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A Clinical Evaluation on the Tooth Root Canal Treatment for Pulpal Necrosis and Irreversible Pulpitis in Academic Dental Hospital

1st Sofiani Erma
School of Dentistry
Medical and Health Science Faculty
Universitas Muhammadiyah Yogyakarta, Indonesia
ermasofiani@umy.ac.id

2nd Mayank Sari Iga
School of Dentistry
Medical and Health Science Faculty
Univeritas Muhammadiyah Yogyakarta, Indonesia
igamayang@gmail.com

Abstract— Clinical evaluation is one of the most practical evaluations of root canal treatment. The success of root canal treatment can be seen in a period of 6 months to 4 years. The success rate of root canal treatment after clinical and radiographic evaluation ranges from 83% to 96% depending on pulp status before treatment. It aims to clinically evaluate the success of root canal treatment in teeth undergoing necrosis and irreversible pulp based on age, sex, tooth element and social status at dental hospital. The type of research is analytic observational with cross-sectional study design. The subjects used were the medical records of male and female patients that had performed root canal treatment for 1 to 3 months, 4 to 6 months and 6 to 12 months in dental hospital based on medical records. The sampling method used was non-probability sampling with purposive sampling. The number of research samples were 65 samples. The data were analyzed using the Mann U Whitney Test. The statistical tests showed no significant difference in clinical evaluation of root canal treatment in cases of irreversible pulpitis and pulpal necrosis of significance values ($p > 0.05$). Successful root canal treatment showed dominant results with good categories 88.5%, moderate 10, 0% and 1.5% bad. Root canal treatment is most commonly found in the male sex, age of group 17-30 years, on maxillary teeth central incisivus, and middle to upper socio-economic status. There is no difference in clinical evaluation of the success of root canal treatment in teeth with pulpal necroses and irreversible pulpitis.

Keywords— Root canal treatment, Clinical evaluate root canal treatment

I. INTRODUCTION

Endodontic treatment is a treatment or preventive measure to restore the condition of a diseased tooth so that it can be biologically accepted by the surrounding tissue(1). Irreversible pulpitis is the strongest indication for endodontic treatment, followed by pulp necrosis, fractured teeth, intentional or prosthodontic reasons and failure of root canal treatment. Ngangi et al. in their study showed pulp necrosis was the most common disease in dentistry(2) .There were 1389 cases, 787 (56.65%) cases of extraction with a diagnosis of pulp necrosis, followed by chronic marginal periodontitis 163 cases (11.73%), then 141 (10.51%) cases of irreversible pulpitis(2).

The success of root canal treatment can be seen histologically, clinically signs and symptoms and radiographs(3). The clinical identification of teeth with irreversible pulpitis examination of cold sensitivity and percussion showed positive results, whereas palpation of mobility showed negative results. Clinical identification of teeth undergoing pulp necrosis on palpation, percussion and mobility tests showing negative results(4). Clinical identification of a successful root canal treatment is insensitive to percussion and palpation, normal mobility, no sinus tract or periodontal disease, teeth can function properly, no signs of infection or swelling, and no unpleasant complaints from patients(5).

II. METHODS

The study design used in this study was observational analytic with a cross-sectional study design. The subjects used were male and female patients who had undergone root canal treatment for 1-3 months, 4-6 months and> 6 months at RSGM-UMY based on medical records. The sampling technique used in this study was nonprobability sampling with purposive sampling. Random sampling and the number of samples in this study were 65 samples.

This research was started with observation at the root canal treatment medical record data at Academic Dental Hospital in 2010-2014 to become the research sample. The data was collected the respondents' identity including name, age, gender, tooth elements that were treated and social status. The scoring process was done to assess the condition of the respondent's tooth condition during 1-3 months, 4-6 months and >6 months after root canal treatment.

Data analysis in this study used analytic descriptive analysis. The data is displayed in the form of frequency and percentage to systematically describe data based on gender, age, dental elements, and social status. The data was analyzed by Mann U Whitney statistic to compare two unpaired groups to

observe the success of root canal treatment between pulpal necrosis group and irreversible pulpitis group at intervals 1-3 months, 4-6 months and >6 months after root canal treatment. Subjective and objective examination scale before treatment as in the following table:

Table 1. Subjective examination scale before and after treatment

Clinical evaluation category	Subjective Examination Before and after treatment	
	complain	no complain
Good	×	√

Table 2. Objective Examination scale before and after treatment

Clinical evaluation category	Objective Examination					
	before treatment				after treatment	
	Sondation	Percussion	Palpation	CE	Percussion	Palpati
Good	-	-	-	+	-	-
Moderate	-	+/-	+/-	+	+/-	+/-
Severe	-	+	+	-	+	+

Notes : - = no pain

+ = pain

+/- = not comfort / different

III. RESULTS

Table 3. Frequency distribution of the patient's condition after root canal treatment

