of flowable composite usage among participants

As shown in (Table 1), Descriptive responses of participants' practices in cavity preparation, bur Selection, enamel bevel placement, and approach for class III cavity preparation. Regarding the type of cavity preparation, 20.1 %of respondents reported that they frequently prepare class III, IV, and V, 19.2 % prepare class III, 15% prepare class V, and 13.6 % prepare class IV. Additionally, 11.2 % reported preparing both class III and IV, 5.1% prepare both class IV and V, 5.1% prepare both class III and V, and 10.7% did not know. In relation to the type of bur selected for tooth preparation for anterior composite restorations, more than half, 65.9% of participants reported diamond bur, 9.8% of respondents used tungsten carbide bur, 4.7 % of participants used carbon steel burs, 9.3 % of respondents recorded a combination of tungsten carbide and diamond burs. Furthermore, 6.1% of respondents used both carbon steel and diamond burs. Additionally, 1.4% of respondents used a combination of carbon steel, tungsten carbide, and diamond burs. Also, 2.8% of participants did not know.

More than half, 77.6% of participants prepared an enamel bevel on facial cavosurface margins, 12.6% prepared it on lingual cavosurface margins. Additionally, 9.8 % of respondents prepared an enamel bevel on both facial and lingual cavosurface margins. The majority, 73.4% of respondents, preferred the lingual approach for class III cavity preparation, while 25.2% labial approach. 1.4% preferred both Labial and Lingual approaches.

Table 1. Descriptive responses of participants' Practices in Cavity Preparation, Bur Selection, Enamel Bevel Placement, and Approach for class III cavity preparation

What type of cavity preparation do you frequently prepare for anterior composite restorations?	N	%
Class III, IV, V.	43	20.1%
Class III.	41	19.2%
Class V.	32	15%
Class IV	29	13.6%
Class III, IV	24	11.2%
Class IV, V.	11	5.1%
Class III, V.	11	5.1%
I do not know.	23	10.7%
What type of bur do you use for tooth preparation for anterior composite restorations?	N	%
Diamond bur.	141	65.9%
Tungsten Carbide bur.	21	9.8%
Carbon steel bur.	10	4.7%
Tungsten Carbide and Diamond burs.	20	9.3%
Carbon steel and Diamond burs.	13	6.1%
I do not know.	6	2.8%
Carbon steel, Tungsten Carbide, and Diamond bur.	3	1.4%
Where do you place the enamel bevel on the tooth /cavity preparation?	N	%
On facial cavosurface margins.	166	77.6%
On lingual cavosurface margins.	27	12.6%
On facial cavosurface and lingual cavosurface margins.	21	9.8%
What approach do you prefer for class III cavity preparation?	N	%
Lingual approach.	157	73.4%
Labial approach.	54	25.2%
Labial approach and Lingual approach.	3	1.4%

In relation to the method of isolation, the majority of respondents 64.9% reported cotton roll and saliva ejector, while 19.2% indicated rubber dam. Furthermore, a combination of rubber dam, cotton rolls, and saliva ejector was selected by 15.4 % of respondents. Only 0.5 % of the population did not know. In relation to the type of wedge that was used by participants, 49.5 % used a wooden wedge, while 19.2% of respondents used a plastic wedge. In addition, 11.2% of participants used a combination of wooden and plastic wedges, 7.9 % used a light-transmitted wedge, 3.3% used a combination of wooden, plastic, and light-transmitted wedges, 2.8% used wooden and light-transmitted wedges. Only 0.9 % used both plastic and light-transmitted wedges, 5.2 % of participants did not use any wedge. In relation to the type of matrix band, 30.4 % of participants reported a metal matrix band, while a clear matrix was indicated by 29% of the survey population.

