



Current Practice Scenario of Dentist in Gujarat Towards Concept of Revascularization Endodontic Procedure

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(Received: 05 January 2026

Revised: 15 February 2026

Accepted: 05 March 2026)

KEYWORDS

Regenerative endodontics, knowledge, Practice, Dental post graduate student, Tissue engineering

ABSTRACT:

Introduction: Regenerative endodontic procedures have attracted the attention of both clinicians and researchers, among all the recent progresses made in the field of dental sciences. Revascularization in endodontics is the development and delivery of tissue to replace diseased, missing and traumatised pulp.

Aim: The purpose of this study was to assess the current practice scenario of dentists in Gujarat state towards Revascularization Endodontic Procedure (REP).

Method: A survey was developed and distributed through the social media among dentists and dental institutes across Gujarat, comprising of 21 questions on knowledge, current practise and future dental treatment of revascularization endodontic procedures.

Result: Survey showed that 13% of the 624 responses were paediatric dentists, 22.1% were endodontists and 41.8% were general dentists. Out of total participants 42.3% had knowledge about revascularisation. 50.5% believed that this concept of treatment would be the best approach for treating non-vital immature tooth. 89.4% of the participants were prepared to learn this new concept of revascularization methods. The results showed that 49% used regenerative endodontic procedures of some kind already.

Conclusion: The result showed that the majority of study participants were positive about the inclusion in dentistry of endodontic revascularization procedures. The dentist can bid farewell to dreadful treatment of the root canal sooner than expected. Further research in revascularization therapies is therefore essential in understanding the genuine awareness of this subject in order to establish safe and reliable methods for all teeth that would need root canal treatment.

1. Introduction

Modern medical research has shifted from a surgical model to a medicinal model and may consider taking a biological care model in search of biological tissue replacements. The purpose of regenerative dentistry is

to induce dental tissue replacement and their supporting structures from this perspective. [1]

Regenerative endodontics is one of the most interesting developments in dentistry today, and endodontists are at the forefront of this leading-edge research. In order to



provide biologically-based regenerative endodontics treatment for the immature permanent teeth that can lead to continuous root development, increased thickness in the dentinal walls, and apical closure, knowledge of pulp, dental trauma and tissue engineering needs to be used. These developments in regenerating a pulp-dentine functional complex have a promising effect on efforts to preserve natural dentition, the ultimate goal of endodontic treatment.[2] Teeth are saved routinely through root canal therapy.[3] Langer and Vacanti[4] described this as a "interdisciplinary field that applies the principles of engineering and life sciences in order to develop biological substitutes which restore, maintain or improve the function of a tissue," which was the first definition of tissue engineering.[3]

The American Association of Endodontists Glossary of Endodontic Terms (2012) defines regenerative endodontics as "biologically based procedures designed to replace damaged structures, including dentin and root structures, as well as cells of the pulp-dentin complex".[5] REPs include root canal revascularisation, post-born stem cell therapy, pulp implants, scaffold implants, three-dimensional cell printing, scaffolding and gene therapy.[6] Although advanced therapy is desired to shift from laboratories to clinics involving the highest level of research teams, in coordination with fundamental scientists and clinicians.[3] Similarly, a minute understanding of REPs and the appropriate ability to do so have a significant impact on the part of clinicians, they must be adequately able to perform these treatments on patients. Epelman et al. conducted a survey [7] in order to recognize the dentists' attitude toward regenerative procedures. Yet their studies involved only a small wing of specialists in endodontics, who were members of the college of diplomats of the American Board of Endodontics. Survey of American dentists training in various specialties was carried out by Manguno et al.[8]

Studies conducted in India have included only on endodontists and their residents from various regions. There is a need to examine the broader opinions of dental practitioners and residents from several other branches, because they might provide a different perspective on the future use of REPs.

2. Objectives

The purpose of our study was to assess the current practice scenario of dentist in Gujarat towards Revascularization Endodontic Procedure. It is therefore imperative to understand their suggestions, knowledge and acceptance of regenerative endodontics.