Frequency distribution of the patient's condition after root canal treatment		Group		Total N(%)
		Irreversibel pulp N (%)	Pulp necrosis N(%)	
1-3 months	Good	33 (47.1)	32 (45.7)	65 (92.9)
	Moderate	2 (2.9)	2 (2.9)	4 (5.7)
	Severe	0 (0)	1 (1.4)	1(1.4)
	Total	35 (50)	35 (50)	70(100)
4-6 months	Good	13 (43.3)	14 (46.7)	27 (90)
	Moderate	2 (6.7)	1 (3.3)	3 (10.0)
	Severe	0 (0)	0 (0)	0 (0)
	Total	15 (50)	15 (50)	30 (100)
6-12 months	Good	15 (50)	13 (43.3)	28 (93.3)
	Moderate	0 (0)	2 (6.7)	2 (6.7)
	Severe	0 (0)	0 (0)	0 (0)
	Total	15 (50)	15 (50)	30 (100)

Table 4. Distribution of the overall data frequency of the patient's condition after root canal treatment

Category	Group		Total
	Irreversible pulpitis N (%)	Pulpal Necrosis N (%)	
Good	59 (45.4)	56 (43.1)	115 (88.5)
Moderate	6 (4.6)	7(5.4)	3(10)
Severe	0 (0)	2(1.5)	2(1.5)
Total	65(50)	65(50)	130 (100)

Table 5. Frequency distribution of root canal treatment with cases of irreversible pulpitis and pulp necrosis by gender and age

Category	Group		Total
	Irreversible pulpitis N (%)	Pulpal Necrosis N (%)	
Gender			
Male	35 (27)	44 (33.8)	79 (60.8)
Female	30 (23)	21 (16.20)	51 (39.2)
Total	65 (50)	65 (50)	130 (100)
Age			
17-30 years	50 (38.5)	54 (41.5)	104 (80)
>30 years	15 (11.5)	11(8.5)	26 (20)
Total	65 50%	65 50,00%	130 100%

Table 6. Frequency distribution of root canal treatment with cases of irreversible pulpitis and pulp necrosis by tooth element

Tooth element	Group		Total N (%)
	Irreversible pulpitis N(%)	Pulpal Necrosis N (%)	
Central maxillary incisors	26(20)	48 (37)	74 (57)
Lateral maxillary incisors	12 (9.2)	11 (8.5)	23 (17.7)
First premolar maxillary	2 (1.5)	0 (0)	2 (1.5)
Second premolar maxillary	6 (4.7)	0 (0)	6 (4.7)
First premolar mandibulary	2(1.5)	0 (0)	2(1.5)
Second premolar mandibulary	14 (10.8)	2 (1.5)	16 (12.3)
First molar mandibulary	2 (1.5)	2 (1.5)	4(3)
Second molar mandibulary	1(0.8)	0 (0)	1 (0.8)
Mandibulary incisors	0 (0)	2 (1.5)	2 (1.5)
Total	65 (50)	65 (50)	130 (100)

Table 7. The overall frequency distribution of root canal treatment based on social status

Occupation	Group		Total N (%)
	Irreversible pulpitis N (%)	Pulpal necrosis N (%)	
Students	29 (22.3)	33 (25.4)	62 (47.7)
Private Employees	30 (23.1)	14 (10.8)	44 (33.9)
Self-employed	2 (1.5)	4 (3.1)	6 (4.6)
Civil Servants	0 (0)	2 (1.5)	2 (1.5)
Indonesian National Army	1 (0.8)	0 (0)	1 (0.8)
Unknown	3 (2.3)	12 (9.2)	15 (11.5)
Total	65 (50)	65 (50)	130 (100)

Table 8. Results of comparison of the success of root canal treatment in cases of irreversible pulpitis and pulp necrosis with time interval

Interval	Classification	N	Mean Rank	Sig
1 - 3 month	Irreversible pulpitis	35	34.97	.626
	Pulpal Necrosis	35	36.03	
	Total	70		
4 - 6 month	Irreversible pulpitis	15	16.00	.550
	Pulpal Necrosis	15	15.00	
	Total	30		
> 6 month	Irreversible pulpitis	15	14.50	.150
	Pulpal Necrosis	15	16.50	
	Total	30		

Based on the Mann U Whitney test, the value of p> 0.05 means that there is no difference in the success of 1-3 months, 4-6 months and >6 months root canal treatment in teeth with pulpal necrosis and irreversible pulpitis

Table 9. Results of comparison of the success of overall root canal treatment in the case of irreversible pulpitis and pulpal necrosis

Classification	N	Mean Rank	Sig
Irreversible pulpitis	65	63.91	.384
Pulpal necrosis	65	67.09	
Total	130		

Based on the Mann U Whitney test, the value of p = 0.384 (p> 0.05) means that there is no difference in the success of root canal treatment of the entire data.

