

Comparison of Stress Between Endodontists, Postgraduate and Undergraduate Students During Endodontic Therapy

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Abstract

Background and Aim: Endodontic therapy is considered one of the most stressful dental treatments. This study was designed with the aim of comparing stress levels during different stages of endodontic treatment among endodontic professionals, under- and post-graduate students.

Materials and Methods: In this ex-post facto investigation, three groups including professional endodontists (n=36), undergraduate (n=41) and postgraduate dental students (n=47) were involved by convenience sampling. A 48-item questionnaire, with five-point scales (very little to very much), was prepared for this study based on interview. The questionnaire was filled out by participants in a self report method. Data were analyzed by multivariate analysis of variance and Scheffe's post-hoc tests.

Results: The stress among undergraduate dental students in all fields was more than those of professionals and postgraduate dental students, except for the stress of local anesthetic injection with lidocaine. Stress levels of all three groups were significantly different in inferior alveolar block injections with lidocaine, with professionals having more stress than under- and post- graduate dental students. The most stressful aspect of endodontic treatment, among the three groups was canal obturation, followed by obturation of the molar canals, preparing molar access cavities in special conditions and taking the final radiographs. The suggested methods offered for occupational stress reduction, was experience and knowledge, adequate knowledge, concentration and self confidence, and trust in God, respectively.

Conclusion: The stress among undergraduate dental students in all fields was more than that in professionals and post graduate dental students, except for the stress of local anesthetic injections with lidocaine.

Key Words: Occupational stress, Root canal therapy, Endodontists, postgraduate dental students, Undergraduate dental students

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Introduction

Stress is a reaction to adapt the individuals to factors and conditions that cause mental and/or physical pressure [1]. In 1930's, Hans Selye, produced a new concept of stress that included anything un-

pleasant, harmful, or excessively grueling [2, 3]. A group of experts believe that stress at work is caused by high demands on the person (huge workload), and person's lack of organization and inability to control the situation [4]. Amongst various

professions, dentistry is often described as a stressful occupation [5, 6]. Stress often occurs due to the nature of clinical work, the work environment, and personality of the operator, also, due to the focus on a small and tight workplace (the oral cavity) [7-10]. Generally, level of stress experienced by the dentists depends on the patient-dentist and dentist-nurse relationships, and on the level of job satisfaction [11-18]. Of all dental treatments, endodontic treatments often cause occupational stress among dentists, dentistry students, and even endodontists. There are several reasons for occupational stress in endodontic treatments including lack of a direct vision to the working area, as well as anatomical variability and complexity of the root canal system [10, 16-19]. According to study by Simon et al. in 1994, one of the stressors faced by many dentists is anesthetic injection [20], for which, there are many different considerations in dentistry [21, 22]. Some previous studies have focused on ways to reduce stress in dentists [10,11,15]. Bourassa et al. in 1992 showed that older dentists appear less stressed and that introducing stressful situations to dentists allows dentists to reduce destructive effects of stress on treatment by preventing them [11]. Rada et al. in 2004 reported that occupational stress in dentists goes back to studying time and grows in the course of clinical work. They believed that proactive approach can prevent the effects of stress, and also previous experience of the person is a factor in controlling stress, so that, the dentists' stress is reduced with increased experience, and that, presence of a supportive person and a good dentist-nurse relationship can strengthen the dentist against stress [10]. They also investigated stress control program in two groups of students by interventions in the course of dentistry education and in dentists through educational workshops [10]. In 2008, Ayera et al. stated that common stress factors among New Zealand dentists included treatment of children, time pressure, and difficulty in concentration, respectively, and strategies for coping with stress, included interaction with people, exercise, and forgetting work-related problems [15]. Kumar et al. in 2009 suggested that there was

a need to provide stress reducing programs for dentistry students [9].

This study aimed to compare stress levels in various stages of root canal treatment in endodontic specialists and residents, and in students of general dentistry course, and to assess the most and the least stressful stages of treatment.

