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Research Article

Survey of Adhesive Systems Knowledge Among Conservative Dentistry Specialist Dentist in Indonesia

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KEYWORDS

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bonding agent;
conservative dentistry;
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rubber dam

ABSTRACT

Introduction: Knowledge of adhesive systems is an essential item in creating a successful tooth restoration. Adhesive systems are common among dentists in Indonesia, but no research has been found that evaluates the knowledge of the members of Indonesian Conservative Dentistry Association (IKORGI) - Central Jakarta Branch. **Objectives:** to determine dentists' understanding regarding the use of adhesive systems during restorative procedures. **Methods:** This research used a descriptive study with a cross-sectional questionnaire design. One hundred and five dentist specialists in IKORGI - Central Jakarta Branch, completed an online survey form within two months comprising three sections: (a) demographics (6 items), (b) knowledge about the latest technology of adhesive systems (5 items), and (c) clinical implications of adhesive systems (10 items). Data was collected and analyzed using Microsoft excel and IBM SPSS. **Results:** The primary data was dominated by the female with the range of 0 to 5 years of experience since graduated from conservative dentistry program. They understood the adhesive system quite well, as seen from the maximum score of the respondents was 4.25. Among participants, 63.8% to 99% showed a strong knowledge about the adhesion terminology and type of adhesives. **Conclusions:** The understanding of adhesive systems knowledge among dentist specialists in IKORGI - Central Jakarta Branch is good, although there are some significant differences between the research variables. Further research is required to cover all areas of Indonesia with or without specialty in conservative dentistry.

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INTRODUCTION

One focus in minimally invasive (MI) direct restorative techniques is to make the outcomes more predictable by maximizing the preservation of the affected dentin tissue.[1] Affected dentin usually created a thicker hybrid layer than normal dentin with the development of a water-rich porous zone beneath the hybrid layer, making it more challenging to have higher bond strength than normal dentin.[2]

Clinicians frequently treat affected dentin substrate in the daily practice. Moreover, the improvements and success in adhesive materials have made resin composite and adhesive systems the mainstay of MI direct restorative techniques.[3] Resin composite restoration has excellent performance regarding their esthetic, long-term durability, lower price, and suitability for both anterior and posterior teeth.[1,4]

In 1955, Dr. Michael Buonocore succeeded to produce an adhesive system that could bond to the enamel substrate. By this time, there are improvements in the adhesive systems to generate adhesion on enamel and dentin substrates.[5] Adhesive system classified by the generation, smear-layer removal mechanism, and number of clinical steps.[6] The advanced understanding in the use of adhesive systems are crucial for the success of tooth restoration.

Furthermore, caries tissue management, effective adhesive system use, and generating optimal tooth retention contribute to clinical success.[7] Unfortunately, the continuous development of adhesive systems and categories has caused difficulties and incorrect understanding of usage and procedures among dentists.[8]

Commonly, adhesive systems were used among dentists in Indonesia. However, SCOPUS searching was used for "adhesive systems" and "questionnaire" keywords in 2002-2021, then only one paper found in Palestine.[8] To date, there is no study about the understanding and knowledge of the adhesive systems in Indonesia.

Therefore, this study aims to determine dentists' understanding regarding the use of adhesive systems during restorative procedures. The questionnaire distribution was carried out using the google form application. Then, the null hypothesis was that there are no differences in knowledge regarding the use of adhesive systems during restorative procedures among specialist dentist in conservative dentistry in the Indonesian Conservative Dentistry Association (IKORGI) - Central Jakarta branch.

MATERIALS AND METHODS

Design of the study

The current study is a descriptive study to determine the dental specialist's understanding on the appropriate usage of the adhesive system and case selections to achieve the research aims. The participants were dentist specialists in conservative dentistry in the IKORGI – Central Jakarta branch, with active status membership as inclusion criteria. Dentist specialists in conservative dentistry without active membership in the IKORGI and general practitioners were excluded. A purposive sampling/non-probability sampling for the chosen participants was used and resulted in a minimum of 100 participants needed to be recruited according to the Slovin's formulation for sample size calculation.[9]

Measures and procedures

A cross-sectional questionnaire survey was conducted. Data were collected from December 12, 2022, to January 12, 2023. A Google form link was shared on a closed professional IKORGI group, and private messages were sent directly to the participants. The questionnaire comprised three sections: (a) demographics (6 items), (b) knowledge about the latest technology of adhesive systems (5 items), and (c) clinical implications of adhesive systems (10 items). Based on their knowledge, the participants answered by filling in the proper response. The data were stored on an encrypted, password-protected memory stick to which only the research team had access.