In addition, 11.7% reported both metal band and clear matrices, 8.9% of respondents identified cellulose crown form, 7.9% reported both clear matrix and cellulose crown form, 3.7% of participants used a combination of metal matrix band and cellulose crown form, 5.1% reported metal matrix band, clear matrix, and cellulose crown form, 3.3% of participants did not use any type of matrix band. As shown in (Table 2), regarding the type of adhesive system, almost half of the participants 43% preferred the three-step: etch and rinse system (acid etching, primer, adhesive), while 34.1% indicated the two-step etch and rinse (acid etch, primer +adhesive). Additionally, one-step self-etching adhesive (all-in- one) was selected by 10.2 % of respondents. Two-step self-etching adhesive (acid +primer, adhesive) was preferred by 8%. Whereas 3.3 % of respondents preferred both the three-step etch and rinse and the two-step etch and rinse systems. Only 1.4 % of participants identified a combination of two-step self-etching adhesive and one-step self-etching adhesive systems. In addition, 35% of participants reported the selective enamel etching +self-etch approach has the least postoperative sensitivity, while 26% selected the etch and rinse protocol. While 12% of respondents indicated a self-etch system, whereas 27% of participants did not know which adhesive system resulted in the least post-operative sensitivity.

Regarding etching time for enamel, our results reported that the majority of the respondents 66.4 % applied etching acid for 30 seconds, while 31.1 % of participants applied it for 15 seconds. 0.5 % of participants reported 15 and 30 seconds .2 % of respondents did not have knowledge about the etching time for enamel. The majority of respondents 65.4% reported that the etching time for dentin was 15 seconds. A smaller proportion, 25.7%, indicated 30 seconds as an appropriate time, while only 0.5 % selected both 15 and 30 seconds. In addition, 8.4% of respondents did not know the correct etching time.

Table 2. Descriptive responses of Participants on the adhesive system and etching time preference

What type of adhesive system do you prefer?	N	%
Three-step: etch and rinse system (acid etching, primer, adhesive).	92	43%
Two-step etch and rinse (acid etch, primer +adhesive).	73	34.1 %
One-step self-etching adhesive (all-in- one).	22	10.2%
Two-step self-etching adhesive (acid +primer, adhesive).	17	8%
Both three-step etch and rinse and two-step etch and rinse systems.	7	3.3%
A combination of two-step self-etching adhesive and one-step self- Etching adhesive system.	3	1.4%
What is the adhesive approach that has the least postoperative sensitivity?	N	%
Selective enamel etching +self-etch approach.	75	35%
Etch and rinse (total etch) protocol.	56	26%
Self-etch system.	26	12%
I do not know.	57	27%
What is the etching time for Enamel?	N	%
30 seconds.	142	66.4%
15 seconds	67	31.1%
15, 30 seconds.	1	0.5%
I do not know.	4	2%
What is the etching time for dentin?	N	%
30 seconds.	55	25.7%
15 seconds.	140	65.4%
15, 30 seconds.	1	0.5%
I do not know	18	8.4%

In relation to the technique to restore the palatal wall for class IV, 64.5% of participants used matrix band support with index finger, and 20.6 % used a silicon template, which is made from wax-up. As shown in (Table 3), the results of the current survey showed that 93.9% of respondents used the incremental technique in the placement of resin composite. The majority of participants 63.6% used 2mm increments. A smaller proportion 27.5 % preferred 1mm increments. While 4.7% reported alternating between 1mm and

2mm increments. Only 3.3% of respondents used 3mm increments, and 0.9 % used a combination of 2mm and 3mm increments.

Table 3. Descriptive responses of participants on the incremental technique in the placement of resin composite restoration.

Do you use the incremental technique in the placement of resin composite?	N	%
Yes.	201	93.9%
No.	13	6.1%
What is the size of each increment of the composite that you use?	N	%
1mm.	59	27.5%
2mm.	136	63.6%
3mm.	7	3.3%
1mm,2mm	10	4.7%
2mm,3mm	2	0.9%

In relation to the composite layering technique,83.6% of participants knew about it, while only 16.4 % did not know. As shown in (Table 4), in response to the question regarding whether the shade was selected before placing the anterior composite restorations, the majority of participants 96.3 % answered yes. Regarding the shade guide used for composite shade selection, 46.7 % of participants used the shade guide available at the clinic, while 32.7 % used the shade guide supplied by the company manufacturer. Additionally,17.3 % did not use any shade guide, and 3.3 % selected both the clinic's guide and the manufacturer's guide.

