



Knowledge and Perception of Saudi Dental Professionals Regarding the Use of Resin Infiltration in their Clinical Practice; A Survey-Based Study in Riyadh, KSA

**Abdullah Fozan A. Alhammad¹, Adel Omer M. Alrayes¹,
Mohammad Mogbil A. Alhedaithy¹, Abdulkarim Abdullah A. Alabdulkarim²,
Faisal Raafat F. Alhakeem², Badr Soliman M. Alhussain³
and Shahzeb Hasan Ansari^{4*}**

¹Dental College Intern, College of Dentistry, University of Riyadh Elm, Riyadh, Saudi Arabia.

²General Practitioner Ministry of Health, Saudi Arabia.

³Consultant Restorative Department, Prince Sultan Military Medical City, Riyadh, Saudi Arabia.

⁴Faculty Preventive Dentistry, REU, KSA College of Dentistry, University of Riyadh Elm, Riyadh, Saudi Arabia.

Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/JPRI/2020/v32i3731007

Editor(s):

(1) Dr. Rafik Karaman, Al-Quds University, Palestine.

Reviewers:

(1) Ganaraj Shetty, AB Shetty Memorial Institute of Dental Sciences, Nitte(Deemed to be university), India.

(2) Musa O. Salawu, University of Ilorin, Nigeria.

Complete Peer review History: <http://www.sdiarticle4.com/review-history/64276>

Original Research Article

Received 25 October 2020

Accepted 29 December 2020

Published 30 December 2020

ABSTRACT

Introduction: Throughout the advancement of subsurface caries lesions, mineral is disbonded out of the enamel, causing enhanced penetrability that look like clinically as incipient or white spot lesions. Nowadays, these lesions are regularly treated by increasing remineralization, e.g., by enhancing the patient's oral hygiene or fluoridation. Nevertheless, in uncooperative patients with cavitated proximal lesions, this approach has significant drawbacks.

*Corresponding author: E-mail: shahzebhasan@riyadh.edu.in;

Methodology: A total of 508 dentists filled the online survey, which was distributed using social media and emails. Online questionnaire was constructed consisting of questions related to demographic data followed by questions linked to their knowledge and perception of Resin Infiltration use among their patients.

Results: Overall knowledge reported by the participants regarding Resin Infiltration was 25.2% poor, 72.9% moderate and only 1.9% excellent. 64% of the dental professionals knew that RI is a micro-invasive procedure.

Conclusion: It can be concluded from the findings that the knowledge of Riyadh based dental professionals regarding the use, indication and technique of Resin Infiltration is not satisfactory.

Keywords: Resin infiltration; minimal invasive dentistry; dental professionals.

1. INTRODUCTION

Throughout the advancement of subsurface caries lesions, mineral is disbonded out of the enamel, causing enhanced penetrability that look like clinically as incipient or white spot lesions. Nowadays, these lesions are regularly treated by increasing remineralization, e.g., by enhancing the patient's oral hygiene or fluoridation. Nevertheless, in uncooperative patients with cavitated proximal lesions, this approach has significant drawbacks. A potential replacement for the arrest of caries lesions may possibly be the infiltration of subsurface lesions with low-viscosity light-curing resins. Since porosities of enamel caries behave as diffusion passageways for acids and dissolved minerals, penetration of these lesions with resins could block the pathways, therefore leading to the stoppage of caries development [1],[2].

New-found tools for caries infiltration are an alternative restorative method to avoid additional progress of enamel lesions. The aim of Resin Infiltration is to occlude the micro-porosities inside the lesion body by penetration with low-viscosity light-curing resins that have been enhanced for quick infiltration into the porous enamel. Following etching the surface with HCL gel, a resin infiltrate is used on the lesion. The resin penetrates into the lesion using capillary forces. The effectiveness of RI in halting caries lesions has been explored in various studies [3],[4].

An encouraging consequence of RI is that enamel lesions lose their white appearance when their microporosities are occluded with the resin and look same as healthy enamel. Consequently, this regimen has been implemented not merely to stop enamel lesions but also to improve the esthetics of labial-surface lesions. The infiltrant is a light-polymerizable material having an exceptionally low viscosity and contact angles on enamel with characteristics that enhance their

swift infiltration into the capillary edifices of the enamel caries lesion. Nevertheless, the mineralized surface layer impedes resin from entering into the lesion; hence, this method involves elimination of this layer by using 15% hydrochloric acid for 2 minutes [5],[6].

1.1 Aims of the Study

- To determine the level of knowledge regarding Resin Infiltration among Riyadh based Saudi dentists.
- To compare the Dentists' responses on the basis of qualification and work experience.

2. MATERIALS AND METHODS

2.1 Study Duration

Study was conducted for 3 months between August 2020 to October 2020.