Materials and Methods

An ex-post facto design was used in this study, where study population consisted of three groups. The first and the second groups included endodontists and residents participating in the fourteenth congress of Asia Pacific Endodontic Confederation (APEC), scientific faculty members and endodontic residents of Isfahan University of Medical Sciences, Islamic Azad University Khorasgan division, and Zahedan University of Medical Sciences. The third group consisted of students, and also all fifth- and sixth-year dentistry students of Khorasgan and Isfahan universities. Thirty-six specialists, 41 residents, and 47 students were involved conveniently. The sample size was determined based on recommendations for comparison between ex-post facto study groups [23]. For the purposes of measuring stress levels during endodontic treatments in the three groups (specialists, residents, and students), a 48-item questionnaire with a 5-degree scoring system (very little=1, and very much=5) was devised and prepared based on interviews with specialists, residents, and students. In the preparation of this questionnaire, questions were based on stages of root canal treatment, and face validity was confirmed by a number of specialists and suggested corrections were made. Participants were asked to write down, at the end of the questionnaire, their suggestions for stress reduction during endodontic treatment, and also to mention the highest and lowest stressful stages. The construct validity of the questionnaire was verified by exploratory factor analysis with Varimax rotation. The result of this analysis with Kaiser-Meyer-Olkin (KMO) measurement was equal to 0.87 and Croitebartlett's significance test produced 562917, and the following 10 factors were found:

1. Work stress on maxillary and mandibular molars and complex access cavity preparations (including cleaning and shaping the canals, obturation and access cavity preparation through crowns, access cavity preparations in intact teeth, prepared tooth, and obturation of canals with apical resorptions).
2. Stress due to preparation and obturation of premolar and anterior teeth in both jaws
3. Stress due to determination of the initial file for premolars and anterior teeth in both jaws
4. Stress due to work on premolar and anterior teeth, and access cavity preparation in anterior teeth in both jaws
5. Stress due to local anesthetic injection with lidocaine (including the stress due to injection of lidocaine and the stress due to inferior alveolar nerve block injection)
6. Stress due to access cavity preparation of premolars in both jaws
7. Stress due to intra-pulpal and intra-ligamentary injections
8. Stress due to miscellaneous cases (including re-treatments, encountering traumatized and pediatric patients, requiring endodontic treatment)
9. Stress induced by certain injections (including palatal injection, intraosseous injection, and posterior and anterior superior alveolar injections)
10. Stress induced by diagnosis of pulpal and periapical diseases and citanest

Cronbach's alpha ranged from 0.78 to 0.92 for the internal consistency of subscales 1-10, and it was 0.96 for the whole questionnaire. This self-report questionnaire was completed by the participants. Data were analyzed by multivariate analysis of variance and Scheffe's post hoc tests. In this study, the three groups (specialists, residents, and students) were the independent variable and the dependent variable was the endodontic treatment stress in the 10 dimensions introduced earlier. Now, given the dependent and independent variables, the three groups (specialists, residents, and students) were compared in terms of the 10 dimensions of endodontic treatment stress, through multivariate analysis of variance. Then in significant cases, the Scheffe's post hoc test was used to com-

pare groups with each other (specialist-residents, specialists-students, residents-students). SPSS version 17 was used as the statistical tool for the aforementioned analyses.

Results

Of the 36 endodontists, 17 were females (47.2%) and 19 males (52.8%), of the 41 residents, 19 were females (46.3%) and 22 males (53.7%), and lastly, of the 47 students, 26 were females (55.3%) and 21 males (44.7%). In terms of age, of the specialists, 15 (42%) were younger than 35 and 21 (58%) were older than 35 years, of the residents, 30 (73%) were under 35 and 11 (27%) were over 35 years old, and all 47 students (100%) were under 35 years of age. The mean dimensions of endodontic work-related stress in specialists, residents, students are given in table 1.

According to table 1, in the mean dimensions of endodontic work, the least stress in specialists group was due to determination of the initial file for premolar and anterior teeth in both jaws (1.51 in row 3), and the highest stress was due to miscellaneous cases (2.92 in 8th row). Those for the residents group were preparation of access cavity for premolars in both jaws (1.51 in row 6) and miscellaneous cases (2.71 in row 8), respectively. Those for students group were anesthetic injection and lidocaine (1.61 in row 5), and miscellaneous cases (3.47 in row 8), respectively.

Results of multivariate analysis for the three groups are presented in table 2. Among specialists, residents, and students, there was no significant difference in stress due to determination of the initial file for premolar and anterior teeth in both jaws, stress due to pulpal and periodontal intra-ligamentary injections, stress due to special case injection, stress due to diagnosis of pulpal and periapical diseases, and total stress. However, there was a significant difference in stress due to work on molars and preparation of access cavity in special cases, stress due to preparation and obturation of premolar and anterior teeth, stress due to work on premolars and preparation of access cavity, stress due to anesthetic injection and lidocaine,

Table 1. Descriptive indices of study standards for three groups of specialists, residents, and students

