

# Knowledge, attitude, and practice toward regenerative endodontics and factors affecting its practice among dental practitioners in Ajmer city: A cross-sectional study

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## ABSTRACT

**Background:** Regenerative methods, which regenerate the damaged structures, are one of the treatment methods in endodontics. This conservative approach helps to generate cells that may produce the lost structure. Thus, the aim of this study was to explore the knowledge, attitude, and practice among dental practitioners toward regenerative endodontics and factors affecting their knowledge, attitude, and practice. **Materials and Methods:** It was a cross-sectional questionnaire study conducted in the month of June–August 2018 in Ajmer city. Permission to conduct the study was obtained from JLN Medical College and Hospital, Department of Dentistry. A total of 100 clinics were visited and face-to-face interview schedule was conducted. A total of 123 dental practitioners were interviewed. A 26 item questionnaire was generated to measure knowledge, attitude, and practice of dental professionals regarding regenerative endodontics. **Results:** 63% of study participants had poor knowledge scores. Majority of study participants 83 (67%) had poor attitude scores. On applying Pearson's correlation, it was determined that the knowledge regarding regenerative endodontics was significantly ( $P \leq 0.001$ ) \*\* correlated to the attitude among study participants. On applying Chi-square test, it was assessed that the knowledge and practice among study participants were significantly ( $P = 0.041^*$ ) and ( $P = 0.001^{**}$ ) associated with gender of study participants. **Conclusion:** From above results, it is concluded that study participants have poor knowledge, attitude, and practice regarding regenerative endodontics. The knowledge regarding regenerative endodontics was significantly associated with the attitude of study participants. Participants with Masters of Dental Surgery (MDS) degree had a significant effect on the knowledge regarding the regenerative endodontics. Endodontic specialty has a significant effect on the attitude of study subjects.

**Keywords:** Dental, endodontics, factors, regenerative

## Introduction

Regenerative endodontic strategies can be characterized as organically based systems intended to supplant harmed structures, including dentin and root structures, as well as cells of

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the mash dentin complex. Regenerative dental methodology has a long history, beginning around 1952, when Dr. B. W. Hermann gave an account of the application of Ca (OH) 2 for a situation report of crucial mash amputation.<sup>[1]</sup> Subsequent regenerative dental techniques incorporate the advancement of guided tissue or bone recovery techniques and diversion osteogenesis;<sup>[2]</sup> the use of platelet-rich plasma for bone augmentation,<sup>[3]</sup> Emdogain for periodontal tissue regeneration,<sup>[4]</sup> and recombinant human bone morphogenetic protein (rhBMP) for bone augmentation;<sup>[5]</sup> and preclinical preliminaries on the utilization of fibroblast development factor 2 (FGF2) for periodontal tissue regeneration.<sup>[6]</sup> Despite these impressive development, there has not been noteworthy interpretation of any of these treatments into clinical endodontic practice.

The targets of regenerative endodontic methodology are to recover mash like tissue, preferably, the mash dentin complex; recover harmed coronal dentin, for example, following a carious introduction; and recover resorbed root, cervical or apical dentin.<sup>[7]</sup>

As of late, there has been an expanding enthusiasm for applying the idea of tissue building to endodontics. The creation and conveyance of new tissues to supplant unhealthy, missing, or damaged mash is alluded to as regenerative endodontics.<sup>[8]</sup> Potential advancements for regenerative endodontics incorporate root waterway revascularization, mash embed, and quality therapy.<sup>[9]</sup> Ongoing case reports from various creators bolster the possibility of such regenerative endodontic strategies.<sup>[10-12]</sup> The future utilization of regenerative and tissue-designing techniques to dentistry holds gigantic potential for gathering an assortment of patient needs.<sup>[13]</sup>

Regenerative endodontics is one of the fields that hasn't been explored in detail and factors that impact its decision. Till now, relatively, few examinations were led to investigate the information, disposition, and routine regarding dental specialists toward regenerative endodontics. Accordingly, the present examination is led to investigate the learning, frame of mind, and practice among dental professionals toward regenerative endodontics and variables affecting their insight, demeanor, and practice.

