

Knowledge and Awareness of Prosthetic Restoration of Endodontically Treated Teeth among the Dental Doctors of Jazan, Saudi Arabia

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Abstract

Introduction: After the elimination of endodontic infection the teeth becomes fragile, brittle and can easily fracture when compared to the natural teeth. The removed teeth and the dental pulp need to be replaced after the endodontic therapy to prevent inconvenience to the patient in chewing, biting and speaking. **Aim:** The main aim of this study is to assess the knowledge and awareness of dental doctors of Jazan about the prosthetic restorations of endodontically treated teeth. **Methodology:** A pre-designed questionnaire was circulated online using Google form to measure the knowledge and awareness of the dental doctors about the prosthetic restorations of the endodontically treated teeth. The results of the survey of elucidating the awareness of dental doctors in Jazan was recorded. The result of this survey was analysed using the SPSS software. **Results:** The above data analysis of this survey to evaluate and access the knowledge and awareness of the dental doctors of Jazan, in Saudi Arabia showed good results. Most of the dental doctors participating in this survey from Jazan are highly experienced and have excellent comprehension about the prosthetic restorations after the endodontic treatment.

Keywords: Prosthetic restoration, endodontically treated teeth, endodontics, Jazan.

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INTRODUCTION

Endodontics deals with the treatment of the diseases related to the Dental pulp by Root canal treatment, Periradicular surgery, apicoectomy, pulp-capping, pulpal regeneration, pulpotomy, hemisection and apexification. The dental pulp includes fibrous tissue, nerves, lymphatic tissue, arterioles and venules. Endodontics involves the treatment and removal of the diseased, infected and inflamed pulp tissue.

The removed teeth and the dental pulp need to be replaced after the endodontic therapy to prevent inconvenience to the patient in chewing, biting and speaking. Hence they are replaced by fixed or removable prostheses. The successful treatment of the tooth infected by micro organisms not only depends on an excellent endodontic treatment but also on an excellent reconstruction of the tooth. The prosthetic restoration is done on the tooth that is treated by Endodontic therapy [1].

After the elimination of endodontic infection the teeth becomes fragile, brittle and can easily fracture when compared to the natural teeth. Usually an intra-radicular post is placed inside the root canal after the

endodontic therapy. Several studies suggest that the post space preparation and posts cementation can make the root canal weak leading to fracture of the root [2]. The ideal material used for the posts should possess the physical characteristics same as Dentin along with the modulus of elasticity, coefficient of thermal expansion and comprehensive strength [3].

The tooth structure can be attained by using the adhesive restorations that creates minimal invasive preparations [4]. In recent times the ultra high molecular weight polyethylene (UHMWPE) fiber reinforcement systems are getting much popularity. UHMWPE has many clinical applications [5]. Due to the special property of UHMWPE, that it adapts to the root canal wall without requiring additional enlargement of the root canal after the endodontic therapy has increased its clinical value [6].

The endodontically treated teeth can be restored by the prosthetic treatment. Most of the prosthetic therapies after the Endodontic treatment may involve the use of direct restorations like amalgam, cements and resin composites or crowns [7]. The infected root canal can be sealed by using calcium

hydroxide dressing that was invented in the year 1991 which evidently eliminates the bacteria in the infected root canals [8]. Calcium hydroxide is simple to prepare, resorbable, readily available and is more soluble in glycerine when compared to water [9]. There exists a direct relation between the structure of the tooth remaining after the Endodontic treatment and the fracture resistance [10].

The ideal post for the root canal after the Endodontic treatment should help to preserve the tooth structure, maintain resistance and retention, ferrule effect, retrievability and failure mode [11].

AIM AND OBJECTIVES

The main aim of this study is to assess the knowledge and awareness of dental doctors of Jazan about the prosthetic restorations of endodontically treated teeth. This can be attained by:

SPECIFIC OBJECTIVES

- Carrying out a survey to evaluate the awareness of the dental doctors practising in Jazan, Saudi Arabia about the various prosthetic restorations of endodontically treated teeth.
- Determining the attitude of the dental doctors regarding the need for restoration of the endodontically treated teeth.