Table 4. Descriptive responses of participants on shade guide selection

Do you select the shade before placing the anterior composite restorations?	N	%
Yes.	206	96.3%
No.	8	3.7
Which Shade guide do you commonly used for composite shade selection?	N	%
The available shade guide at the clinic.	100	46.7%
The shade guide supplied by the company manufacturer.	70	32.7%
They did not use any shade guide.	37	17.3
Both the clinic's guide and the manufacturer's guide.	7	3.3%

Regarding the most commonly used shade in practice, A2 was the predominant choice, reported by 51.8 % of respondents. As shown in (Table 5), light-emitting diode (LED) was the light unit chosen for 71.5% of participants, while 19.6 % used Quartz-tungsten-halogen light (QTH). In addition,4.2 % of dentists used both LED and QTH, whereas 4.7% did not know. 25.7 % of participants used a radiometer for light-cure monitoring, while 32.2 % of the study population did not have knowledge about it. Whereas, 42.1% did not use a radiometer. In relation to the technique used for curing resin composite, continuous light curing at a constant intensity level was reported by 58.4% of respondents, while 15.4 % used the continuous two-step curing technique. A smaller proportion, 5.1%, reported the pulse -delay method, and 4.7 % identified the continuous two-step ramp. 16. 4% of participants did not know.

Table 5. Descriptive responses of participants on light curing

What type of light unit do you use?	N	%
light-emitting diode (LED).	153	71.5%
Quartz-tungsten-halogen light (QTH).	42	19.6%
Light-emitting diode (LED) and Quartz-tungsten-halogen light (QTH).	9	4.2%
I do not know.	10	4.7%
Do you use light cure unite Monitoring (Radiometer)?	N	%
Yes.	55	25.7%
No.	90	42.1%
No knowledge about it.	69	32.2 %
What technique do you use for curing resin composites?	N	%
Continuous light curing.	125	58.4%
Continuous two-step curing.	33	15.4%
Pulse -delay.	11	5.1%
Continuous two-step ramp.	10	4.7%
I do not know.	35	16.4%

Regarding the use of transparent matrices after placement of the final layer of composite restorations, 57% of respondents used transparent matrices (Figure 3).

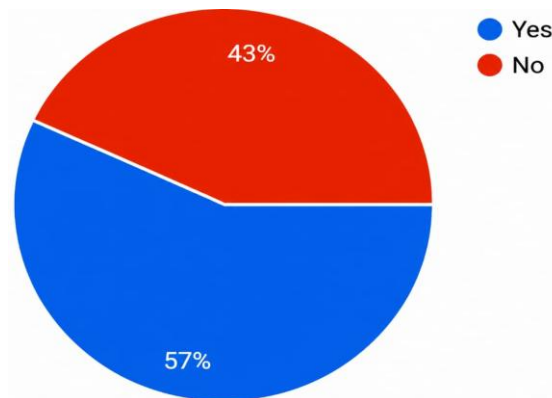


Figure 3. Distribution of transparent matrices after the final composite layer

As shown in (Figure 4), regarding finishing and polishing tools, 57% of participants used polishing strips, while 56.5% used diamond burs. Finishing and polishing procedures were done immediately by the majority of participants, 85.5%, while 10.7 % after 24 hours, 3.8 % of respondents reported that they performed finishing and polishing procedures both immediately and after 24 hours.