2.2 Study Design

This is a cross sectional study conducted among the dentists in Riyadh using an online survey.

2.3 Study Sample

A total of 508 dentists filled the online survey, which was distributed using social media and emails.

2.4 Study Instrument

Online questionnaire was constructed consisting of questions related to demographic data followed by questions linked to their knowledge and perception of Resin Infiltration use among their patients.

2.5 Instrument Validity and Reliability

A pilot study was conducted by sending the survey to 20 participants and the data was inserted in SPSS version 22 to determine the reliability by using Chronbach's coefficient alpha

and the value was .761, which is acceptable to conduct this study. Validity of the questionnaire was tested by sending it to experienced researchers in Riyadh Elm University and changes were made according to their feedback and comments.

2.6 Statistical Analysis

Collected data was analyzed using SPSS version 22, where descriptive as well as inferential statistics was conducted. Comparisons between groups are made with the value of significance kept under 0.05 using Chi-square test.

3. RESULTS

A total of 508 dentists from Riyadh, Saudi Arabia participated in this study, with 42% females and 58% males.

Out of 62.6% had bachelors and 37.4% participants had Master's or Board.

As far as their work experience was concerned, 66.9% had less than 5 years and 33.1% had more than 5 years of experience.

Overall knowledge reported by the participants regarding Resin Infiltration was 25.2% poor, 72.9% moderate and only 1.9% excellent. 64% of the dental professionals knew that RI is a micro-invasive procedure.

71% reported that RI is indicated for incipient lesion and similar number revealed that low viscosity resins can be used for RI. 25.4% gave the incorrect response to RI if it can remove carious lesions and 55.4% correctly responded that RI is effective against dental fluorosis. 71.9% of the subjects correctly notified that RI is not effective against cavitated carious lesions,

Participants with Bachelors degree had lower knowledge about proper etching technique in RI as compared to participants with Masters or Board qualification (p-value: .041).

Bachelor dentists also showed lower level of knowledge when inquired about the need of a dehydrating agent in RI (p-value: .011).

Similarly, only 2 variables showed significant differences when compared the responses on the basis of work experience. Dentists having less than 5 years of experience rated their knowledge much lower as compared to dentists having more than 5 years of experience (p-value: .001).

4. DISCUSSION

In this study Fig. 1 describes the Gender distribution among the study participants, Fig. 2 shows the Qualifications of the study participants and Fig. 3 denotes the Work experience of the study participants.

This study aimed to assess the level of knowledge and perception of Saudi dental professionals towards the use, indication and technique involved with Resin Infiltration. Although RI has a history of discovery for more than 2 decades now [7], its use among the dentists has not been seen commonly until recent times. We could not find a similar study revealing the knowledge and perception of dental professionals regarding the use of RI, therefore we will scrutinize the responses given by our subjects in detail.

It can be noted from the findings that only 64% of the participants reported RI to be a microinvasive procedure. Studies have clearly indicated previously that RI is actually a microinvasive esthetic dental procedure with lab as well as clinical findings backing its authenticity. Merging this microinvasive method with a significant caries remineralization system may offer therapeutic advantages and substantially decrease both long term restorative requirements and expenses, thus completing the idea of minimum intervention dentistry [8].

In another question, majority of our study participants reported that RI is indicated mainly for incipient lesions. This is a correct response as we compared this with a systematic review, which discovered that the utilization of RI to stop the advancement of non-cavitated caries lesions is promising. This indicates that RI is a favorable noninvasive method and may possibly be judged as an added option to non-operative and operative treatment methods. Nevertheless, top-class, long-term clinical experiments, if possible, in general dental practice settings, are needed to verify the effectiveness of RI for non-cavitated caries lesions in both primary and permanent teeth [9].

We also inquired the participants about the use of 15% Hydrochloric acid in place of 37% Phosphoric acid for the purpose of acid etching. Majority of them did not know that 15% HCL is the better choice of material to be used when etching for RI. This has been tested and reported by several previous studies that 15% hydrochloric acid gel is more appropriate for the erosion of the

surface layer of shallow natural enamel lesions than phosphoric acid gel. Consequently, this pretreatment may possibly be desirable for the

conditioning of natural enamel caries lesions preceding to resin infiltration [10].