Thus, it is necessary to comprehend their opinions, their level of awareness and their potential integration into endodontics. This will also help to determine whether more emphasis needs to be given to teaching REP in the post-graduate curriculum or even make to modifications if required in the teaching syllabi of the residents. [6]

3. Methods

The protocol of study was approved in line with the Helsinki Declaration of Human Rights by the Institutional Ethics Board. This cross-section survey was conducted across the state between November 2022 and January 2023. A multi-choice questionnaire was developed which included twenty-one digital questions on the knowledge, current practise and future use of REPs. The questionnaire was auto-administered in English and the link was circulated by social networks between dentists and dental schools. Two parts were included in the survey. The first section contained six questions concerning respondent's profile. The second section contained 15 questions regarding knowledge, attitude and practise in the clinical scenarios concerning the use of REP. The questionnaire data was analysed as a percentage of total answers to the majority schools of thoughts of respondents to an individual question by the number of participants.

4. Results

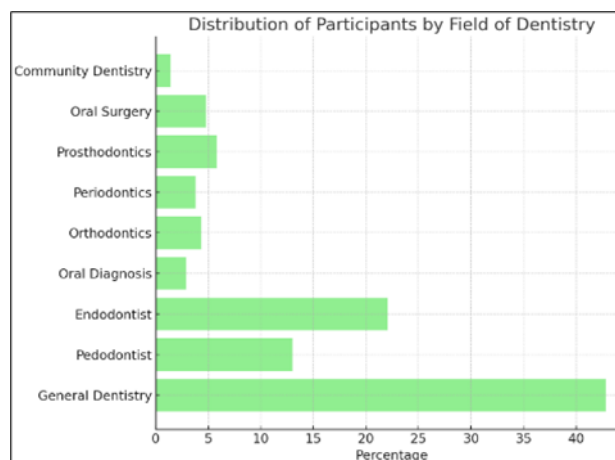
624 completed forms were received through the digital questionnaire link which was circulated via social media. Every question was answered by all participants. Table 1 shows the questions that were included in the questionnaire with the replies from the participants.

Table 1: Questions asked in the questionnaire

	Knowledge Attitude and Practice Towards REP's Graphs
1	How frequently do you read scientific dental journals?
2	Do you think Revascularization Endodontic Procedures work?
3	Have you received continued education in stem cells and/or regenerative dental treatment?
4	Would you be willing to attend a training course and/or continuing education courses to apply regenerative dental

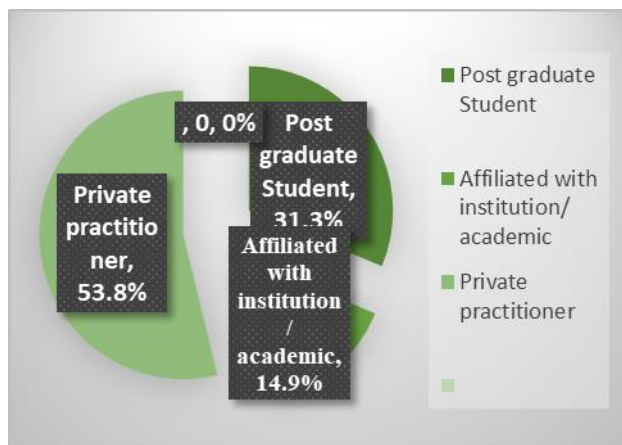


	treatment?
5	Should regenerative therapy be included into dentistry?
6	How often do you come across cases with periapical lesions for your patients?
7	Would you be willing to save teeth and dental tissues for regenerative dental treatment?
8	Do you use any type of regenerative procedures in your practice such as membranes, scaffolds, or bioactive materials?
9	How did you gather knowledge about regenerative endodontic procedures?
10	What is your assessment of regenerative dental treatment outcomes?
11	After non-surgical root canal treatment, would healing of periapical tissues be enhanced by tissue engineering?
12	What is the average duration of treatment for a successful regenerative procedure?
13	Which of the following regenerative endodontic treatments is the most valuable?
14	What do you consider to be the optimal treatment option for necrotic immature teeth?
15	Should a dental stem cell banking facility be present in your city?
16	Do you think that regenerative dental treatment will be a better treatment option than tooth implant placement?