## Materials and Methods

It was a cross-sectional questionnaire study conducted in the month of June–August 2018 in the city of Ajmer. The study participants include dental practitioners having their clinics. The city was divided into 5 parts: east, west, south, north, and central. From each direction, 20 clinics were randomly selected, and interview was conducted among the dental practitioners of these clinics. Ethical approval was obtained from independent ethical committee of JLN Medical College and Hospital. Written informed consent was also obtained from participants. Dental professionals including bachelors and specialist running his or her private practice for more than 1 year in Ajmer city and who

gave the informed consent were included in the study. A total of 100 clinics were visited and face-to-face interview was conducted. Among those clinics, if dental professional was busy, then questionnaire was left to be filed by the professional. A total of 123 dental practitioners were interviewed. The questionnaire was pretested in a pilot survey comprising of 10% of total participants. The proforma was tested for reproducibility by test-retest. Reliability of the questionnaire was assessed by using Test-Retest and the values of measured Kappa ( $\kappa$ ) = 0.81, weighted Kappa ( $\kappa_w$ ) = 0.78. Internal consistency of questionnaires was assessed by applying Chronbachs-Alpha ( $\alpha$ ), and the value of  $\alpha$  = 0.74 was measured. A 26-item questionnaire was generated to measure knowledge, attitude, and practice of dental professionals regarding regenerative endodontics. This questionnaire consists of four parts. First part consists of 5 questions on demographic details. Second part consists of questions related to knowledge of the study participants regarding regenerative endodontics. To all these questions, 5 marks were given for correct answer, whereas 0 mark was for wrong answer. The total marks range from 0 to 35 for knowledge questions. Third part consists of attitude questions. Answers to these questions were judged on Likert scale ranging from “agree to disagree.” Score ranges from 1 to 4. Total score to these 8 questions ranges from 8 to 32. Fourth part consists of questions on practice regarding regenerative endodontics. Answer to these 5 questions was in yes or no. Yes was given 1 mark, whereas no was given 0 mark. Total score of this part ranges from 0 to 5. Total score of all 3 parts (21 questions) ranges from 1 to 72 marks.

## Statistical analysis

Demographic details of study participants and their knowledge, attitude, and practice scores were analyzed using descriptive statistics. Pearson's correlation was used to analyze correlation between knowledge, attitude, and practice among study participants and correlation between demographic variables with knowledge, attitude, and behavior about regenerative endodontics.

## Results

Table 1 shows demographic details of the study participants. The most of the study participants [52 (42%)] were between 36 and 45 years of age. 87 (71%) of participants were male. The majority of study participants [91 (74%)] were MDS. Among the study participants, most of them were done their master's degree in endodontists. From all the study participants, [78 (63%)] were having experience of less than equal to 5 years.

Table 2 shows knowledge, attitude, and practice scores among study subjects. 63% of study participants had poor knowledge scores, whereas only 11% of study participants had good knowledge scores regarding regenerative endodontics. The majority of study participants had poor attitude scores, that is 83 (67%), whereas only 17 (14%) of study participants had good attitude scores. Only 5 (4%) of study participants had good practice scores, whereas 98 (79%) of study participants had poor practice scores.

**Table 1: Demographic detail of study participants**

Demographic details	N (%)
Age	
25–35 Years	39 (26)
36–45 Years	52 (42)
More Than 45	42 (32)
Total	123 (100)
Gender	
Male	87 (71)
Female	36 (29)
Total	123 (100)
Degree	
BDS	32 (26)
MDS	91 (74)
Total	123 (100)
Specialty	
Orthodontics	10 (11)
Oral Medicine	09 (10)
Oral Surgery	12 (13)
Endodontics	20 (22)
Prosthodontic	14 (15)
Periodontics	08 (9)
Oral Pathology	08 (8)
Public Health Dentistry	10 (11)
Total	91 (100)
Year of experience	
Less than equal to 5 years	78 (63)
More than 5 years	55 (27)
Total	123 (100)

**Table 2: Knowledge, attitude, and practice scores among study subjects**

Variables	Number of subjects	Percentage of subjects (%)
Knowledge	0–11 (poor)	63
	12–24 (Fair)	26
	25–35 (Good)	11
	Total	100
Attitude	8–14 (poor)	67
	15–24 (Fair)	19
	25–32 (Good)	14
	Total	100
Practice	Less than 1 (poor)	79
	2–4 (Fair)	17
	More than 4 (Good)	4
	Total	100

Table 3 on applying Pearson’s correlation, it was determined that knowledge regarding regenerative endodontics was significantly ( $P \leq 0.001$ )\*\* correlated to the attitude among study participants.