METHODOLOGY

A pre-designed questionnaire was circulated online using Google form to measure the knowledge and awareness of the dental doctors about the prosthetic restorations of the endodontically treated teeth. The results of the survey of elucidating the awareness of dental doctors in Jazan was recorded. This study was carried out in the year 2020. The questionnaire was designed in English language and later is translated into Arabic language. The Questionnaire in both English and Arabic was circulated online to the dental doctors of Jazan, in Saudi Arabia. The questionnaire includes the questions related to the demographic data of the dental doctors followed by questions related to knowledge and Awareness about prosthetic restorations of endodontically treated teeth.

DATA COLLECTION

The results of this cross-sectional study of determining the knowledge and awareness of dental

doctors of Jazan, in Saudi Arabia was recorded. The result of this survey was analysed using the SPSS software. The frequencies and percentage of the results of elucidating the awareness of dental doctors was done using the P value less than or equal to 0.05.

Data Management and Analysis Plan

The data collected from the online survey was analysed using the computer software Statistical package for social sciences that is SPSS 16. The frequencies and percentages of the responses from the dental doctors of Jazan in Saudi Arabia is done and the descriptive statistics is attained and the mean, standard deviation and frequency distribution is calculated. Data inscription was done in a password-protected computer in a database created by the Principal Investigator working on this project. A hard copy of the data and Identification variable is maintained in a locked file cabinet in the research coordinator office. Only those involved in the study have access to data. The data is accessible only to the persons involved in the study. All data is identified. Data is restrained vaguely.

RESULTS

About 93 dental doctors of Jazan in Saudi Arabia answered the survey related to the prosthetic restorations of endodontically treated teeth. 1(1.1%) participant belong to age group 19-20 years, 19(20.4%) are in 21-25 years age group, 31(33.3%) are in 26-30 years age group and 42(45.2%) belonged to age group >30 years. Majority of the participants are males 67(72.1%) and remaining 26(27.9%) are females.

About 28 (30.1%) of the dental doctors participating in the study has 1 year of experience, while 14 (15.1%) of them has 2 years of experience, 7 (7.5%) of the participants has 3 years of experience, 4 (4.5%) of them has 4 years of experience, 3 (3.2%) of the participants has 5 years of experience, 10 (10.7%) of the participants has 5-10 years of experience and 27 (29.1%) of the participants of this survey has more than 10 years of experience.

36 (38.7%) of the participants are working in the private sector, 42 (45.1%) are working in the public sector and 15 (16.1%) are unemployed. Majority of the dental doctors from Jazan participating in the survey are Saudi nationals whereas 8 (8.6%) of them are non-Saudi nationals.

DEMOGRAPHIC CHARACTERS	FREQUENCY	PERCENTAGE
Age		
19 - 20 years	1	1.1
21 - 25 years	19	20.4
26 - 30 years	31	33.3
>30 years	42	45.2
Gender		
Female	26	27.9
Male	67	72.1

Experience		
1 year	28	30.1
2 year	14	15.1
3 year	7	7.5
4 year	4	4.3
5 year	3	3.2
5-10 year	10	10.7
More than 10 year	27	29.1
Working		
In Private sector	36	38.7
In Public sector	42	45.1
Is Unemployed	15	16.1
Nationality		
Saudi	85	91.4
Non-Saudi	8	8.6

According to statistics of this survey, most of the dental doctors that participated in this cross-sectional study are well aware about the prosthetic restorations after the endodontic therapy. About 84 (90.3%) are aware about prosthetic rehabilitation can restore the lost teeth after the endodontic therapy in Saudi Arabia. 86 (92.4%) are aware that Endodontically treated teeth dry out over time with their dentin undergoes changes in collagen cross-linking. 80 (86.0%) are aware that endodontically treated teeth are more brittle than the non-endodontically treated teeth. 83 (89.2%) are aware that the endodontically treated

teeth are more susceptible to fracture when compared to non treated teeth.