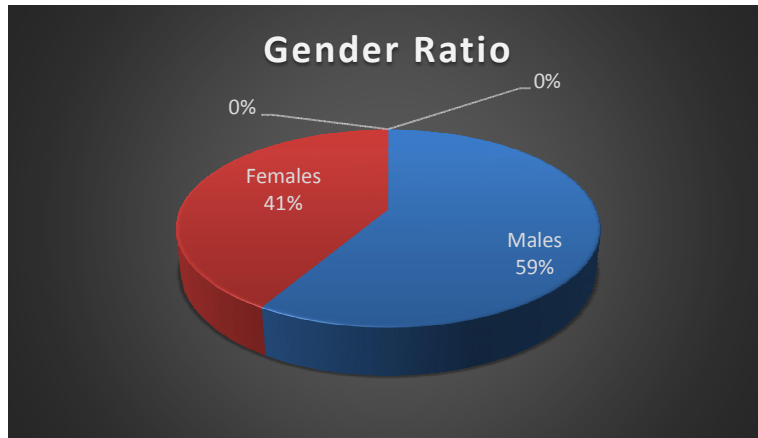


Fig. 1. Gender distribution among the study participants

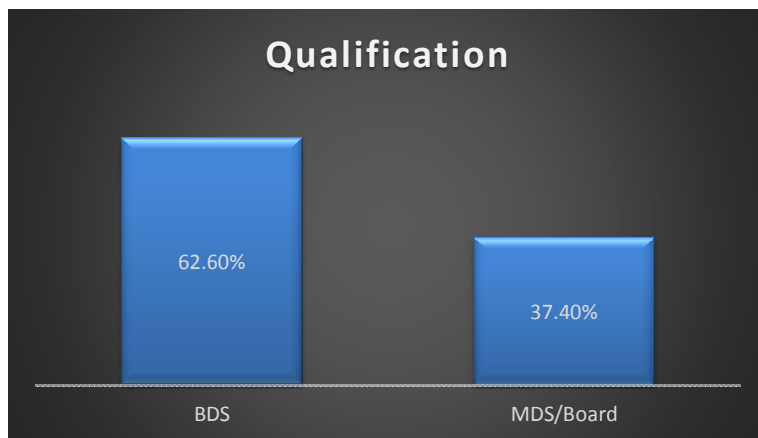


Fig. 2. Qualifications of the study participants



Fig. 3. Work experience of the study participants

Table 1. Descriptives of each survey question response reported by the study participants

Survey Questions	Response Frequencies
How do the participants rate their knowledge regarding RI?	Poor: 105 (25.2%) Moderate: 304 (72.9%) Excellent: 8 (1.9%)
Which statement regarding RI is true?	RI is a preventive procedure: 146 (35%) RI is a micro-invasive procedure: 267 (64%) RI is an invasive procedure: 4 (1%)
Incipient lesion is the main indication for resin infiltration.	True: 296 (71%) False: 84 (20.1%) Do not know: 37 (8.9%)
Low viscosity resins can be used for resin infiltration.	True: 230 (55.2%) False: 93 (22.3%) Do not know: 94 (22.5%)
Resin infiltration involves removal of carious lesion.	True: 106 (25.4%) False: 254 (60.9%) Do not know: 57 (13.7%)
Resin infiltration is effective against dental fluorosis.	True: 231 (55.4%) False: 112 (26.9%) Do not know: 74 (17.7%)
Resin infiltration is effective against cavitated carious lesion.	True: 84 (20.1%) False: 300 (71.9%) Do not know: 33 (7.9%)
15% hydrochloric acid is better etching agent as compared to 37% phosphoric acid for resin infiltration.	True: 98 (23.5%) False: 126 (30.2%) Do not know: 193 (46.3%)
Dehydrating agent is required in resin infiltration application	True: 169 (40.5%) False: 54 (12.9%) Do not know: 194 (46.5%)
Resin infiltration provides permanent occlusion of superficial micropores and cavities	True: 176 (42.2%) False: 102 (24.5%) Do not know: 139 (33.3%)
You require more knowledge and training regarding resin infiltration?	Yes: 396 (95%) No: 21 (5%)

Table 2. Relationship of knowledge with qualification of survey participants

Survey Questions	In relation with qualification
How do the participants rate their knowledge regarding RI?	p-value: .311
Incipient lesion is the main indication for resin infiltration.	p-value: .918
Low viscosity resins can be used for resin infiltration.	p-value: .325
Resin infiltration involves removal of carious lesion.	p-value: .454
Resin infiltration is effective against dental fluorosis.	p-value: .062
Resin infiltration is effective against cavitated carious lesion.	p-value: .313
15% hydrochloric acid is better etching agent as compared to 37% phosphoric acid for resin infiltration.	BDS: False: 34.4% Masters/Board: False: 23.1% p-value: .041*
Dehydrating agent is required in resin infiltration application	BDS: False: 9.9% Masters/Board: False: 17.9% p-value: .011*
Resin infiltration provides permanent occlusion of superficial micropores and cavities	p-value: .227
You require more knowledge and training regarding resin infiltration?	p-value: .249