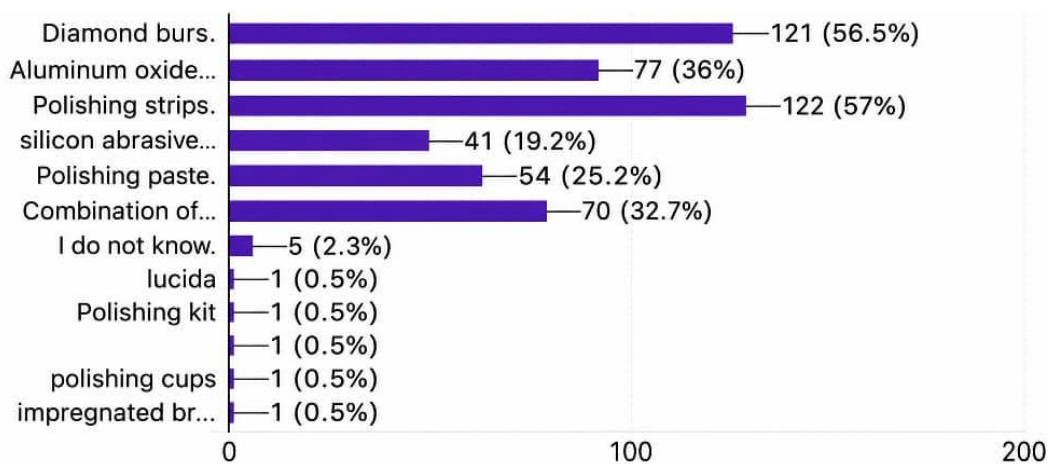


Figure 4. Distribution of finishing and polishing tools usage among participants

A majority of respondents 77.6 % did not apply a layer of unfilled resin on the surface of the composite following the polishing procedure. As shown in (Table 6), the most frequently reported difficulty during anterior composite restoration was shade selection, 38.3%, followed by isolation, 20.6%. Finishing and polishing of composite was identified as the main problem by 12.6 % of participants, while placement of composite 10.3%. Discoloration was reported by 0.9 % of respondents as the primary issue. In addition, 5.1% of dentists reported combined difficulties with shade selection and isolation, while 3.3% reported problems with both shade selection and finishing and polishing procedures. Shade selection and Placement of composite were identified together as difficulties by 2.3% of respondents, whereas 1.4 % reported combined challenges with Placement of composite, finishing, and Polishing procedures. Additionally, 4.7% reported challenges across multiple steps, including shade selection, isolation, placement of composite, finishing, and polishing procedures. 0.5 % of respondents indicated no problems.

Table 6. Descriptive responses of participants on problems during anterior composite restoration

What are the problems you experienced during anterior composite restorations?	N	%
Shade selection.	82	38.3 %
Isolation.	44	20.6%
Finishing and polishing.	27	12.6%
Placement of composite.	22	10.3%
Discoloration.	2	0.9%
Shade selection and isolation.	11	5.1%

Shade selection, finishing, and polishing procedures.	7	3.3%
Shade selection and Placement of composite.	5	2.3%
Placement of composite, finishing, and Polishing procedures.	3	1.4%
Shade selection, isolation, placement of composite, finishing, and polishing procedures.	10	4.7%
No problems.	1	0.5%

Discussion

The great popularity of resin composite restoration is attributed to its good esthetics, minimally invasive approach, micromechanical bonding, and economy as compared to indirect restorations. The composite restorations have demonstrated good clinical performance [8]. In this study, we assessed the knowledge, attitude, and practice of class III, IV, and V direct anterior composite restorations among dentists in Libya. The response rate was satisfactory and relatively high (71.33%, n = 214), compared to similar studies carried out in different countries [2], [9]. This may be because the questionnaire topic was relevant, as well as the methods used to design and administer the questionnaire. The high response rate ensured that this study was representative of the dental practitioners in Benghazi, Libya. In this study, the majority of participants, 73.8% females, a similar result was observed in other surveys conducted in other countries [10]. The female dentists mostly majored in restorative dentistry, as well as pediatric dentistry and oral medicine. On the contrary, male dentists are preferred over female dentists in other specialties (e.g., oral surgery, orthodontics, and periodontics) [11].

