

A survey on knowledge, attitude and beliefs of regenerative endodontics among postgraduate dental residents

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Abstract: *Background:* The recent breakthrough in implementation of regenerative endodontics is regarded unparalleled for coming years, for which knowledge and skills are to be enhanced at various level of education. There is a need to understand the knowledge, attitude and belief with respect to this subject. In India, use of regenerative dentistry is at its initial stages and there is very less awareness and knowledge regarding its use and implementation. *Objective:* This study was conducted to assess the knowledge, attitude and belief of postgraduate residents towards the regenerative endodontics *Methods:* Online questionnaire-based study among dental professionals undergoing postgraduate training in various colleges in India. *Results:* Respondents considered lack of sufficient knowledge as main barrier in the field of regenerative procedure (47.1%), even though term regenerative endodontics was commonly known. About (43%) of respondents had knowledge about the type of dental stem cells other than dental organ. Most of the respondents (79.6%) have not attended any workshop/conference or continuing dental education program related to regenerative endodontic procedures *Conclusion:* There is a positive attitude towards regenerative procedures and its application, although the knowledge about this method is limited. The interest seems greater among endodontists (20%) followed by prosthodontist (15%), oral surgeons (13.3) pedodontist (12.4) and periodontists (11.4%). *Clinical significance:* regenerative endodontics provides a more conservative approach, that is biologically based so the need for the study.

Keywords: Regenerative endodontics, Stem cells, Dental pulp.

Introduction

Regenerative endodontic procedures can be defined as biologically based procedures designed to replace damaged structures, including dentin and root structures, as well as cells of the pulp-dentin complex [1], the creation and delivery of new tissues to be a substitute for diseased or traumatized pulp or missing teeth is referred to as regenerative therapies. The success of regenerative endodontic therapy is the ability to constitute a technique that will allow clinicians to create a functional pulp tissue [2].

The term regenerative endodontic procedures may include all treatments that accomplish pulp-dentin regeneration from the simplest blood clot revascularization method, partial pulpotomy, and apexogenesis to the most complex treatment, which involves creating tissue-engineered dental pulp constructs in the laboratory and implanting them into cleaned and shaped root canals [3-4]. Recent studies, on the dental pulp stem cells revealed that the multipotency and angiogenic

capacity of these cells could be exploited therapeutically in dental pulp tissue engineering [5]. The potential sources for stem cells are embryonic stem cell and adult stem cells [6].

Material and Methods

This study is a cross-sectional questionnaire based survey conducted from November 2017 to January 2018. A final 20 questions were included in the study to assess knowledge attitude and belief of dental practitioners towards the use of regenerative endodontics in dentistry. The questionnaire was in English language and self-administered. The questionnaire was divided into 3 parts. Part A comprised questions about dentist's professional status and knowledge. Part B sought the dentist's attitude and part C consisted of questions based on belief's about regenerative endodontics. The Ethical approval was obtained from the Ethics committee of the institution. The data on

general information was required mandatory to be filled by participants or response cannot be recorded. Soft copies of the questionnaire were posted on online dental forms dedicated to dental postgraduates presently undergoing training in various colleges in India

Results

Professional status: A total of 105 responses were collected, of which (54.3%) were females and (45.7%) males giving a female to male ratio of 1.19. Most (80%) of the participants were in the age group of 20-30 years. Endodontists (21%) were the highest participants in the study followed by prosthodontists (15.2%) and pedodontist with participation of (12.4%), least participation was observed from oral medicine (1.9%) residents. Majority (60.8%) of participants are in practice for 0 to 5 years.

Knowledge: Most (86.1%) of the participants have come across term regenerative endodontics, the source of information mainly through undergraduate training (37.5%). Respondents have knowledge of classification of stem cells (55.9%) and sources of dental stem cells (67%). Only (43.1%) of respondents have knowledge about the development of dental stem cells from non-dental organs. Most (65%) respondents are versed with the current scope of regenerative endodontics in dentistry. Only 36% knew about the stem cell bank in India while a majority (48%) were unsure about stem cell banking in India.

Attitude: High percentage (74.7%) of participants are willing to store stem cells for future regenerative prospects and considered lack of sufficient knowledge (47.1%) as a barrier in the regenerative treatment procedures besides high cost (26.5) involved and lack of awareness (26.5%). The respondents are very likely to attend (90.2%) workshop/conference or continuing dental education program about regenerative procedures besides majority (59.8) of the professional's had no previous experience of dental education in regenerative endodontic procedures and wanted more real life training (43.7) to help in increasing the knowledge about the topic.

Belief: Regenerative endodontic therapy should be incorporated in dentistry as majority (71%) of

respondents believed. Stem cell banking is seen as a prospect for dental tissue regeneration (70.9%) overwhelmingly responded and most residents that is (44%) sees dental tissue grown in laboratory to be used by dentists in 10 years' time frame. Regenerative treatment was considered to be a better treatment option (56.7%) than implant therapy by most of the dentists. Regulations should be introduced in dental professional for regenerative treatment including stem cells as (67.3%) respondents were of the belief. Cost of treatment was believed to be more by (31.1%) residents, for regenerative treatment than the present procedures.

