Knowledge and clinical practice of adhesive protocols for composite restorations among dental practitioners in Islamabad

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ABSTRACT

Objective: To assess the knowledge and clinical practice of adhesive protocol of composite restorations among dental practitioners working in dental hospitals and clinics of Islamabad.
Study Design: Descriptive cross sectional study
Place and Duration: Islamabad Medical and Dental College, from 1st October 2017 to 20th March 2018.
Methodology: A pre piloted questionnaire was used to record information related to knowledge and clinical practice of adhesive protocols in composite restorations. The questionnaire contained questions regarding increment selection, adhesive approach, adhesive preference, isolation approach, bond strength, postoperative sensitivity. Data was assessed for knowledge regarding adhesive protocols and its clinical application in light of responses obtained in questionnaire.
Results: Among total of 172 respondents 97.1% utilized incremental technique for composite restoration and 84.3% used etch and rinse approach for adhesion. About 46.5% of the respondents identified the IV generation adhesives as "gold standard". Regarding clinical practice, IV generation adhesives were used by 29.7% of the practitioners. The knowledge of recommended isolation method for adhesive restorations was identified as rubber dam by 88.4% but only 4.7% identified the clinical practice of always applying it while doing an adhesive restoration.
Conclusion: Most of the dental practitioners possess evidence based knowledge regarding adhesive protocols for composite restorations. However the clinical practice of an occasional use of rubber dam and the use of simplified adhesives is not in accordance with the established evidence based practice.
Keywords: Adhesive, Rubber dam, Composite resins, Dental practitioner, Dental restoration, Knowledge

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INTRODUCTION

In 1950, restorative materials based on adhesive technology were introduced and over time they gained popularity as the material of choice for restoring teeth[1]. Among the various reasons for the acceptance of these materials as an effective alternative to amalgam was the advantage of restoring teeth more conservatively. However, the long term benefits of adhesive restorations like composite relied on a myriad of factors and most notable among them was the ability of the operator to follow the correct technique involved in establishing an adhesive bond. The quality of composite restorations is a function of the operator knowledge and skill[2], as the bond strength of adhesive restoration is significantly influenced by the adhesive protocol followed in different situations[3].

The principle governing the adhesive restorations is the exchange of inorganic part of tooth with synthetic resin. It involves the removal of calcium phosphate and formation of micro-porosities on tooth surface. These micro-porosities are subsequently filled with resin providing a micromechanical interlocking in tubules for retention of restoration[4].

Applying adhesive technology different adhesive systems were produced. Originally formulated adhesive systems were with

separate etchants, primers and adhesives, but over time they evolved in to a single component system[5]. The simplification of the technique reduced the possibility of technical error and the total time to perform composite restoration, but most studies have demonstrated that the traditional three steps etch and rinse adhesive systems produced better and long lasting restorations[6].

Modification in adhesive technology has provided dental practitioners with a large range of adhesive systems, including two step and three step etch and rinse systems and the two step and one step self-etch systems and universal adhesives[5]. However, due to a plethora of adhesive systems present in the market, the dental practitioner may find it difficult to make an evidence based selection of the adhesive system. Owing to the ease of use associated with the single step self-etching adhesive systems, they continue to be the most preferred adhesive systems by dental practitioners despite the lack of adequate support by evidence[5].

However, irrespective of the adhesive system being used, the use of a rubber dam to achieve effective isolation of the tooth is regarded as an important prerequisite of any adhesive protocol. Contamination of etched enamel or dentin by saliva results in a significantly reduced bond strength[7]. Clinical reports have also supported the idea that restoration longevity could be influenced by rubber dam isolation[8]. Despite the available evidence the use of rubber dam in clinical dentistry has not been that strictly observed, in a study conducted by Demarco et al involving 187 general dental practitioners a staggering number of 74.3%respondents did not use rubber dam[9].

Hence it is important to see how well the dental practitioners in our region comply with the evidence based guidelines pertaining to the adhesive protocols of composite restorations. The objective of this study was to assess the knowledge and clinical practice of adhesive protocol of composite restorations among dental practitioners working in dental hospitals and clinics of Islamabad.

METHODOLOGY

This descriptive cross sectional study was conducted in Islamabad Medical and Dental College over a period of six months starting from 1st October 2017 to 20th March 2018. The inclusion criteria for the study was dental practitioners performing composite restorations in Islamabad while the exclusion criteria was undergraduate students, house officers and dental practitioners unwilling to participate in the study. Cluster sampling was used for selecting dental practitioners from clinics while convenience sampling was used for dental practitioners working in hospitals. Sample calculation was made using WHO sample calculator with 90% confidence interval and 347 was the required sample size.