Conversely, the findings of a previous study reported that 68% of participants were males [3]. The presence of only a small fraction 0.9% above 55 years suggests a relatively young workforce, which may influence perspectives on contemporary dental practices and technology. The majority of participants 99.5 % identified as Libyan, indicating a localized sample. This homogeneity could have implications for the generalizability of the findings to broader populations in dental studies. About 79.4% graduated from Libyan universities, with a smaller number coming from other regions. This suggests that the local educational institutions play a key role in training dental professionals in the region. Analysis of the current study results reveals that the majority of participants preferred the use of nanohybrid composites, followed by nanocomposites. The preference of nanohybrid composites may be attributed to their superior strength, making them suitable for areas subjected to functional stress, while also maintaining a high-quality surface finish after polishing. In addition, nanocomposites are recognized for their excellent polish ability and their ability to retain surface luster over extended periods. This is primarily due to their nanoscale filler particles, which contribute to enhanced wear resistance and long-term esthetic stability. Despite these properties, their slightly lower mechanical strength compared to nanohybrid composites may explain their secondary preference among participants [12]. The low percentage 12.1% did not know the type of composite, as shown in (Figure 1), demonstrated a good awareness regarding the appropriate type of resin composite restorative material. The most commonly used method of storage used by the survey respondents was the storage of the composite at room temperature, 92.1%. These results are in accordance with the dental manufacturer's instructions for storing composite at room temperature [13].

Various variables like the variation in temperature, ventilation at storage, humidity, light visibility, and radiation are important in terms of the performance of composite clinically [14]. A previous study reported that the use of a composite, which is stored at room temperature, is preferred over the refrigerated one. If it is refrigerated (which most operators do to increase the shelf life), then it's advised that the resin composite should be unrefrigerated prior to its use [15]. Preheating increases the flowability of the composite restorative material, providing better adaptation to cavity walls and reducing microleakage, thereby increasing the durability of the restoration. It also increases the temperature of the composite because the higher thermal energy enhances the mobility of the radicals and monomers, resulting in a higher degree of monomer conversion and an improved polymerization rate [16]. The high percentage of participants 90.2 % did not use preheating composites in their clinical practice. These results may explain this because there are several factors that could affect the effectiveness of preheating, such as the preheating temperature, the preheating device used, the light-curing device, the light-application time, and the thickness of the material [16]. In relation to the usage of flowable composites, more than half of the participants (57.9%) used it for class V, and almost half 40.7 % used it for non-cariou lesions, as shown in (Figure 2). Due to their initial low viscosity and high post-gel flexibility, many previous studies have advised the use of flowable composites for restoring non-cariou cervical lesions [17].

The survey showed relatively comparable responses among participants regarding the type of cavity preparation that is frequently prepared for anterior composite restorations. This relative similarity in responses may be attributed to the fact that anterior restorative procedures commonly involve different types of cavities depending on the clinical presentation, such as proximal caries, incisal edge fractures, or cervical lesions. Consequently, dentists are likely to encounter and manage a combination of these cavity types in

daily clinical practice [18]. Regarding the type of bur, 65.9% of participants used a diamond bur. The tooth preparation technique plays an important role in the success of adhesion. Previous studies have found that diamond bur can result in rough surfaces and a thick smear layer, potentially weakening the bond because of incomplete resin infiltration.

Conversely, carbide bur is associated with a thinner smear layer, better wettability, and enhanced adhesion. However, the effect of these burs on surface quality and bond strength remains inconsistent in the literature, with some studies finding no significant differences compared to substrate and material properties [19]. More than half, 77.6% of participants, reported placing an enamel bevel on the facial Cavo surface margins in anterior teeth. In most cases, an enamel bevel is used on the facial Cavo surface margin to provide a gradual color transition from the restoration to the surrounding tooth structure for esthetics. It also increases bonding surface area and enhances marginal adaptation [19]. The majority, 73.4% of respondents, preferred a lingual approach for class III cavity preparation, as it preserves the facial enamel and maintains the natural appearance of anterior teeth [18]. This approach supports a more conservative cavity design, indicating that participants are aware of appropriate esthetic and clinical principles. In our study, 64.9% of respondents used cotton rolls and a saliva ejector.