Discussion

The present survey collected data on dental residents' knowledge, attitude and belief in regenerative endodontic practice including stem cells. In this study, a total of 105 responses were received and a complete set of response for 20 questions was registered by 99 participants, (table 1) depicts the number of responses received for each option for the questions and (figure 1) shows the questions with number of responses recorded. The question on attitude, recommending a patient to store dental stem cells and explaining its future prospects, remains least answered by residents and also they are not likely (74.7%) to discuss it with patients, this depicts residents are unsure about the usage of stem cell in their clinical practice.

A percentage of 87.1 residents had heard about regenerative endodontic procedure before, this can be attributed to the increase in understanding about the topic through means which include, discussions on this topic through journals, seminars, symposium and Continued Dental Education Programs and conferences based on regenerative endodontics and stem cell therapies. Matthew AS et al [7] have concluded undergraduate training and conference/symposium/seminar was primary source of knowledge on stem cells. Since it's during undergraduate training, the majority of students first come across the subject matter on regeneration, strengthening the undergraduate curriculum on regenerative endodontics is felt. Most of the respondents were young (84%) below 30

years of age and at beginning of their professional career and they expressed enthusiasm for gaining knowledge on this subject. This was reflected in their belief that regenerative procedure will have effective space in clinical practice within the next

decade. Utneja S et al [8] found that 73% of participants in their study expressed a similar response on gaining knowledge on this subject.

Fig-1: Number of responses received for each question

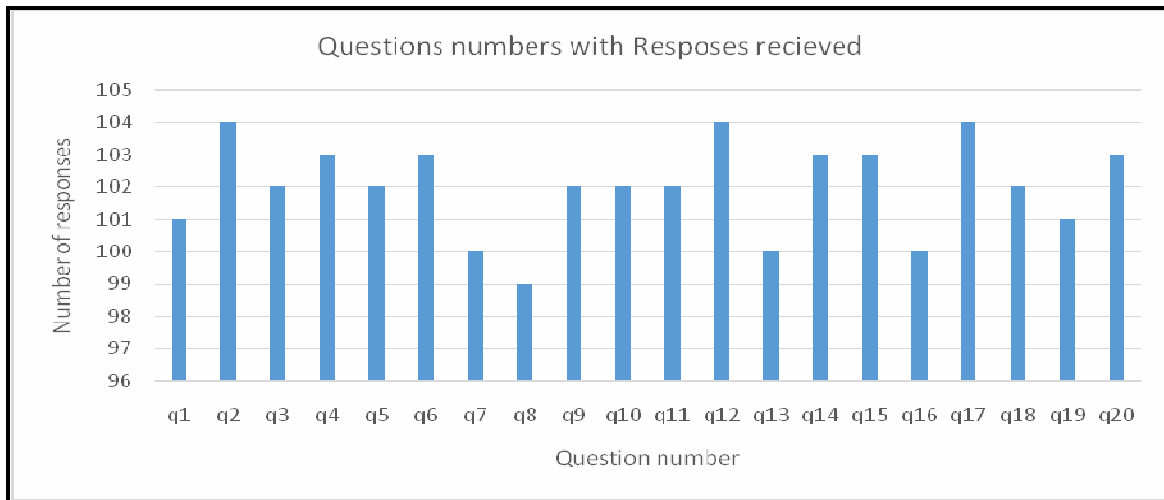


Table-1: Sample Questionnaire

General Information:	
Name:	
Age:	
Gender:	
Specialty:	
Years of experience:	
A: KNOWLEDGE	
Q1. Have you ever come across the term regenerative endodontics?	
1. Yes	86.1% n=87
2. No	13.9% n=14
Q2. What is your source of information?	
1. Conference/Symposium/Seminar	5.8% n=6
2. Undergraduate training	37.5% n=39
3. PG training	12.5% n=13
4. Internet	14.4% n=15
5. Books	16.3% n=17
6. Journal	12.5% n=13
7. Mass media	1% n=1
Q3. How stem cells are classified?	
1. Embryonic Stem cells	17.6% n=18
2. Adult Stem cells	12.7% n=13
3. (1) & (2)	55.9% n=57
4. Don't know	13.7% n=14
Q4. What are the sources of dental stem cells?	
1. Dental Pulp Stem cells	4.9% n=5
2. Stem cells from human exfoliated deciduous teeth	9.7% n=10
3. Stem cells from apical papilla	2.9% n=3
4. Dental follicle progenitor cells	8.7% n=9
5. Stem cells from Periodontal Ligament	1.9% n=2
6. All of the above	67% n=69
7. Don't know	4.9% n=5
Q5. Type of Stem cells found in human exfoliated deciduous teeth?	
1. Adipocytes	6.9% n=7
2. Chondrocytes	1% n=1
3. Osteoblasts	4.9% n=5
4. Mesenchymal	9.6% n=20
5. All of the above	43.1% n=44
6. None	3.9% n=4
7. Don't know	20.6% n=21