The questionnaire survey was done after the ethical approval (134/Ethical Approval/FKGUI/XII/2022 with protocol number 011671122). Reliability test for the questionnaire was done using a test and retest with 10% of the total participants. Thus, 25 participants filled in the questionnaire twice within ten days span. Then, the validity test was done by face validity. The research team made sure the questions for questionnaire were relevant and precise. The next step was to share the questionnaire on a closed professional IKORGI group or given directly to the participants by purposive sampling. After the participants were approved and willing to respond, they signed an informed consent and filled in the questionnaire for 10-15 minutes. The questions list for the questionnaire was mentioned in Table 1 and 2.

Statistical analyses

The data were analyzed using IBM SPSS Statistics version 25.0. (IBM Corp., Armonk, NY, USA). Chi-square test was used for categoric data, Mann-Whitney U

and Kruskal-Wallis for numeric data with a confidence interval is 95% (α=0.05).

Table 1. The questions list for questionnaire–Demographics and basic work characteristics of survey respondents.

No	Variables	Preferences
1.	Year of admission in specialist in conservative dentistry	1 = 1983-2006 2 = 2007-2012 3 = 2013-2016 4 = 2017-2019
2.	Sex	1 = Male 2 = Female
3.	Time after Specialist degree in Conservative Dentistry graduation	1 = 0-5 years 2 = 6-9 years 3 = 10-15 years 4 = More than 15 years
4.	Location of the clinic	1 = Private clinic or hospital 2 = Government hospital or public health center 3 = Oral and Dental Specialist Hospital
5	Source of information for adhesive systems	1 = University 2 = Seminar and hands-on 3 = Social media 4 = Dental supplier
6	Topic of interest on seminar and hands-on	1 = Endodontic 2 = Restoration 3 = Others

Table 2. The questions list for questionnaire–Knowledge about the latest technology of adhesive systems (5 items) and clinical implications of adhesive systems (10 items)

No	Questions	Choices and Correct Answer
1.	Definition of the adhesion?	A. Substrate attachment with dissimilar adherents B. Substrate attachment with similar adherents C. Not sure Answer: A
2.	The classification of adhesive systems. (you may answer more than one)	A. Generation B. Solvent C. Mechanism of smear layer removal D. Number of clinical steps Answer: All is included
3.	What is the component in fifth generation adhesive system?	A. Etchant; primer and bonding in one bottle B. Etchant; self-priming adhesive C. Primer; solvent; and bonding Answer: A
4.	Nowadays, how many adhesive systems based on their generation?	A. Generation I to VII B. Generation I to VIII C. Generation I to IX Answer: B
5.	What is the difference between etch and rinse to self-etch adhesive system?	A. Self-etch has less step compare to total etch/etch and rinse adhesive system, due to no etch and rinse step. B. Total etch/etch and rinse has higher hardness compare to self-etch adhesive system, due to the more step. Answer: A
6.	Based on clinical experiences, which tooth region is treated in most cases?	A. Anterior B. Posterior Answer: A or B
7.	Did you use a rubber dam during the resin composite restoration procedure?	A. Yes B. No Answer: A or B
8.	From the pictures below, which adhesive system do you usually used? (you may answer more than one).	A.  B.  C.  D.  E.  F. 
9.	Based on the picture below, what is the kind of generation and type of adhesive system? 	A. Generation 8 (Universal) - Combined Total-Etch, Self-Etch and Selective-Etch B. Generation 5 - Total etch C. Generation 7 - Self-etch Answer: A