Because of the difficulty of rubber dam techniques, malposition or partially erupted teeth, and in patients who are mouth breathers or have a latex allergy, the respondents opted for cotton rolls and saliva ejectors due to their ease of placement. Cotton rolls can become saturated quickly, leading to improper moisture control and requiring frequent repositioning or replacement due to their tendency to shift or move during procedures. This can interfere with the effectiveness of the procedure [20]. 19.2% of participants used a rubber dam. Rubber dam is one of the most commonly used isolation methods [21,22] because it provides a dry, clean operative field, accessibility, visibility, and protection of the patient and operator. It can be suggested that most of the respondents did not use a rubber dam for isolation due to technical difficulty and patient discomfort [23,24].

Findings of this study were in agreement with a previous study that reported that 63% of participants did not use a rubber dam for any restoration [25]. 30.4% of participants preferred metal matrix bands, while a comparable proportion 29% used clear matrices, with smaller percentages reporting combinations or alternative systems such as cellulose crown forms. This close distribution suggests variability in clinical preference, likely influenced by the specific requirements of anterior restorations. Metal matrices provide good rigidity and proximal contour, whereas clear matrices are commonly selected for anterior composite restorations due to their ability to allow light transmission and improve polymerization [26]. The use of cellulose crown forms reflects their indication in more extensive anterior restorations where anatomical form is required [26].

Nearly half of the participants 49.5% preferred wooden wedges, while smaller proportions used plastic wedges 19.2% or combinations of different types. This distribution indicates a general preference for wooden wedges, likely due to their ability to provide better adaptation to the gingival margin through slight expansion when moistened, as well as effective tooth separation. The use of different wedge types or combinations may reflect variations in clinical situations and operator preference [27]. The small percentage of participants who did not use any wedge 5.2 % may raise concerns, as proper wedging is considered essential for achieving adequate proximal contour, contact, and marginal seal. These findings are in agreement with established operative dentistry principles, which emphasize the importance of wedge selection based on clinical requirements [18]. The preferred adhesive system for the dentists in this survey study was a three-step etch-and-rinse adhesive system, 43%, followed by two-step etch- and- rinse system, 34.1%. Although more complex to use, three-step etch-and-rinse adhesive systems have exhibited in some laboratory and clinical studies a more reliable and stronger bonding to dentin [2].

Previous study found that three-step etch -and - rise adhesives did not meet the requirements of the American Dental Association guidelines for provisional and full acceptance of the restorations, and in some of the clinical studies reviewed, they did not gain full acceptance [28]. Two-step etch-and-rinse adhesive appeared in the dental market with the purpose of simplifying the adhesive procedures, reducing the time of application, and the possibility of error during adhesive procedures [2]. Our findings are in agreement with a previous study that found the majority of respondents preferred etch-and-rinse adhesives [2]. In contrast, self-etch adhesive systems were less commonly used. This lower preference may be due to concerns regarding their comparatively weaker enamel bonding effectiveness, as self-etch adhesives do not etch enamel as aggressively as phosphoric acid [29].

Post-operative sensitivity is one of the most common complaints after adhesive restoration procedures [30]. In our study, approximately 50% of participants lacked the knowledge regarding the association of postoperative sensitivity with the adhesive approach. More specifically, 27% of respondents reported having no knowledge, and 26 % they identified the etch and rinse approach as being associated with the least postoperative sensitivity. A discrepancy between dentin demineralization and adhesive resin infiltration has been described for etch-and-rinse adhesive systems. Clinically, inadequate impregnation of the etched

dentin substrate may result in post-operative sensitivity, according to hydrodynamic theory [31]. One of the advantages of self-etch adhesive is that post-treatment sensitivity is less due to acidic compounds in the adhesive [32]. Acid etching is an important step for obtaining proper adhesion both to dentin and enamel [33].