Table 4 on applying Chi-square test, it was assessed that knowledge and practice among study participants were significantly ( $P = 0.041$ \*) and ( $P = 0.001$ \*\*) associated with gender of study participants. The degree of study participants was significantly ( $P = 0.000$ \*\*\*) associated with the knowledge

**Table 3: Correlation analysis of knowledge, attitude, and behavior among study subjects by using Pearson’s correlation**

	Knowledge		Attitude		Practice	
	R	P	r	P	r	P
Knowledge	-	-	0.390	0.001**	-	-
Attitude	-0.245	0.673	-	-	2.671	0.345
Practice	0.222	1.234	-0.200	1.234	-	-

\*Significant at 0.05 percent level of significance. \*\*Significant at 0.01 percent level of significance. \*\*\*Significant at 0.001 percent level of significance

**Table 4: Correlation analysis of demographic variables with knowledge, attitude, and behavior about regenerative endodontics among study subjects by using Chi-square test**

Demographic variables	Knowledge		Attitude		Practice	
	$\chi^2$	P	$\chi^2$	P	$\chi^2$	P
Age	-0.236	0.221	4.101	1.10	-0.178	0.87
Gender	2.344	0.041*	-0.209	0.411	0.181	0.001**
Degree	3.565	0.000***	-0.401	1.207	-0.018	0.219
Specialty	-3.870	0.761	3.901	1.222	0.392	0.603
Year of experience	0.289	1.290	2.332	0.05*	0.900	1.233

\*Significant at 0.05 percent level of significance. \*\*Significant at 0.001 percent level of significance. \*\*\*Significant at 0.000 percent level of significance

among study participants regarding regenerative endodontics. Years of experience was significantly ( $0.05$ \*) associated with the attitude of study participants.

Table 5 on applying multiple logistic regression test, it has been determined that age more than 45 years of study subjects and MDS Degree have significant ( $P = 0.002$ \*) and ( $P \leq 0.001$ \*\*\*) impact on good knowledge toward regenerative endodontics. Study subjects who had done their master’s degree in subjects of endodontics have significant ( $P \leq 0.01$ \*\*) impact on good attitude toward regenerative endodontics. Years of experience more than 5 years has significant ( $P \leq 0.05$ \*) impact on good practice of regenerative endodontics.

## Discussion

The revelation of the mash of permanent and deciduous teeth raised the captivating plausibility of utilizing dental mash for tissue engineering.<sup>[14]</sup> Recent progresses in the distinguishing proof and portrayal of dental immature microorganisms, and in dental tissue-designing techniques, recommend that inside the decayed teeth, bioengineering methodologies may effectively be utilized to recover dental tissues and entire teeth.<sup>[11]</sup> In request for this methodology to arrive at clinical pertinence in human, sufficient intrigue is required; learning supported by research among administration is the prime essential. The discovery of stem cells in the pulp of permanent and deciduous teeth raised the intriguing possibility of using dental pulp stem cells for tissue engineering, which could be of further help in primary prevention of most common oral diseases like periodontal diseases and dental caries.<sup>[13]</sup> The regenerative treatment will

**Table 5: Multiple logistic regression to show the impact of various independent variables taking knowledge, attitude, and practice toward regenerative endodontics as the dependent variable among study subjects**

Demographic variables	Knowledge			Attitude			Practice		
	Sig.	Exp (B)	OR (95% CI)	Sig.	Exp (B)	OR (95% CI)	Sig.	Exp (B)	OR (95% CI)
Age (More Than 45)	0.002*	0.294	134–0.645	0.394	1.334	0.688–2.586	0.638	0.735	0.204–2.645
Gender (Male)	0.194	1.619	0.783–3.347	0.290	1.981	1.900–1.999	0.233	1.784	1.701–1.810
Gender (female)	0.892	1.0		0.080	1.0		0.781	1.0	
Degree (MDS)	0.001**	0.810	0.722–0.790	1.201	1.822	1.700–1.888	0.710	1.201	0.981–1.322
Specialty (Endodontics)	0.432	0.456	0.400–0.532	0.000*	0.290	0.234–0.322	0.120	0.603	0.546–0.681
Specialty (Oral surgery)	0.211	1.320	1.101–1.421	0.131	0.509	0.422–0.562	0.911	0.721	0.689–0.799
Specialty (orthodontics)	0.039	1.0		0.035	1.0		0.031	1.0	
Year of experience (More than 5 years)	1.100	0.109	0.013–0.198	0.221	1.781	1.600–1.722	0.050*	0.207	0.131–0.289