No	Questions	Choices and Correct Answer
10.	Based on the picture below, what is the kind of generation and type of adhesive system? 	A. Generation 8 (Universal) - Combined Total-Etch, Self-Etch and Selective-Etch B. Generation 5 - Total etch C. Generation 7 - Self-etch Answer: B
11.	In the case of fiber post cementation using dual-cure luting resin cement, which adhesive system do you use?	A. Total etch/etch and rinse B. Self-etch C. Selective etch Answer: B
12.	In the case of tooth abfraction restoration, which adhesive system do you use?	A. Total etch/etch and rinse B. Self-etch C. Selective etch Answer: C
13.	In the case of fissure sealant, which adhesive system do you used?	A. Total etch/etch and rinse B. Self-etch C. Selective etch Answer: A
14.	How long is enamel etching prior to the rinse?	A. 5 sec B. 10 sec C. 15 sec Answer: C
15.	How long is dentin etching prior to the rinse?	A. 10 sec B. 15 sec C. 20 sec Answer: A

Test and Retest Reliability

The Intraclass Correlation Coefficient (ICC) was used to assess the internal consistency of the questionnaire. According to Cicchetti's classification in 1994 of test and retest are mentioned in Table 3.[10]

Table 3. Cicchetti's classification of test and retest.

Value	Reliability interpretation
0.40 – 0.59	Fair agreement
0.60 – 0.74	Good agreement
> 0,75	Excellent agreement

Validity Test

Validity based on Field in 2005 means the ability of an instrument to measure accurately, divided into face, content, construct, and criterion validity. In this study we used the face validity standard by measuring the questionnaire to be understood by the participants. Face validity evaluates a questionnaire based on feasibility, readability, writing consistency, formatting, and clarity of the language used. Face validity can be understood as the author's subjective assessment of the presentation and relevance of measuring instruments, whether the questions on the questionnaire appear relevant, reasonable, unambiguous, and clear.[11,12] Then, univariate analysis was used to describe the characteristics of each variable studied.

RESULTS

In all, 105 specialist dentists in conservative dentistry in the Indonesian Conservative Dentistry Association (IKORGI)-Central Jakarta branch responded and provided complete responses. Based on test and retest reliability using ICC was 0.945 in the questionnaire. Therefore, the level of reliability of the questionnaire is >0.75 indicating excellent agreement.

Demographics

Demographic data of the participants were displayed in Table 4. Most of the respondents were female (91%) with graduate time 0 to 5 years and year 2017 to 2019 of admission in specialist program in conservative dentistry. The location of the clinic was 61.9% private clinic or hospital.

The Latest Knowledge in Adhesive Systems

In this section, the authors calculated the number of respondents' correct answers using scoring techniques. Each correct answer will be given a value of 1 and an incorrect answer will be given a value of 0. Especially for the second question which discusses the classification of adhesive systems, because each choice is a correct answer, each answer option is worth 0.25. Thus, the maximum score in this section is 5. From the results of processing the answers of 105 respondents, it is known that the lowest score obtained is 1.25 and the highest score is 4.25.

The distribution of the latest knowledge in adhesive systems presented in Table 5. There were 99 respondents (94.3%) understood the notion of adhesion, namely the attachment of a substrate to a non-similar adherent. Forty-one respondents (39%) understood the classification of adhesive systems based on generation;

Solvents; Smear layer removal; Number of clinical steps. The third question showed that 67 respondents (63.8%) understood the components of the 5th generation adhesive system, namely etchant and self-priming adhesive. In the fourth question, 80 respondents (76.2%) answered that the generation that is currently still used is generation I to VIII. In the last question, it was found that 104 (99%) understood the difference between self-etch and total-etch, namely that self-etch has a shorter number of stages than total etch/etch and rinse because there is no need to do etching and rinsing.

Table 4. Demographic Characteristics

	Demographic characteristics for dentists in specialist conservative dentistry in the Indonesian Conservative Dentistry Association (IKORGI) - Central Jakarta branch	**N (%)**
1.	Year of admission in specialist in conservative dentistry	
	- 1983 – 2006	12 (12%)
	- 2007 - 2012	19 (19%)
	- 2013 – 2016	30 (30%)
	- 2017 – 2019	39 (39%)
2.	Sex	
	- Male	14 (13,3%)
	- Female	91 (86,7%)
3.	Time after Specialist in Conservative Dentistry graduation	
	- 0-5 years	65 (61,9%)
	- 6-9 years	25 (23,8%)
	- 10-15 years	8 (7,6%)
	- More than 15 years	7 (7%)
4.	Location of the clinic	
	- Private clinic or hospital	102 (79,1%)
	- Government hospital or public health center	21 (16,3%)
	- Oral and Dental Specialist Hospital	6 (4,7%)
5.	Source of information for adhesive systems	
	- University	88 (39,5%)
	- Seminar and hands-on	16 (7.2%)
	- Social media	88 (39,5%)
	- Dental supplier	31 (13,9%)
6.	Topic of interest on seminar and hands-on	
	- Endodontic	85 (68%)
	- Restoration	34 (27,2%)
	- Others	6 (4,8%)