Approval from the relevant institutional review board (included ethical review committee) was acquired before commencing the research. Pre piloted questionnaire was used to record the information related to clinical practice and knowledge regarding adhesive protocols for composite restorations. Piloting involved assessment of content validity by subject specialists followed by recording responses of 10 participants for assessment of the reliability using Cronbach alpha scores (α>0.7). The questionnaire comprised of nine clinical practice based questions and five knowledge based questions. The questionnaire contained questions regarding increment selection, adhesive approach, adhesive preference, isolation approach, bond strength, postoperative sensitivity.

The questionnaire was used to collect data in the form of responses given by the dental practitioners. The dental practitioners filled the questionnaire on the basis of their knowledge and adhesive protocols they are following for composite restorations. The questionnaires were distributed by hand among dental practitioners working in dental hospitals and private practices of Islamabad and were recollected by hand.

Data Analysis: The data was obtained in the form of responses to the questionnaire. It was tabulated and analyzed using the Statistical Program for the Social Sciences Software (version 22.0). Valid percentages were calculated based on the number of responses to each question.

RESULTS

A total of 207 questionnaires were retrieved from the respondents who participated in the study. The response rate was 59.6 % for this study. In order to control response bias, questionnaires with un-attempted questions were excluded and 172 completed questionnaires were finally selected for analysis. Table-I highlights the frequency of general characteristics of the respondents with the majority of the respondents claiming to use composite for both anterior and posterior teeth. About 97(56.4%) of the dental practitioners had an experience of more than 5 years.

Table-I: Demographics of the participants (N=172)

General characteristics		n (%)
Qualification	Graduate	77 (44.8%)
	Postgraduate	95 (55.2%)
Experience	< 5 years	75 (43.6%)
	6-10 years	58 (33.7%)
	> 10 years	39 (22.7%)
Site of Practice	Hospital based	81 (47.1%)
	Clinic based	40 (23.3%)
	Both	51 (29.7%)
Type of tooth mostly restored	Anterior teeth	68 (39.5%)
	Anterior and Posterior teeth	104 (60.5%)

Table-II shows the preference of adhesives based on the chronological classification, with 51 (29.7%) opting for the IV generation adhesives. The etching time for etch and rinse approach was identified as 30 seconds for enamel and 15 seconds for dentin by the majority of the respondents 86 (50.0%).

Table-II: Frequency of clinical preferences for different types of adhesives (N=172)

Preferred adhesive generation	n (%)
IV	51 (29.7%)
V	39 (22.6%)
VI	17 (9.9%)
VII	16 (9.3%)
Universal	31 (18.0%)
Others	18 (10.5%)

The results of the knowledge based questions pertaining to increment size, use of rubber dam, adhesive generation identified as gold standard, adhesive approach with most favorable bond strength and adhesive approach associated with least postoperative sensitivity are shown in Table III. Etch and rinse approach was most preferred for placing composite restorations103 (59.8%), followed by selective enamel etching in combination with self-etching 45 (26.2%) and self-etch 24 (14.0%).

About 167 (97.1%) made incremental use of the composite and 113 (65.7%) only used rubber dam occasionally while restoring teeth with composite while 51 (29.7%) of the respondents never used a rubber dam.

Table-III: Frequency for responses on knowledge based questions regarding increment size, rubber dam, adhesive, bond strength, postoperative sensitivity (N=172)

		n (%)
Increment size	1 mm	33 (19.2%)
	2 mm	128 (74.4%)
	3 mm	11 (6.4%)
Importance of rubber dam	Yes	152 (88.4%)
	No	20 (11.6%)
Gold Standard adhesive	IV	80 (46.5%)
	V	31 (18.0%)
	VI	37 (21.5%)
	VII	24 (14.0%)
Favorable bond strength	Self-Etch	24 (14.0%)
	Etch and Rinse	103 (59.9%)
	Selective enamel etching+ Self-Etch	45 (26.2%)
Adhesive approach with least postoperative sensitivity	Self-etch	38 (22.1%)
	Etch and rinse	66 (38.4%)
	Selective enamel etching + Self etch	68 (39.5%)

DISCUSSION

This study identified a disparity between the knowledge and clinical practice of adhesive procedures among dental practitioners working in Islamabad. Initially the use of adhesive restorations in the stress-bearing areas of posterior teeth was limited but that changed with the advancement of adhesive technology[10].