Graph 2: Profile of participants

Profile of participants: Among the participants 53.8% were private practitioners, 31.3% postgraduate students and 14.9% dentists were associated with institutions/academics (Graph 1). 50.5% were males and 49.5% were females. 42.8% of the participants were general dentist, 22.1% endodontists and 13% pedodontists (Graph 2). 67.3% had been in practise for 0-5 years, 25% for 5-10 years and remaining 7.7% for >10 years. Of all age groups, the majority were 20-30 years (74 per cent) and 20.7 per cent were between 30-40 years.

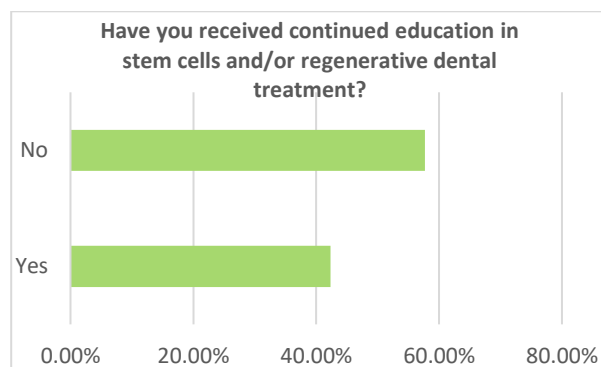


Graph 1: Distribution according to the designation

Knowledge, attitude and practice towards REP's: 57.7% had not received education and training in stem cells and/or regenerative dental treatments while 42.3% had received [Graph 3]. 54% thought that REP would be efficient in dental practice [Graph 4]. Among them 44.7% received education and training through conferences and journals and 34.6% through the curriculum.

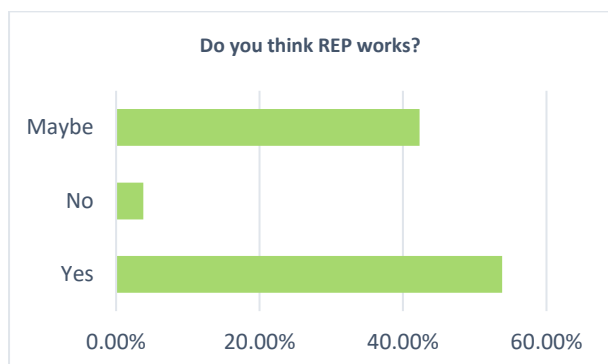
89.4% were willing to participate in training courses to incorporate regenerative endodontic procedures into their practise [Graph 5]. However, the results indicated that only 49% had used any kind of regenerative procedure to date. 64.4% felt that there should be a dental stem cell banking facility in their city.

Graph 3: Distribution on whether the participants have received continued education in stem cells and/or regenerative dental treatment

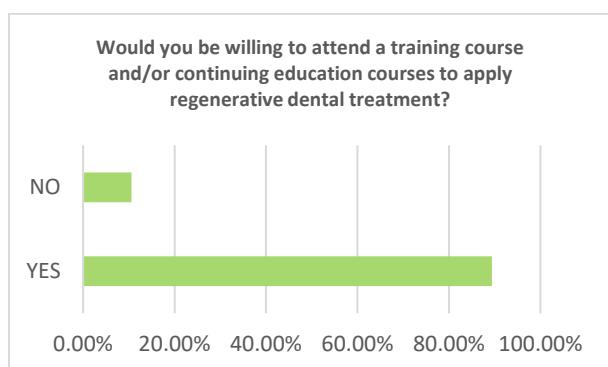




Graph 4: Distribution on whether the participants think Revascularization Endodontic Procedures (REP) is efficient

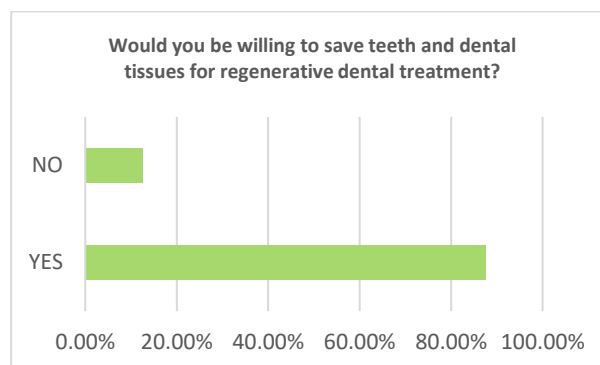


Graph 5: Distribution on whether the participants willing to attend a training course and/or continuing education courses to apply regenerative dental treatment