Our results reported that the majority of the respondents 66.4% applied etching acid for 30 seconds, although 37% phosphoric acid has traditionally been applied for up to 60 seconds; the most routine etching time is 15 to 30 seconds. Various studies done thereafter found that etching time less than 30 seconds yields peak quality of the etched enamel [34]. This reduction in etching duration minimizes unnecessary enamel loss while maintaining adhesive performance [34]. In addition, 31.1 % of participants applied it for 15 seconds; the preference for shorter etching times may indicate increased awareness of evidence-based practices aimed at preserving tooth structure, reducing chairside time, and improving overall clinical efficiency [34]. The majority of respondents 65.4% reported that the etching time for dentin was 15 seconds. A smaller proportion, 25.7%, indicated 30 seconds as an appropriate time, while only 0.5 % selected both 15 and 30 seconds. In addition, 8.4% of respondents did not know the correct etching time. Previous studies have suggested that, when using the total-etch technique, dentin should be etched for approximately 10–15 seconds to achieve adequate surface conditioning while minimizing excessive demineralization. Prolonged etching time demineralizes the dentin surface to a depth greater than that to which resin monomers can penetrate, a thick, poorly infiltrated hybrid layer. Therefore, reducing etching time is crucial to ensure complete resin infiltration and effective sealing of the dentinal surface [35].

In anterior teeth with marked destruction of coronal tooth structure affecting the incisal edge, the controlled placement of composite restorations using a silicon template, which is made from a wax-up, is more recommended than the freehand application. This technique permits multiple chromatic layering, leading to improved tooth optical properties in addition to optimizing the restoration of tooth form and contours with a slight need for occlusal adjustment. 64.5% of participants used matrix band support with index finger, and 20.6 % used a silicon template, which is made from wax-up. This contradicts evidence-based research and therefore demonstrates the need for practice improvement [3]. The incremental filling technique in the placement of resin composite has been recognized as a placement technique of choice in large composite restoration to minimize polymerization shrinkage stresses and avoid the limitation of depth of cure [36]. The results of the current survey showed that 93.9% of respondents use the incremental technique in the placement of resin composite, which is in line with the established protocols for composite restorations. The majority of participants 63.6 % reported using 2mm increments, which is consistent with evidence-based recommendations. Incremental layering of dental composite using a thickness not exceeding 2mm has been suggested to reduce polymerization shrinkage stress and enhance the degree of conversion and provide adequate esthetics [37].

In relation to the composite layering technique, 83.6% of participants reported they knew about it; this result might explain due to concept of the composite layering technique is of real interest for dental practitioners because the aesthetic aspect, particularly important for patients, can be rendered by stratification techniques, directly in the dental clinic [38]. The majority of participants 96.3 % selected the shade before placing the anterior composite. Shade selection plays an important role in achieving a good aesthetic restoration. Furthermore, it plays a predominant role in patient satisfaction. Patients are currently demanding esthetic replacement that must match their existing dentition, and are more concerned about the shade match of their restorations rather than the quality of the restorations [39]. Regarding the most commonly used shade in practice, A2 was the predominant choice, reported by 51.8 % of respondents. These results were in agreement with a previous study [40]. But in the previous study, B1 shade was commonly used in Practice [41]. The variation in the results may be due to different geographical areas and a completely different population [39]. Adequate light curing is crucial to achieve the desired biomechanical and biocompatibility properties of the resin composite material [3]. Our results showed that the LED unit was the light unit chosen for 71.5% of participants, while 19.6 % used the QTH unit.