Around 81 (87.0%) are aware that the Loss of tooth structure due to caries and trauma also contributes to fracture of endodontically treated teeth. 84 (90.3%) are aware about the crown restorations are failed due to loss of tooth structure. 91 (97.9%) are aware that the use of post and core can strengthen the endodontically treated teeth. About 79 (84.9%) of the dental doctors from Jazan that some studies suggests weakening the root structure with subsequent root fracture.

Awareness About Prosthetic Restoration Of Endodontically Treated Teeth In Dental Services	YES (%)	NO (%)	P-Value
Are you aware about prosthetic rehabilitation can restore the lost teeth after the endodontic therapy in Saudi Arabia?	84 (90.3%)	9 (9.7%)	0.015
Are you aware that Endodontically treated teeth dry out over time with their dentin undergoes changes in collagen cross-linking?	86 (92.4%)	7 (7.6%)	0.022
Are you aware that endodontically treated teeth are more brittle than the non-endodontically treated teeth?	80 (86.0%)	13 (14.0%)	0.025
Are you aware that the endodontically treated teeth are more susceptible to fracture when compared to non treated teeth?	83 (89.2%)	10 (10.8%)	0.020
Are you aware that the Loss of tooth structure due to caries and trauma also contributes to fracture of endodontically treated teeth?	81 (87.0%)	12 (13.0%)	0.027
Are you aware that the crown restorations are failed due to loss of tooth structure?	84 (90.3%)	9 (9.7%)	0.015
Are you aware that the use of post and core can strengthen the endodontically treated teeth?	91 (97.9%)	2 (2.1%)	0.013
Are you aware that some studies suggests weakening the root structure with subsequent root fracture?	79 (84.9%)	14 (15.1%)	0.009
Are you aware that the primary function of post is to provide retention to core to support the coronal restoration?	82 (88.2%)	11 (11.8%)	0.029
Are you aware about the active and passive post?	88 (94.6%)	5 (5.4%)	0.019
Are you aware about the parallel and tapered posts?	90 (96.7%)	3 (3.3%)	0.020
Are you aware about the custom cast post and cores?	92 (98.9%)	1 (1.1%)	0.016
Are you aware about the prefabricated posts and cores?	89 (95.6%)	4 (4.4%)	0.019
Are you aware about the ceramic and zirconium posts?	88 (94.6%)	5 (5.4%)	0.019
Are you aware about the fiber posts?	84 (90.3%)	9 (9.7%)	0.015
Are you aware that the shearing forces acting on anterior teeth are more frequently restored with posts than posterior teeth?	91 (97.9%)	2 (2.1%)	0.013
Are you aware that the selection of post design and post system is important since it acts major deciding factor longevity of tooth and long-term success of endodontic treatment?	87 (93.5%)	6 (6.5%)	0.023

82 (88.2%) of the candidates participants are well aware of the primary function of post is to provide retention to core to support the coronal restoration. 88 (94.6%) of them are aware about the active and passive post. 90 (96.7%) are aware about the parallel and

tapered posts. 92 (98.9%) are aware about the custom cast post and cores. 89 (95.6%) are aware about the prefabricated posts and cores. 88 (94.6%) of the dental doctors 84 (90.3%) are aware about the fiber post, 91 (97.9%) are aware about the shearing forces acting on

anterior teeth are more frequently restored with posts than posterior teeth. 87 (93.5%) are aware that the selection of post design and post system is important since it acts major deciding factor longevity of tooth and long-term success of endodontic treatment.

The above data analysis of this survey to evaluate and access the knowledge and awareness of the dental doctors of Jazan, in Saudi Arabia showed good results. Most of the dental doctors participating in this survey from Jazan are highly experienced and have excellent comprehension about the prosthetic restorations after the endodontic treatment.

DISCUSSION

In review of the literature, in 17th Century to assist the retention of the crown, Fauchard inserted the canal made with wooden dowels and the retention of the dowels was favoured by the nature of wood absorbing moisture [12]. In the year 1869, the porcelain faced crown with gold lined root canal was secured by a screw made of metal posts. Amidst the 18th Century, a tube was developed by Clark that allowed drainage from the apical area of the canal [12]. Richmond in 1878, for the first time introduced a threaded tube inside a canal with screw retained crown [12].