\*Significant at 0.05 percent level of significance. \*\*Significant at 0.001 percent level of significance. \*\*\*Significant at 0.000 percent level of significance

reform endodontics with the synergistic intersection of advances in flagging pathways hidden morphogenesis and ancestry of stem/ancestor cells by morphogens. However, to practically apply regenerative endodontics, adequate knowledge, positive attitude, and practice are needed.

In the present study, knowledge, attitude, and practice of dental practitioners and factors affecting their opinion toward regenerative endodontics were explored. The past many studies<sup>[9,15-18]</sup> have conducted to determine opinion of dental practitioners toward regenerative endodontics, but none of the studies has not assessed the factors affecting their judgment.

In the present study, the knowledge of dental practitioners regarding regenerative endodontics was tested, whereas the studies conducted in the past on this topic had only explored the opinion of the study participants.

In the present study, 63% of study participants has experience of less than or equal to 5 years compared to the Dental Residents' Expectations for Regenerative Endodontics study by Manguno *et al.*<sup>[18]</sup> where 96.8% of study participants had experience of 0–10 years.

In the present study, 57% of study participants agree or partially agree with the statement that it will take more than 20 years to take for some regenerative stem cell therapies to be used in dentistry, whereas in the study by Manguno *et al.*<sup>[18]</sup> about 92% of study participants agree with the statement. The same result was reposted in the study by Utneja *et al.*<sup>[15]</sup> and Epelman *et al.*<sup>[16]</sup> in which 91% and 98% of study participants reported the same, respectively. The recent technique developed in regenerative endodontics is controlling of odontogenic differentiation through involvement of Yes-associated protein.<sup>[17]</sup>

In the present study, only 31% of study participants were willing to do regenerative dental treatment to save teeth and dental tissue, whereas in the study by Utneja *et al.*,<sup>[15]</sup> 87.5% of study participants were willing to do the procedure. In the study by Epelman *et al.*<sup>[16]</sup>, 84% of study participants were willing for doing the procedure in the future. Manguno *et al.*<sup>[18]</sup> in his study

reported that about 96% of study participants were willing to perform the procedure of regenerative endodontics.

In the present study, the majority of study participants were having poor knowledge regarding the regenerative endodontics. Different results were seen in the study by Utneja *et al.*<sup>[15]</sup> in which most of study participants had good knowledge regarding regenerative endodontics.

In the present study, poor attitude was seen in the majority of study participants compared to the study by Utneja *et al.* in which most of study participants were optimistic about regenerative endodontics, whereas in the study by Epelman *et al.*<sup>[16]</sup>, there was no clarity about the enthusiasm of dental professionals regarding regenerative endodontics.

In the present study, the most of the study participants had not performed the procedure of regenerative endodontics nor had they undergone any CDE program on the same, whereas in the study by Epelman *et al.*<sup>[16]</sup>, 50% of study participants were performing the regenerative endodontic procedure.

Outcomes from the present study must be looked by considering its limitations also. Participants of the present study were from only one city. Hence, the results of the study cannot be extrapolated to the entire dental student population. Questionnaire studies are susceptible to social desirability and faking bad biases.

## Conclusion

From above results, it is concluded that the majority of study participants' knowledge, attitude, and practice regarding regenerative endodontics were poor. The knowledge regarding regenerative endodontics was significantly associated with the attitude of study participants. MDS degree had a significant effect on the knowledge regarding regenerative endodontics. Endodontic specialty has a significant effect on the attitude of study participants toward regenerative endodontics. The more the experience, the better the practice regarding the regenerative endodontics.

## Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the participants have given their consent for their images and other clinical information to be reported in the journal. The participants understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Nil.

## Conflicts of interest

There are no conflicts of interest.

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