The Clinical Implications of Adhesive Systems

The Clinical implications of adhesive systems are mentioned in Table 6. The results stated that most dentists handled more posterior teeth than anterior teeth; 91 respondents (86.7%) and 14 respondents (13.3%), respectively, and only 56 respondents (53.3%) used a rubber dam during restoration procedure. The author presented six adhesive system products with different types and generations for the next question. Respondents were asked to choose which adhesive system is the most commonly used during clinical procedures. The results obtained were that there were three products with the highest answers, namely 96 respondents (91.4%) knew and used Single Bond Universal Adhesive (3M ESPE, USA), 41 respondents (39%) knew and used Adper Single Bond Plus (3M ESPE, USA), and 33 respondents (31.4%) knew and used Optibond Universal (Kerr Dental).

Table 5. Knowledge in the latest adhesive systems.

No	**Questions**	**Choices and Correct Answer**	**N (%)**
1	Definition of the adhesion?	A. Substrate attachment with dissimilar adherents	99 (94.3%)
		B. Substrate attachment with similar adherents	6 (5.7%)
		C. Not sure	0 (0%)
		Answer: A	
2	The classification of adhesive systems. (you may answer more than one)	A. Generation B. Solvent C. Mechanism of smear layer removal D. Number of clinical steps Answer: All is included	
		1 from 4 choices	41 (39%)
		2 from 4 choices	39 (37.3%)
		3 from 4 choices	16 (15.2%)
		All is included	9 (8.6%)
3	What is the component in fifth generation adhesive system?	A. Etchant; primer and bonding in one bottle	35 (33.3%)
		B. Etchant; self-priming adhesive	67 (63.8%)
		C. Primer; solvent; and bonding	3 (2.9%)
		Answer: A	
4	Nowadays, how many adhesive systems based on their generation?	A. Generation I to VII	7 (6.7%)
		B. Generation I to VIII	80 (76.2%)
		C. Generation I to IX	18 (17.1%)
		Answer: B	
5	What is the difference between etch and rinse to self-etch adhesive system?	A. Self-etch has less step compare to total etch/etch and rinse adhesive system, due to no etch and rinse step.	104 (99%)
		B. Total etch/etch and rinse has higher hardness compare to self-etch adhesive system, due to the more step.	1 (1%)
		Answer: A	

Table 6. Clinical implications of adhesive systems.

No	Questions	Choices and Correct Answer	N (%)
1.	Based on clinical experiences, which tooth region is treated in most cases?	A. Anterior B. Posterior Answer: A or B	14 (13.3%) 91 (86.7%)
2.	Did you use a rubber dam during the resin composite restoration procedure?	A. Yes B. No Answer: A or B	56 (53.3%) 49 (46.7%)
3.	From the pictures below, which adhesive system do you usually used? (you may answer more than one).	A.  B.  C.  D.  E.  F.  Answer: Any	96 (91.4%) 41 (39%) 15 (14.3%) 3 (2.9%) 33 (31.4%) 5 (4.8%)
4.	Based on the picture below, what is the kind of generation and type of adhesive system? 	A. Generation 8 (Universal) - combined total-etch, self-etch and selective-etch B. Generation 5 - total etch C. Generation 7 - self-etch Answer: A	71 (67.6%) 12 (11.4%) 22 (21%)
5.	Based on the picture below, what is the kind of generation and type of adhesive system? 	A. Generation 8 (Universal) - combined total-etch, self-etch and selective-etch B. Generation 5 - total etch C. Generation 7 - self-etch Answer: B	4 (3.8%) 87 (82.9%) 14 (13.3%)
6.	In the case of fiber post cementation using dual-cure luting resin cement, which adhesive system do you use?	A. Total etch/etch and rinse B. Self-etch C. Selective etch Answer: B	40 (38.1%) 60 (57.1%) 5 (4.8%)
7.	In the case of tooth abfraction restoration, which adhesive system do you use?	A. Total etch/etch and rinse B. Self-etch C. Selective etch Answer: C	20 (19%) 26 (24.8%) 59 (56.2%)
8.	In the case of fissure sealant, which adhesive system do you used?	A. Total etch/etch and rinse B. Self-etch C. Selective etch Answer: A	69 (65.7%) 25 (23.8%) 11 (10.5%)
9.	How long is enamel etching prior to the rinse?	A. 5 sec B. 10 sec C. 15 sec Answer: C	2 (1.9%) 6 (5.7%) 97 (92.4%)
10.	How long is dentin etching prior to the rinse?	A. 10 sec B. 15 sec C. 20 sec Answer: A	90 (85.7%) 12 (11.4%) 3 (2.9%)