Moeen ud Deen and colleagues while evaluating the frequency of different types of restorative materials observed in patients reported that Amalgam (58.8%) was the most commonly placed restorative material in posterior teeth compared to composite (14.5%)[11]. However in our study 60.5% respondents relied on composite for use in both anterior and posterior teeth. Although these results cannot be compared due to a difference in the nature of information being provided by the two studies however it does suggest an increasing trend in operator preference for composites in posterior teeth.

Incremental filling has been identified to improve micro tensile bond strength of the composite[12] and the use of medium sized 2 mm increments of composite generates less cuspal strain while ensuring the mechanical properties of the material are not compromised[13]. In the present study 74.4% of the respondents identified using a 2 mm sized increment for their composite restoration which is in agreement with contemporary evidence. Therefore, a large majority of the dental practitioners assessed in this study claimed to be using the recommended increment size.

The use of etch and rinse approach and more specifically the 4th generation of adhesives have been regarded as the "gold standard" based on their clinical performance[14]. The present study revealed that most clinicians (46.5%) have the knowledge of 4th generation adhesives being the "gold standard" but a relatively small number (29.7%) utilized these adhesives in their clinical practice. The fact that only 29.7% of the respondents preferred 4th generation adhesives in clinical practice suggests a trend towards the use of simplified adhesives rather than what is identified as the "gold standard". These findings differ from those reported by Demarco et al, wherein 15% and 77% of the respondents preferred 4th and 5th generation adhesives respectively[9]. This difference may be attributed to the selected sample and the regional availability of the different types of adhesive systems across the world.

Large number (39.5%) of participants lacked the knowledge regarding association of postoperative sensitivity with adhesive approach as they identified selective enamel etching + Self-Etch approach to be associated with the least postoperative sensitivity contrary to existing evidence[14].

Most of the respondents (88.4%) in our survey agreed that rubber dam should be applied while performing adhesive restorations as it affects the quality of restoration. This is in accordance with the current evidence that recommends the use of rubber-dam for adhesive restorations as it is helpful for achieving good adhesion between the tooth and restorative materials[15]. Therefore, most of the respondents of the present study have the necessary knowledge related to the importance of isolation in delivering adhesive restorations.

However, despite having adequate knowledge, respondents did not employ rubber-dam in clinical practice with only 4.7% responding that they always use it. These results are in agreement with the previous survey of the house officers of twin cities where only 3.6% used rubber dam[16]. On the other hand, Demarco et al reported a 25% usage of rubber dam among Brazilian dental practitioners while placing composite

restorations[9]. The difference in the reported practice of rubber dam between the two studies can be explained by a difference in the population being surveyed; the dental practitioners in Pakistan are reluctant to apply rubber dam due to the additional chair side time and lack of adequate clinical training[16].

The strength of the present study is a sample comprising of roughly equal number of practitioners with and without post graduate qualification. The limitations of the study include a questionnaire with acceptable reliability scores. An improvement of the questionnaire design can be carried out in order to improve the reliability even more. Also the study population was restricted to dental practitioners of Islamabad hence the results may not be representative of the knowledge and clinical practice of dental practitioners residing in other cities of the country. The response rate of 59.6% for the present study is comparable to other similar surveys[9], but the reduction in the total responses available for analysis due to exclusion of incompletely filled questionnaires was observed. This may have been avoided by mentioning commercial names of adhesives and associated items to facilitate identification by dental practitioners who may not be familiar with the exact scientific classification.

CONCLUSION

Most of the dental practitioners possess evidence based knowledge regarding adhesive protocols for composite restorations. However the clinical practice of an occasional use of rubber dam and the use of simplified adhesives is not in accordance with the established evidence based practice.

Recommendation: Regular attendance of continuing education programs by clinicians can help reduce the disparity between knowledge and clinical practice.

CONTRIBUTION OF AUTHORS

Ashraf MU: Conceived idea, Designed research methodology, Data analysis, Manuscript writing, Introduction writing
Bhatti UA: Designed research methodology, Result compilation, Manuscript writing
Qureshi B: Proof reading, Manuscript writing, Literature search
Ashfaq Q: Data collection, Data analysis
Niazi A: Data collection, Data analysis
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