Recently, with the development of the LED units, the energy produced is similar or higher than QTH, with polymerization depth similar to the traditional QTH units [3]. The other advantages of using LED units are their easy maintenance and longer lifespan of the lamp [9]. Findings of this study were in agreement with a previous study, which reported that 70% of the dentists used LED [2]. 42.1% of the study population did not monitor their light units, whereas 32.2% did not have knowledge about light curing monitoring. Similarly, a previous study also verified that the majority of dentists were not aware that the light-curing units require periodic testing and maintenance [42]. While for LED units the need for energy monitoring is less required, since LED units are able to keep the irradiance stable for a long time, for QTH units, this monitoring should be mandatory and weekly performed [2]. Continuous light curing at a constant intensity level was reported by 58.4% of respondents.

Uniform continuous curing, a light of constant intensity is applied to the dental composite for a specific period of time. It is carried out using QTH and LED curing units [43]. Our results showed that 57% of

respondents used transparent matrices after placing the final layer of composite restorations. It has been reported earlier that the composite resin's surface hardness is influenced by the use of transparent matrices and reflecting wedges. However, recent literature is of the view that clinical success of class II posterior composite restorations is not affected by the choice of matrix strip [9]. Finishing and polishing of dental composite enhances the esthetics and increases the longevity of the restoration [3]. Rough surfaces will accumulate plaque and stains with subsequent discoloration and secondary caries. Respondents commonly selected different tools in finishing and polishing resin composite restoration rather than using a single tool for finishing and polishing, thereby reflecting the general keenness of respondents to perform optimum finishing and polishing techniques [9]. In the present study, the high prevalence of polishing strips 57% and diamond burs 56.5% suggests a standardized clinical approach among practitioners. Finishing and polishing strips were the preferred tools that might be related to their ease of usage, especially with class III composite restorations [9]. The high reliance on diamond burs is expected, as they remain the first choice for initial gross reduction and anatomical contouring because of their superior cutting efficiency on different restorative materials [44].

Finishing and polishing procedures were done immediately by the majority of participants, 85.5%. These results were in agreement with a previous study [2]. Most dentists prefer to perform the finishing and polishing procedures in the same sitting immediately after restoration placement, which is more convenient and acceptable for the patient. Immediately after curing, the resin composite material is not completely mature. Thus, the heat generated would result in the flow of the material and deform the resin composite, thereby compromising the initial marginal sealing. Previous studies stated that an improved marginal seal is obtained by polishing after 24 hours. But delayed polishing could damage the seal obtained by hygroscopic expansion of the resin composite and increase the microleakage. Therefore, finishing should be delayed as long as is practical to decrease the adverse effects. Finishing after 10-15 minutes is recommended [44]. A majority of respondents 77.6 % did not apply a layer of unfilled resin on the surface of the composite following polishing procedures. This may indicate that most of the participants are unaware of the importance of applying surface sealant.

Similarly, a previous study found that 73.7% of participants thought that it is not essential to apply surface sealant [45]. Surface sealants were introduced to improve the final appearance of the composite restoration. Their application fills irregularities, making the restoration smoother, brighter, and promoting improved marginal sealing and resultant reduced microleakage [46]. The composite application procedure comprises several stages, and the correct achievement of these steps is crucial for the longevity of the restoration and clinical success [47]. The most frequently reported difficulty during anterior composite restoration was shade selection, 38.3 %, followed by isolation, 20.6%. Material shade mismatch can be due to various factors, such as those occurring during shade selection, and those after composite restoration placement, such as unsatisfactory oral hygiene and use of beverages such as coffee and tea, among others, that could cause staining both the restoration and the teeth [48].

Conclusion

This survey study revealed that dentists have good knowledge regarding anterior composite restorations. However, the use of rubber dam isolation, self-etch adhesive, and silicon template, which is made from wax-up to restore the palatal wall for class IV, were limited were limited. It should there is a need for continued professional education and clinical training of dentists towards composite restorations in order to perform satisfied results and esthetics within a particular time.

Conflicts of Interest

The authors declare no conflict of interest regarding this survey study

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