Precisely on the fourth question the author presented photos of products A and B, respondents were asked to state the type and generation of the photos of the adhesive system that had been presented. The answers obtained were as many as 71 respondents (67.6%) answered generation 8 (Universal) - Combined total-etch, self-etch and selective-etch. This also applies to the fifth question with a photo of product C, the results of data analysis show that 87 respondents (82.9%) answered generation 5 - total etch.

Then, the author included three questions that discuss the choice of adhesive system type based on existing case examples. In the first case, the author discussed fiber-post cementation with dual-cure resin luting cement. As many as 60 respondents (57.1%) answered self-etch, 40 respondents (38.1%) answered total-etch, and 5 respondents (4.8%) answered selective etch. The second case discussed the restoration of abfraction teeth as many as 59 respondents (56.2%) chose the selective etch answer, 26 respondents (24.8%) chose the self-etch answer, and 20 respondents (19%) answered total-etch. The third case discussed the treatment of fissure sealants.

It was found that 69 respondents (65.7%) answered total-etch, 25 respondents (23.8%) answered self-etch, and 11 respondents (10.5%) answered selective etch. The two last questions showed the distribution of etching time options on enamel and dentin structures. It was known that in the question of how long it took to etch the email structure, 97 respondents (92.4%) chose 15 seconds, 6 respondents (5.7%) chose 10 seconds, and 2 respondents (1.9%) chose 5 seconds. Whereas in the dentin structure, 90 respondents (85.7%) chose 10 seconds, 12 respondents (11.4%) chose 15 seconds, and 3 respondents (2.9%) chose 20 seconds.

DISCUSSION

The primary study objective was to establish an understanding regarding the use of adhesive systems during restorative procedures among specialist's dentist in conservative dentistry using a cross-sectional study. In this study, 105 respondents were active members of the Indonesian Conservative Dentistry Association (IKORGI) – Central Jakarta branch. The data were collected using the Google form application due to the ongoing COVID-19 pandemic. Moreover, the relatively high level of respondent activity made the online questionnaire preferable.

Following previous studies in 2020 and 2017, the result of univariate data analysis obtained by the respondents in this study was dominated by female respondents (86.7%). The female dentist mostly majored in conservative dentistry as well as pediatric dentistry and oral medicine.[8,13] On the contrary, male dentists are preferred in other specialists (e.g., oral surgery, orthodontics, and periodontics).[14] This study reported one hundred two respondents (79.1%) working in a hospital or private clinic, while the rest are in the government hospital or public health center and oral and dental specialist hospital. A reason for that was the large number of private hospitals and clinics located in Central Jakarta with high patients' flow.

Respondents in this study came from various years of specialist ranging from 1983 to 2019, where the research respondents belonged to generation X and generation Y (millennials). Based on the concept of understanding, generation X is people born between 1961 – 1980 who understand the beginnings of technological developments. Meanwhile, generation Y people born in 1981 – 1995 are categorized as "digital natives", groups who have lived side by side with technology since the beginning of their life.[15] Technological progress in that year has progressed towards digitalization and modernization, which at this time these changes are very beneficial to all dentists worldwide.[16]

The benefit of technological development is facilitating communication between dentists and dental students is currently dominated by the millennial generation, who are getting used to and following learning methods through e-learning.[17] This means that the information sought can be easily obtained by its users. Thus, all information regarding the adhesive system is straightforward for dentists to acquire. Furthermore, educational institutions are the beginning of the introduction to dentistry. The access systems facilitated by the university accommodate university members in seeking the latest knowledge related to dentistry. Therefore, in our study, 88 respondents (39.5%) chose educational institutions and social media as the source of adhesive systems information.