Most dentists (87.5%) confirmed that they would be willing to save teeth and dental tissue for regenerative dental treatment [Graph 6], and almost half (50.5%) considered that regenerative dental treatment would be a better treatment option than replacement dental implants. The majority of participants were of the opinion (98.1%) that regenerative therapy should be incorporated into dentistry. The consensus among most participants highlighted the importance of incorporating educational material on regenerative endodontics into the curriculum. Interestingly, there were noticeable differences in knowledge levels observed among participants from different specialties.[9]

Graph 6: Distribution on whether the participants would be willing to save teeth and dental tissues for regenerative dental treatment



5. Discussion

The goal of regeneration in endodontics is to promote the healing of diseased, nonvital, immature, and open apex teeth by regenerating the pulp tissues and promoting apexogenesis. Revascularization is the method used to restore blood supply and revive a tooth that was previously nonvital and necrosed. [10]

REPs appear to be collectivist & pinch-hitting to more traditional treatments such as apexification mostly in treatment of non-vital immature permanent teeth as they allow the biological successor to damaged structures such as dentin, root structures and pulp dentin complex cells to further append root length and increase dentin thickness, making the tooth less exposed to fractures. [11]

This survey was conducted to collect data on the level of awareness, knowledge and clinical status of REP among dental practitioners in Gujarat. The survey capitulated the very enthusiastic participants' responses.

The present study demonstrated that half a percentage of participants had good knowledge of regenerative endodontic procedures, indicating that such techniques had gained a great deal of appreciation in comparison to their pre-decade status. Most of the respondents were willing to save teeth and dental tissues through REP's and preferred it over implants as a treatment option, but almost all noticed the need to attend REP's training, reflecting the underlying lack of knowledge. Similar study conducted by Fatma et. al.,[12] (2023) revealed that 43% participants had not performed regenerative endodontic procedures yet. The above-mentioned results are also consistent with similar surveys conducted by Epelman et al.[7], Manguno et al. [8],



Utneja et al.[6], Shah V et al.[13] and Aishwarya Das et al.[14]

Almost half of the practitioners performed some type of REP in clinical practise, most of which were confined to the use of membranes, scaffolds or bioactive materials. Most of the practitioners were aware of other REPs, but were doubtful about their results. They were all of the opinion that REP could be used in a multitude of scenarios such as periradicular bone healing, continued root development in immature teeth, pulp tissue revitalisation within the root canal, and dental re-implantation. Many (37%) consider the triple antibiotic paste and pulpal regeneration to be the appropriate treatment for necrotic immature teeth. Results from numerous published reports show that these procedures often lead to the reconciliation of apical periodontitis and associated symptoms of inflammation, radiographic evidence of continued root development and apical narrowing, and the restoration of vitality responses. According to Utneja et. al.,[6] only one eighth respondents have found regenerative techniques valuable in treating necrotic immature teeth which constituted 20% of patients reporting to them. More than half of the participants still consider the application of calcium hydroxide followed by MTA apical plug and backfilling with obturation material to be the optimum treatment for necrotic immature teeth. Similarly in a study conducted by Epelman et. al.,[7] 49.1% were already using some type of regenerative therapy in their practice. Two participants (3.5%) thought REP would be unsuccessful, and the remaining participants (41.4%) were confident of its success. Overall, as noted by the literature and the present study the knowledge and the usage of regenerative therapies in endodontics is still not instilled into the minds of most of the dental practitioners. There is a need for continuing education and training programmes for all treatments that achieve pulp-dentin regeneration from the simplest blood clot revascularization method to the most complex treatment, which involves creating tissue-engineered dental pulp structures in the laboratory and implanting them into clean, shaped root canals. [6]

The lack of availability of the materials required to carry out the procedure may also be a major reason for not practising it. [13] The Indian Council for Medical Research has taken steps to lay down guidelines for stem cell research which were revised in March 2012.