Row	Dimensions of stress	Specialists			Residents			Students		
		M	SD	SE	M	SD	SE	M	SD	SE
1	Stress due to specific cases of preparation of access cavity and work on molars in both jaws	2/09	0/69	0/11	2/33	0/68	0/1	3/01	0/75	0/11
2	Stress due to cleaning, shaping, and obturation of premolar and anterior teeth in both jaws	1/52	0/59	0/1	1/58	0/58	0/09	1/99	0/68	0/1
3	Stress due to determining primary instrument in premolar and anterior teeth in both jaws	1/51	0/58	0/1	1/66	0/8	0/09	1/85	0/79	0/11
4	Stress due to work on premolar and anterior teeth, and access cavity to anterior in both jaws	1/75	0/77	0/13	1/84	0/46	0/07	2/1	0/76	0/11
5	Stress due to anesthetic injection and lidocaine	2/09	1/07	0/18	1/8	0/85	0/13	1/61	0/64	0/09
6	Stress due to preparation of premolar access cavity in both jaws	1/51	0/67	0/11	1/51	0/57	0/09	1/95	0/77	0/11
7	Stress due to intrapulpal and periodontal intra ligamentary injections	2/17	1/03	0/17	2/04	0/85	0/13	2/02	0/86	0/12
8	Stress due to miscellaneous cases	2/92	1/05	0/17	2/71	0/83	0/13	3/47	0/83	0/12
9	Stress due to certain injection cases	1/88	0/54	0/09	1/79	0/52	0/08	1/92	0/6	0/09
10	Stress due to diagnosis of pulpal and periapical disease and citanest	1/59	0/8	0/13	1/56	0/59	0/09	1/63	0/59	0/09
11	Total stress	1/91	0/63	0/1	1/86	0/31	0/06	2/099	0/48	0/07

Table 2. Results of multivariate analysis in 3 groups (stress dimensions as in table 1)

Row	Variables	SS	df	MS	F	P
1	Stress due to complex access cavity preparations and root canal treatment of molars in both jaws	21/5	2	10/75	21/37	0/000
2	Stress due to cleaning, shaping, and obturation of premolar and anterior teeth in both jaws	5/6	2	2/83	7/24	0/001
3	Stress due to determining primary instrument in premolar and anterior teeth in both jaws	2/46	2	1/23	2/74	0/07
4	Stress due to work on premolar and anterior teeth, and access cavity to anterior in both jaws	2/96	2	1/48	3/2	0/04
5	Stress due to anesthetic injection with lidocaine	4/63	2	2/31	3/19	0/04
6	Stress due to preparation of premolar access cavities in both jaws	5/76	2	2/88	6/18	0/0003
7	Stress due to intrapulpal and intraligamentary injections	0/49	2	0/25	0/3	0/74
8	Stress due to miscellaneous cases	13/7	2	6/85	8/45	0/000
9	Stress due to certain injection cases	0/39	2	0.2	0/63	0/53
10	Stress due to diagnosis of pulpal and periapical disease	0/1	2	0/05	0/11	0/89
11	Total stress	1/41	2	0/7	2/8	0/06

stress due to preparation of access cavity in premolars, and stress due to miscellaneous cases.

Paired differences between groups are presented in table 3. In the stress due to work on premolars and preparation of access cavity in special cases, between specialist and student groups (mean difference -0.92), between residents and students (mean

difference -0.78), and in this respect, the stress level in students was significantly higher than that in specialists and residents. In the stress due to cleaning and shaping, and obturation of premolars and anterior teeth in both jaws, the stress level in students was also significantly higher than that in specialists and residents. In stress due to working on

Table 3. Results of Scheffe's post hoc test in significant stress dimensions for three groups

Significant stress dimensions	First group	Comparison group	Mean differences	Standard deviation	significance
	Specialists	Students	-0/92	0/16	0/000
	Residents	Students	-0/78	0/15	0/000
	Specialists	Students	-0/47	0/14	0/0004
	Residents	Students	-0/41	0/13	0/01
	Specialists	Students	-0/36	0/15	0/05
	Specialists	Students	-0/47	0/19	0/04
	Specialists	Students	-0/44	0/15	0/016
	Residents	Students	-0/44	0/14	0/011
	Specialists	Students	-0/56	0/2	0/02
	Residents	Students	-0/44	0/14	0/01

premolars and anterior teeth and access cavity preparation in both jaws, there was a significant difference among the three groups, and stress level was higher in students compared to specialists. On the contrary, in stress due to anesthetic injection of inferior alveolar nerve block and lidocaine, stress in specialists was significantly higher than that in

students. The frequency of the first 5 of the most and least stressful endodontic treatment stages in three groups are presented in table 4. In the opinion of participants, the most stressful stage in endodontic treatment was obturation of the canal, and the least stressful stage was shaping the canal.