The questionnaire in our study about knowledge regarding the latest adhesive systems reported that, most of the dentist (99 respondents – 94.3%) fully understood about the definition of adhesion. Adhesion is defined as the sticking of two surfaces to one another, then dental adhesion depends on the properties of components: assembly materials such as cement and adhesive, the tooth, and prosthesis.[18] However, only 9 respondents – 8.6% know about adhesive system classification that based on generation, number of clinical steps, smear-layer treatment, and etching strategies. This could be due to overlapping classification of adhesive systems confusing for its users. In addition, currently most of the literature often describes the classification based on generation and number of clinical steps only.[5,8,19]

The next question in the questionnaire concerns about components contained in the generation fifth adhesive system. Based on the literature, the fifth-generation adhesive system consist of the primer and the bonding agent combined into one bottle, with an etching agent in a different container. This system is popular with the term "one-bottle".[5] Only 35 respondents (33.3%) answered accurately about the composition of the fifth-generation adhesive system, and this is speculated that numbers used the product in daily clinical practice. Additionally, aligned with the result in Table 4, the 3M Adper Single Bond 2 (product B) discussed in the third question was answered 41 times (39%). However, the product most frequently used by respondents was 3M ESPE Single Bond Universal Adhesive (product A), which was answered 96 times (91.4%). In this study, the authors asked about adhesive system classification based on generation, and that is reasonably understood by 80 respondents (76.2%). Their understanding of the classification of adhesive generation is quite good, due to many literature studies that review the adhesive system classification having 8 generations until now.[5]

Adhesive system classification based on etching strategies are total-etch and self-etch, and one additional selective-etch strategy. Self-etch is an adhesive system that does not require a separate etching step because it is packaged in one solution bottle. Self-etch adhesive simultaneously conditions the enamel and dentin structures and infiltrates and dissolves part of the smear layer. The advantage of self-etch adhesive is that the working procedure is shorter, does not require rinsing steps, and minimizes post-treatment sensitivity due to acidic compounds in the adhesive. However, this type has a deficiency in bond strength with tooth structure, especially dentin with caries and sclerotic lesions, resulting in poor adhesive strength and non-long-term service life.[20]

In contrast, the total-etch type tends to have a more prolonged procedure. However, more work runs do not imply better bond strength.[21]. This is due to various factors such as the use of dental insulating products, etching time, and the multiple application methods of the adhesive. The total-etch adhesive provides higher bond strength than self-etch after repeated applications.[21,22] Applying three layers of total etch and two layers of self-etch provides better bond strength than a single application.[21] Thus, the correct answer to answer the fifth question in Table 5 is that self-etch has a shorter number of stages than total-etch because there is no need to do the etching and rinsing process, and 104 respondents (99%) chose the right answer.

Saliva contamination on enamel or dentin may have a negative effect on adhesive bond-strength in resin composite restoration.[23,24] The collagen contained in the saliva enzyme may degrade collagen fibers after etching procedure, which could interfere with hybrid layer formation.[24] To prevent that condition, a rubber dam isolation can be used during restorative procedures (direct restoration, indirect restoration, fiber-post placement), to prevent iatrogenic cases, and help in cracked tooth diagnosis.[23] The rubber dam isolations used by 59 respondents (53.3%) during restorative procedures. Nevertheless, other 49 respondents (46.7%) never used it during restorative procedures. Rubber dam isolation has a significant effect on bond strength to enamel, independent of the adhesive systems.[25] Additionally, the long-term effect on successful of the restoration.[26] Thus, the application of a rubber dam is advised whenever restorative procedures are performed.