[15] These apply to all, including independent researchers, institutions, corporate research departments and the monitoring of ethical committees, human stem cell research and/or their derivatives[16]. However, as research progresses and facts unfold, more extensive and detailed guideline needs to be developed and implemented, in particular in fields of medicine and dentistry, which deal with practical applications of research.

6. Conclusion

Although these results reflect that pediatric dentists and endodontists are optimistic about the use of REPs as compared to the general dental practitioners and other specialists, but there is an imperative need to emphasize on special training for the same along with readily available materials required for this procedure.

To recognize the true knowledge on this topic on a universal scale, more research and surveys need to be conducted amongst clinicians, academicians and residents in other locations.

References

1. Bora A et al Regenerative pulp therapy for immature non-vital tooth: A case report *Int. J.Appl.Dent.* 2016; 2(4):83-86.
2. Endodontics: Colleagues for Excellence 2013; www.aae.org/colleagues. Accessed on 4/2/2019
3. Murray PE, Garcia-Godoy F, Hargreaves KM. Regenerative endodontics: a review of current status and a call for action. *J Endod.* 2007;33(4):377-90.
4. Langer R, Vacanti JP. Tissue engineering. *Science.* 1993;260(5110):920-6.
5. Bansal R, Jain A, Mittal S. Current overview on challenges in regenerative endodontics. *J Conserv Dent.* 2015;18(1):1-6.
6. Utneja S, Nawal RR, Ansari MI, Talwar S, Verma M. A survey of attitude and opinions of endodontic residents towards regenerative endodontics. *J Conserv Dent* 2013;16:314-8.
7. Epelman I, Murray PE, Garcia-Godoy F, Kuttler S, Namerow KN. A practitioner survey of opinions toward regenerative endodontics. *J Endod.* 2009;35(9):1204-10.
8. Manguno C, Murray PE, Howard C, Madras J, Mangan S, Namerow KN. A survey of dental



- residents' expectations for regenerative endodontics. *J Endod.* 2012;38:137-43.
9. Assiry AA, Karobari MI, Snigdha NT, Mohamed RN, Basheer SN, Zameer M. Evaluation of Attitude and Knowledge of Endodontic, Pedodontic and SBARD Residents in Saudi Arabia toward Regenerative Endodontics-A National Survey. *Medicina (Kaunas).* 2022;58(4):545. doi: 10.3390/medicina58040545. PMID: 35454383; PMCID: PMC9030200.
 10. Neelamurthy PS, Kumar RA, Balakrishnan V, Venkatesan SM, Narayan GS, Karthikeyan I. Revascularization in immature and mature teeth with necrotic pulp: a clinical study. *J Contemp Dent Pract.* 2018;19(11):1393-9.
 11. Iwaya SI, Ikawa M, Kubota M. Revascularization of an immature permanent tooth with apical periodontitis and sinus tract. *Dent Traumatol.* 2001;17(4):185-7.
 12. Hatipoğlu FP, Hatipoğlu Ö, Taha N, Lehmann AP, Aldhelai TA, Madfa AA, Al-Haddad A, Jukić Krmek S, Javed MQ, Bhatti UA, Drobac M. Attitude and practice of regenerative endodontic procedures among endodontists and paediatric dentists: A multinational survey from 13 countries. *International journal of paediatric dentistry.* 2023;33(5):521-34.
 13. Shah V, Thakkar K, Hirpara N, Vaidya R, Patel N (2016) Current Status and Opinions of Post Graduate Residents in Gujarat Towards Regenerative Endodontics: A Survey. *Dentistry* 6: 399.
 14. Das A, Nasim I. A knowledge, attitude, and practice survey among endodontic postgraduate students toward regenerative endodontic procedures. *DIT* 2019;12:893-896.
 15. Krishna Prasada L, Bukhari SMU. A survey on knowledge, attitude and beliefs of regenerative endodontics among postgraduate dental residents. *Al Ameen J Med Sci* 2019;12:49-53
 16. Ganguly NK. Guidelines for stem cell research and therapy. Department of biotechnology and Indian council of medical research. New Delhi: Royal Offset Printers; 2012.