Table 4. The frequency of 5 most and least stressful stages in endodontic treatment in three groups

Most stressful	Frequency	Rank	Least stressful	Frequency	Rank
Obturation	15	1	Shaping the canal	9	1
Molar teeth obturation	8	2	Cleaning file	8	2
Access cavity to upper molars in special cases	5	3	Anesthetic injection	6	3
Final graph preparation	5	3	Protease obturation	4	4
Preparation of access cavity through capping	4	4	Canal preparation of anterior teeth	4	4
Access cavity	4	4	Access cavity	4	4
Access cavity through healthy tooth	5	5	Anterior teeth canal preparation	5	5
Access cavity to upper and lower molars	5	5	Primary instrument or length of instrument	3	5
Finding canals	5	5			
Instrument separation	5	5			
Pediatric endodontics	5	5			
Surgical endodontics	5	5			

Discussion

According to the results obtained, stress in students, in all areas except in stresses due to anesthetic and lidocaine injections was higher compared to the specialist and resident groups. This may have been due to the higher experience and seniority of specialists and residents compared to students. Results of this study concur with those obtained by Bourassa et al. in 1994 showing that stress reduces in dentists with increasing age [11], also, results are in agreement with Rada et al. who consider experience a factor in controlling stress [10]. There was a significant difference among the three groups in stress due to anesthetic injection of inferior alveolar nerve block and lidocaine, and the level of stress in specialists was higher than that in residents and students. This was probably due to the specialists' attention to the complications of the injection and trying to achieve a successful anesthesia with minimum number of injections. Although inferior alveolar nerve block injection in mandible is the most common anesthetic injection of the type, it fails frequently due to bending of the needle, abnormal extra innervation, or pain and inflammation. Even if the needle is in the right anatomic position, still, success cannot be guaranteed [22]. Hence, higher levels of stress is seen in specialists due to knowledge and experience of potential complications in such cases [10, 21] and lack of attention by students leads to the least stress in this case. The students' lack of proficiency, and knowledge and excessive attention to other stages of treatment lead to neglecting the importance of this stage. Simon et al. in 1994 found that anesthetic injection was so stressful for many dentists that they wished they could change their profession [20], which agrees with the results of this study. With regard to the methods of reducing stress in endodontic treatment, participants stated providing high-quality radiographs with suitable angulations, especially with preoperative radiographs could reduce stress in dentists since radiographs are like dentists' auxiliary eyes [22]. Next comes patient's cooperation. A good patient-dentist relationship, and timely attendance, will

reduce dentist's stress. Rada et al. suggested other methods for occupational stress reduction, which include recognition of stress in patients, time management, and methods like hypnosis, desensitization and relaxation, good dentist-nurse relationship and reinforcing each other, and rest [10]. These methods are almost in agreement with those suggested by participants in this study. Bourassa et al. in 1994 stated that with awareness of stressful situations, the dentist has the opportunity to combat these stresses effectively and eliminate the damage incurred on treatment [11]. Thus, in this study according to table 4, the most stressful activity among the three groups was obturation of canals, followed by stresses due to obturation of molar teeth, preparation of access cavity in upper molars, and taking final radiographs in complex cases. Therefore, focusing on these areas in students' educational programs must be emphasized, so that with methods presented in this study, and gaining experience with practicing obturation and preparation of access cavity to upper teeth on extracted teeth could help reduce stress in dental professionals. Since quality of obturation is considered in the final radiograph, gaining experience and sufficient practice can help reduce stress in obturation stage. In a study by Ayera et al. in 2008, the most stressful treatment for New Zealand dentists was pediatric treatment [15]. In this study, pediatric endodontics ranked 5th. The least stressful stages of treatment for the three groups were shaping, cleaning, and anesthetic injection, respectively, which was in agreement with previous results. This was due to the less than average injection stress level in students and residents, while in specialists, the stress level was higher than average (as mentioned earlier). The reason for high level of stress in students compared with specialists and residents is combination of stressors that develop in university time and grow into clinical work [10].

Conclusion

Generally, attention to stressors, especially in students, and less in specialists and residents, and use of recommendations of this study, could reduce

stress in the three groups. According to the findings in this study, stress control must be focused on students and dentists. For the students, stress control training during dental education, and stress control techniques for dentists, through workshops are recommended.

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