A rubber dam not used by all the respondents due to the high operational cost produced in expensive treatment fee, difficulty in rubber dam placement, longer time for dental treatment, and inconvenience for the patient.[23] In order to overcome those problems, dentists may practice more and use rubber dam frequently, as well as inform the patient about the benefit of the rubber dam prior the treatment. The use of local anesthesia may improve the comfort for patients during rubber dam placement.[23] Rubber dam is not the only dental isolation tool, but there are various other types of dental isolation products such as bibulous paper, cotton rolls, and dental suction.[24] The success rate of composite resin using rubber dam isolation is 60.41% and cotton roll isolation is 54.31% after 2 years, which is known to have no significant difference. [24]

The other clinical implications of adhesive systems discussed in Table 6 is about the adhesive system preference for fiber-post cementation. Sixty respondents (57.1%) prefer self-etch, 40 respondents (38.1%) for total-etch, and 5 respondents for selective-etch (4.8%) adhesive system during fiber-post cementation. Fiber post used in post endodontic treatment to enhance the strength and improve the final outcome of restoration. Fiber post have elastic modulus as same as dentin and its simple procedure by cementing it using an adhesive technique.[27] Previous study mentioned that bond strength of the adhesive system in fiber post cementation were depend on the hybrid layer and resin tag.[28] Total-etch adhesive system has a longer procedure during fiber post cementation. It consisting of etching solution application, followed by rinsing and drying, primer application, bonding agent application, and the final step is cementing the fiber post using resin material.[28] Self-etch adhesive system combines etching solution and primer into one solution, without rinsing and drying procedures are required. However, application procedures using etching is more complex and may risk of etching solution and water remaining in the root canal.[28] Selective-etch adhesive system is used when the cavity still has enamel structures. Therefore, when deciding to use selective-etch technique, the clinicians must pay attention so that the etching solution does not spread to the dentin surface.[29]

In order to improve bond strength in fiber post cementation using self-adhesive resin cements and make it adequate alternative to regular resin cements, application of universal adhesive on root canal dentin prior the self-adhesive resin cement may increase bond strength between fiber post and dentin.[27] The universal adhesive system can be used in total-etch, self-etch, or selective-etch mode. Previous study in 2022, mentioned that the universal adhesive in self-etch mode applied to root canal dentin prior fiber post cementation can improve bond strength to root canal dentin. Additionally, the scrubbing method when apply the adhesive and 15 seconds solvent evaporation may enhance bond strength in universal adhesive.[27,29]

On the other hand, for dentin etching time, most respondents (90 respondents – 85.7%) answered 10

seconds, 12 respondents (11.4%) answered 15 seconds, and three respondents (2.9%) answered 20 seconds. A previous study conducted by Burrer et al. in 2020 about etching trials on dentin structures with different times: 15 seconds (control group); 7.5 seconds; 30 seconds; 60 seconds; 120 seconds; using 3M Scotchbond Universal product, resulted in an etching time of 7.5 seconds has a significant decrease in bond strength.[34] In addition, the etching time was doubled over the manufacturer's instruction recommendations, having similar bond strengths in the group with an etching time of 15–30 seconds.[34] The dentin surface tends to be of higher tubular density and moist and can lead to increased demineralization resulting in a thicker hybrid layer and lower bond strength.[35] It can be concluded that the recommended time for etching the dentin structure is 10-15 seconds, but this can change according to the manufacturer's product instructions.

Current study has several shortcomings, where data collection was conducted online and could not be done face to face, caused by various external factors, including the COVID-19 pandemic in Indonesia emerged as a phenomenon that has fluctuations in cases that are unstable and difficult to predict. In addition, the productivity of the research respondents was relatively high, which is one of the considerations for this research to be conducted online.

The data collection results showed an uneven distribution, where not all Central Jakarta IKORGI members participated in filling out the research questionnaire, so most respondents were obtained with a graduation year range of 0-5 years. In addition, the relatively short data collection time resulted in the authors not reaching more respondents outside Central Jakarta. Therefore, further research is required to detail and include more extensive questions related to dental restorations outside of the three cases listed on the research questionnaire on conservative dentistry in a larger population (Indonesian dentists).

Thus, the null hypothesis was that there are differences in knowledge regarding the use of adhesive systems during restorative procedures among dentist specialist in conservative dentistry in the Indonesian Conservative Dentistry Association (IKORGI) - Central Jakarta branch was rejected in this study. They understood the adhesive system quite well, as seen from the maximum score of the respondents was 4.25.

CONCLUSION

The understanding of adhesive systems knowledge among dentist specialists in IKORGI - Central Jakarta Branch is good, although there are some significant differences between the research variables.

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CONFLICT OF INTEREST

The authors declare no competing interests.

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