IV. DISCUSION

The success of root canal treatment carried out at Academic Dental Hospital Universitas Muhammadiyah Yogyakarta showed the dominant results in the good category (88.5%). The results of this study were consistent with the research conducted by Quadros et al. conducted a clinical and radiographic evaluation of root canal treatment carried out by final-level students of the Dental School of Piracicaba found that the success rate of root canal treatment evaluated ranged from 83% to 96% depending on pulp status before treatment. Pulp status before treatment shows the presence of pain, swelling, sinus tract, radiographic examination of periodontal ligaments occurs(6).

In this study the success of root canal treatment in teeth with irreversible pulpitis and pulp necrosis was known that the case of men is more dominant than women. In contrast to the previous study by Ahmed, et al. (2009) in Pakistan women had more root canal treatment than men because women were more concerned with dental and oral health(7,8).

The results of this study showed that the most root canal treatment in tooth with irreversible pulpitis was 50 patients in 17-30 years old and >30 years old as many as 15 patients. The root canal treatment in tooth with pulpal necrosis was 54 patients in 17-30 years old and >30 years old as many as 11 patients. Data on the success of root canal treatment in tooth with irreversible pulpitis and pulpal necrosis were known that the dominant age of many root canal treatments is 17-30 years. The results of previous studies by Sagita et al showed that the most root canal treatment was the age group of 20-40 years (67%), the age group 33-44 years had an average tooth loss of 5.09% of teeth and in the age group 65 years and above the average has lost 22.73% of teeth, so it can be concluded that the more the age increases, the more teeth have been extracted(9).

Based on research that conducted at Academic Dental Hospital Universitas Muhammadiyah Yogyakarta, it was found that the tooth element found in the success of root canal treatment with irreversible pulpitis was 26 elements of maxillary central incisor, 12 elements of maxillary lateral incisor, 2 elements of maxillary first premolars, 6 elements of maxillary 2 premolar teeth, 2 elements of lower jaw premolar teeth, 14 elements of mandibular premolar teeth, 2 elements of lower mandibular first molars and 1 element of mandibular second molars. Pulp necrosis cases found in dental elements were carried out on the success of root canal treatment were 48 elements of maxillary central incisor, 11 elements of maxillary lateral incisor, 2 elements of mandibular 2 premolars, 2 elements of mandibular central incisor and 2 elements of molar teeth 1 lower jaw. During the study, there were no permanent maxillary canines, mandibular permanent canines. The results of this study are consistent with the results of a previous study by Marza and Adil, which stated that the central incisor and maxillary permanent premolar 1 were the most common root canal treatments(10). The incisors are permanent anterior teeth that are most considered in terms of aesthetics. The aim of endodontic treatment is to maintain teeth with maximum function and good aesthetics(11).

The study resulted that the success of root canal treatment irreversible pulpitis patients was 29 students, 30 private employees, 1 person of Indonesian National Army, 2 people was self-employed, 3 people with unknown status. Pulpal necrosis patients who did the most root canal treatment were 33 students, 14 private employees, 4 self-employed people, 2 civil servants, and 12 unknown people. The results showed that the most root canal treatment at Academic Dental Hospital Universitas Muhammadiyah Yogyakarta was a case with a middle to upper economic status. Middle to upper economic status has more awareness to maintain dental and oral health. People with high economic status prefer to do dental care rather than pulling teeth, whereas this situation is inversely proportional to the people from low economies who will choose to extract their teeth with a dental condition that cannot be maintained anymore and the high cost if maintenance is done(10).

In this clinical evaluation study, there were no significant differences between root canal treatment in pulpal necrosis tooth and root canal treatment in irreversible pulpitis. The success of root canal treatment depended on not only accurate diagnose but also disinfection process, biomechanical preparation, root canal obturation, and final restoration post root canal treatment(12,13).

V. CONCLUSION

1. There is no difference in clinical evaluation of the success of root canal treatment in teeth that have pulpal necrosis and irreversible pulpitis.

2. There is no significant difference in the success of root canal treatment in teeth undergoing pulpal necrosis and irreversible pulpitis for a period of 1-3 months, 4-6 months and >6 months.

3. The Results of root canal treatment after 1-3 months, 4-6 months and> 6 months are found in male respondents (60.8%), at the age of 17-30 years (80%), in the jaw incisor element top (57%) and upper middle social status (91.5%).

4. The results of root canal treatment after 1-3 months, 4-6 months and> 6 months show good criteria of 88.5%.

VI. SUGGESTION

1. Further research is needed regarding evaluating the success of root canal treatment by adding evaluation criteria using radiography and histology.
2. Further information is needed on students and young dentists on how to write medical records and more complete the contents of the medical record information.

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