*Statistically significant comparisons

Table 3. Relationship of knowledge with work experience of survey participants

Survey Questions	In relation with work experience
How do the participants rate their knowledge regarding RI?	Less than 5 years: Poor: 30.1% More than 5 years: Poor: 15.2% p-value: .001*
Incipient lesion is the main indication for resin infiltration.	Less than 5 years: False: 16.1% More than 5 years: False: 28.2% p-value: .008*
Low viscosity resins can be used for resin infiltration.	p-value: .520
Resin infiltration involves removal of carious lesion.	p-value: .335
Resin infiltration is effective against dental fluorosis.	p-value: .196
Resin infiltration is effective against cavitated carious lesion.	p-value: .156
15% hydrochloric acid is better etching agent as compared to 37% phosphoric acid for resin infiltration.	p-value: .216
Dehydrating agent is required in resin infiltration application	p-value: .681
Resin infiltration provides permanent occlusion of superficial micropores and cavities	p-value: .075
You require more knowledge and training regarding resin infiltration?	p-value: .347

*Statistically significant comparisons

We were able to gather some important information about the level of knowledge among the dental professionals regarding the use and indication of Resin Infiltration. However, the scope of this study can be expanded in future and information can be collected from other cities of Saudi Arabia to generalize the findings further. Moreover, similar studies should be done in other countries as well so that there can be a comparison constructed and awareness spread among international dentists regarding RI.

5. CONCLUSION

It can be concluded from the findings that the knowledge of Riyadh based dental professionals regarding the use, indication and technique of Resin Infiltration is not satisfactory. There is a need to educate and train our undergraduate dental students so that they can practice minimal invasive procedures as soon as they graduate.

CONSENT

As per international standard or university standard, Participants' written consent has been collected and preserved by the author(s).

ETHICAL APPROVAL

As per international standard or university standard written ethical approval (Ethical code: "FUGRP/2020/179/253/246") has been collected and preserved by the author(s).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

- Kim S, Kim E-Y, Jeong T-S, Kim J-W. The evaluation of resin infiltration for masking labial enamel white spot lesions. *Int J Paediatr Dent*. 2011;21:241–248. Available: <https://doi.org/10.1111/j.1365-263X.2011.01126.x>
- Paris S, Meyer-Lueckel H, Kielbassa AM. Resin infiltration of natural caries lesions. *J Dent Res*. 2007;86:662–666. Available: <https://doi.org/10.1177/154405910708600715>
- Gugnani N, Pandit IK, Goyal V, Gugnani S, Sharma J, Dogra S. Esthetic improvement of white spot lesions and non-pitted fluorosis using resin infiltration technique: Series of four clinical cases. *J Indian Soc Pedod Prev Dent*. 2014;32:176–180. Available: <https://doi.org/10.4103/0970-4388.130996>
- Muñoz MA, Arana-Gordillo LA, Gomes GM, Gomes OM, Bombarda NHC, Reis A, Loguercio AD. Alternative esthetic management of fluorosis and hypoplasia stains: Blending effect obtained with resin infiltration techniques. *J Esthet Restor Dent*. 2013;25:32–39.

- Available:<https://doi.org/10.1111/j.1708-8240.2012.00527.x>
5. Auschill TM, Schmidt KE, Arweiler NB. Resin Infiltration for Aesthetic Improvement of Mild to Moderate Fluorosis: A Six-month Follow-up Case Report. Oral Health Prev Dent. 2015 ; 13: 317–322.
Available:<https://doi.org/10.3290/j.ohpd.a32785>
 6. Lee J-H, Kim D-G, Park C-J, Cho L-R. Minimally invasive treatment for esthetic enhancement of white spot lesion in adjacent tooth. J Adv Prosthodont. 2013;5: 359–363.
Available:<https://doi.org/10.4047/jap.2013.5.3.359>
 7. Gwinnett AJ. Quantitative contribution of resin infiltration/hybridization to dentin bonding. Am J Dent. 1993;6:7–9.
 8. Manoharan V, Arun Kumar S, Arumugam SB, Anand V, Krishnamoorthy S, Methippara JJ. Is resin infiltration a microinvasive approach to white lesions of calcified tooth structures?: A systemic review. Int J Clin Pediatr Dent. 2019;12: 53–58.
Available:<https://doi.org/10.5005/jp-journals-10005-1579>
 9. Doméjean S, Ducamp R, Léger S, Holmgren C. Resin infiltration of non-cavitated caries lesions: A systematic review. Med Princ Pract. 2015;24:216–221.
Available:<https://doi.org/10.1159/000371709>
 10. Meyer-Lueckel H, Paris S, Kielbassa AM. Surface layer erosion of natural caries lesions with phosphoric and hydrochloric acid gels in preparation for resin infiltration. Caries Res. 2007;41:223–230.
Available:<https://doi.org/10.1159/000099323>

© 2020 Alhammad et al.; This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Peer-review history:
The peer review history for this paper can be accessed here:
<http://www.sdiarticle4.com/review-history/64276>