<p>Q6. What is the current scope of application of regenerative endodontics in dentistry?</p> <ol style="list-style-type: none"> In continued root formation 3.9% n=4 In pulp healing and regeneration 7.8% n=8 In replantation and transplantation 3.9% n=4 Pulp/dentin tissue engineering and regeneration 9.7% n=10 All of the above 65% n=67 Don't know 9.7% n=10 <p>Q7. Are there any dental stem cell banks in India?</p> <ol style="list-style-type: none"> Yes 36% n=36 No 16% n=16 Don't know 48% n=48 <p>B: ATTITUDE</p> <p>Q8. In a clinical practice, will you recommend patient to store dental stem cells and explain its future prospects?</p> <ol style="list-style-type: none"> Yes 25.3% n=25 No 74.7% n=74 <p>Q9. What is the main barrier in regenerative treatment?</p> <ol style="list-style-type: none"> High cost 26.5% n=27 Lack of awareness 26.5 n=27 Lack of sufficient knowledge about stem cells in dentist 47.1% n=48 <p>Q10. Have you attended any workshop/conference or continuing dental education program about application of regenerative endodontic procedures?</p> <ol style="list-style-type: none"> Yes 59.8% n=61 No 40.2% n=41 <p>Q11. Would you like to attend any workshop/conference or continuing dental education program about application of stem cells if given a chance?</p> <ol style="list-style-type: none"> Yes 90.2% n=92 No 9.8% n=10 <p>Q12. Which of the following statements would most help newly qualified dental professionals to be better able to gain knowledge about regenerative endodontics?</p> <ol style="list-style-type: none"> More real life training 43.7% n=46 Short courses to improve knowledge about stem cells 25.2% n=26 Topics related to stem cells to be included in the curriculum 31.1% n=32 <p>C: BELIEF</p> <p>Q13. Should regenerative therapy be incorporated into dentistry?</p> <ol style="list-style-type: none"> Yes 71% n=71 No 10% n=10 Maybe 19% n=19 	<p>Q14. Do you think that dental stem cell banking will be useful to be able to regenerate dental tissues?</p> <ol style="list-style-type: none"> Yes 70.9% n=73 No 12.6% n=13 Unsure 16.5% n=17 <p>Q15. Does Platelet Rich Fibrin (PRF), induced bleeding technique and Platelet Rich Plasma (PRP) have a role in the revascularization of tooth with necrotic pulp?</p> <ol style="list-style-type: none"> Yes 55.3% n=57 No 14.6% n=15 Unsure 30.1% n=31 <p>Q16. How many years do you think it will take before dentists are able to implant new teeth grown in a laboratory?</p> <ol style="list-style-type: none"> 0-10 years 44% n=44 11-20 years 38% n=38 Greater than 20 years 18% n=18 <p>Q17. Do you think that regenerative dental treatment will be a better treatment option than tooth implant placement?</p> <ol style="list-style-type: none"> Yes 56.7% n=59 No 12.5% n=13 Unsure 30.8% n=32 <p>Q18. In case you can't provide a regenerative treatment, would you be willing to refer your patient to a stem cell treatment center?</p> <ol style="list-style-type: none"> Yes 78.4% n=80 No 21.6% n=22 <p>Q19. Do you believe that dental professional associations should regulate the use of stem cell and regenerative dentistry?</p> <ol style="list-style-type: none"> Yes 67.3 n=68 No 14.9% n=15 Unsure 17.8% n=18 <p>Q20. What should the cost for regenerative dentistry be?</p> <ol style="list-style-type: none"> Equal to current treatment 29.1% n=30 More than current treatment 31.1% n=32 Less than current treatment 23.3% n=24 Unsure 16.5% n=17
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Respondents had theoretical knowledge about classification and sources of stem cells at the same moment wants more real life experience by real life training. As a large majority did not have any formal exposure to a practical technique involving regenerative procedures this is reflected in the study as the majority (59.8%) have not attended any workshops/conference or symposium and they showed a willingness to attend such programs (90.2%). Most of the respondents (64%) didn't have any knowledge about stem cell banks in India. More initiative should be undertaken to increase the awareness about stem cell banking as dentists showed the high percentage (74.7) of willingness to store dental stem cell and were optimistic about its future use. Indian Council of Medical Research proposed to the guidelines regarding stem cell research which was modified in March 2012 [9].

The support for regenerative endodontic procedures by respondents and the willingness to receive training in the discipline including their positive attitude generally towards stem cell banking, has a greater effect, as the patient may be benefited with new treatment option other than implants. The majority of participants in the survey believed that regenerative endodontic

therapy will be a better treatment option compared to the implant retained prosthesis. An opinion similar to that was expressed in the survey by Epelman et al [3] and Manguno C et al [10]. The cost of the treatment got a varied response with no single option appearing to be a clear favorite among residents depicting dentists themselves are unsure of the cost involved the procedure.

Conclusion

There is a positive attitude towards regenerative procedures including stem cells, dental residents have a good theoretical knowledge of regenerative endodontics and were enthusiastic about incorporating it into their clinical practice. A need for regular training was felt.

Clinical Significance

Regenerative endodontics is a wide field and area of research, knowing dentist's knowledge, attitude and belief are of particular significance as it will influence diagnosis and treatment planning and work towards patients benefit.

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