The Richmond Crown that was a single piece post retained crown made with porcelain facing to function as a bridge retainer was invented in the late 19 century. In the year 1958, Hampson EL and Demas NC replaced the threaded tube with a single piece dowel crown [12]. Sorensen J.A and J.T. Martinoff reported the high risk of un-restorable cusp fracture in endodontically treated teeth with intra-coronal restorations [13]. They also reported that the use of crown can enhance the restoration success of endodontically treated posterior teeth. In 1987, Eissman and Radke explained the ferrule effect of casting a metal ring that protects the integrity of the endodontically treated tooth structure.

Fernandez AS in 2001, proposed the development of the hydrostatic pressure inside the root canal during the cementation process [14]. Vichi 2000 and Freedman 2001 emphasized the use of restoration in a colour close to that of natural teeth. In the 20th Century, the fixed dental prosthesis were evolved exponentially.

In the modern technologies in dentistry, various fields and specialities have merged together to give patient good services, however the restoration of the endodontically treated teeth is still a challenge. A varied improvisation and enhancement in the posts have been done, but still it could fail sometimes in case of endodontically treated teeth. The failure rate is low, but still more research and development need to be done to make this negligible in the field of prosthetic restoration of endodontically treated teeth. Root fracture and posts

loosening are the most encountered clinical complications of prosthetic restorations.

To follow the correct procedure of prosthetic restoration, a dental doctor must have good knowledge about it after the endodontic therapy. Thus in this study a brief introduction about the requirement of restoration in the endodontically treated teeth is explained and also the evaluation of the knowledge and awareness among the dental doctors of Jazan is done related to prosthetic restoration of endodontically treated teeth. The majority of the participants (45.2%) were above 30 years of age. 72.1% of the dental doctors were males. 29.1% of the dental doctors in Jazan are highly qualified of more than 10 years experience. About 45.1% works in the private sector and 91.4% are Saudi Nationals that participated in this study.

The results of this survey are similar when compared to the results of the studies by Alenzi A *et al.*, [15]. The intraradicular fiber posts are cheap and biocompatible and is used to bond to dentin and restore the endodontically treated teeth. A well designed randomized controlled clinical trials are unavailable in the scientific literature. The factors that effect the selection of posts may be: root length, tooth anatomy, post width, canal configuration and post adaptability, coronal structure, position of the tooth in the arch, stress, torsional force, role of hydrostatic pressure, post design, post material, material compatibility, bonding ability, core retention, retrievability and esthetics. The ideal prefabricated posts should be sufficient in length, parallel in shape, cemented, standardized to size of existing drills, vented, and have greater resistance to dislodgement.

In the year 1988, Kanca *et al.*, reported that the use of intra coronal direct placement composite restorations gives high success rate in restoring the endodontically treated posterior teeth [12]. The endodontically treated teeth need to be determined for restoration by checking the apical seal, sensitivity to percussion and inflammation. Sorenson and Engelman reported that parallel sided posts causes less tooth fracture when compared with tapered posts [13]. In order to carry out the restoration of the endodontically treated teeth, the endodontic treatment must be successful, The dental practitioner should reduce the loss of tooth structure in both endodontic and posts preparation; the apical seal need to be maintained adequately to reduce the length of posts; and the concentration of the posts during the post insertion need to be minimized.

CONCLUSION

Most of the dental doctors from Jazan that participated in this study, have good knowledge and awareness about the prosthetic restorations of endodontically treated teeth. The dental doctors are highly educated and most of them have good practising

experience in the field. The doctors are well aware about the prosthetic restorations that can be done after the endodontic therapy. More research need to be done including all the dental care takers in different regions of Saudi Arabia to estimate more clear results.

LIMITATIONS

This study was carried out in only the dental doctors of Jazan, the same surveys can be done in other parts of Saudi Arabia.

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ETHICAL CONSIDERATIONS

Compliance with Ethical Standards

Ethical Approval: This proposal contain survey studies with human participants that is the dental doctors practising in Saudi Arabia performed by any of the authors.

Conflict of Interest: The authors do not have any commercial associations that might pose or create a conflict of interest with information presented in this communication. No intramural or extramural funding supported any aspect of this work.

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