



## Frequency and Distribution of Mandibular Teeth Treated by Single Visit RCT and Multi Visit RCT in an Indian Population- A Retrospective Study

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### Article History:

Received on: 15 Jul 2020  
Revised on: 18 Aug 2020  
Accepted on: 19 Aug 2020

### Keywords:

frequency,  
mandibular teeth,  
multi-visit root canal  
treatment,  
single visit root canal  
treatment

### ABSTRACT

The aim of this study was to determine the frequency and distribution of mandibular teeth treated by single visit root canal treatment (RCT) and multi-visit RCT in a group of the Indian population. With the approval of the Institutional Review Board of Saveetha Dental college, the data of 3887 patients between June 2019 to March 2020 were retrieved and analysed. Data was collected from 3887 patients and were divided into the criteria of a single visit and multi-visit RCT. The data were tabulated into excel sheets under the headings age, gender, teeth, type of treatment. It was an Institutional based Retrospective study. It was observed that there was a statistically significant association in the age and gender of patients who underwent single visit and multi-visit RCT in mandibular teeth. The probability value  $P < 0.05$  was obtained after performing a Chi-square test, showing that multi-visit RCT cases (59.9%) were higher than single visit RCT (40.56%). Within the limitations of the study, it was concluded that the frequency of multi-visit RCT was higher in mandibular teeth compared to single visit RCT. Frequency of multi-visit RCT was higher in mandibular molars followed by second premolars in comparison to single visit RCT. The frequency of multi-visit RCT was higher in both males and females compared to single visit RCT.



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ISSN: 0975-7538

DOI: <https://doi.org/10.26452/ijrps.v11iSPL3.3002>

Production and Hosted by

IJRPS | <https://ijrps.com>

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### INTRODUCTION

Endodontics is a branch of dentistry which emphasises on the health and disease status of pulp and surrounding periradicular tissues. Root canal procedure is aimed at eliminating the microbes

and infection from the root canal by removing the infected or necrotic pulp (Alomaym *et al.*, 2019). Root canal treatment encompassed the removal of infected pulp and ensued by cleaning and shaping, followed by obturation of the root canal.

Gutmann described that the importance of endodontic success lied in thorough debridement and neutralization of dead necrotic tissue, bacterial and inflammatory products present in the root canal. This alleviates the endodontic pain (Jain *et al.*, 2018).

There are practically two modes of intervention of endodontic pain- pharmacological and non-pharmacological modes. But the most precise and accepted mode to reduce long-standing endodontic pain is to perform root canal treatment (Ramamoorthi *et al.*, 2015). The main aim of RCT is to create an aseptic environment within the root canal system.

AAE has prescribed certain guidelines to perform RCT which include irreversible pulpitis that can be symptomatic or asymptomatic with or without the presence of apical periodontitis and cracked or fractured teeth with pulpal involvement.

The success of RCT is characterized by the absence of symptoms. However, the root canal procedure can be done in a single visit or multiple visits based on various factors such as tooth condition/patient condition. Of late, the perception of endodontists is inclined towards single visit RCT. It offers potential advantages as it is less time consuming, cost-effective and less painful and traumatic compared to multi-visit RCT (Bhagwat and Mehta, 2013). On the contrary, if the pulp has become necrotic or if it is associated with periradicular pathology, it indicates that the root canal system has become infected. In such cases, thorough disinfection, cleaning and placement of intracanal medicament (for the lesion to heal) followed by final filling of the canal is required. Hence multi-visit RCT is usually preferred over a single visit in these cases (Dorasani et al., 2013).

Post RCT teeth usually experience either short term or long term complications (Riaz et al., 2018). Short term complications include inflammation of periapical tissues postoperatively and also intermittent pain that causes a flare-up. Pain and swelling have been associated with inadequate instrumentation and disinfection, forceful pushing out of the debris from the canal into periradicular tissues that lead to the presence of bacterial infection within the root canals and consequent contamination of periapical tissues again (Ramanathan and Solete, 2015). Long term complications include the continuous presence of infection resulting in inflammation, abscess and formation of a sinus tract, which necessitates endodontic retreatment or extraction of teeth (Schwendicke and Göstemeyer, 2017).

Studies concerning postoperative pain and healing rate show the treatment outcome to be similar, whether completed in a single visit or multi-visit. The composition and the amount of bacterial contamination of the reaction of the patient's immune system will play a key role in postoperative pain (Marwah et al., 2008). Roane et al. reported that a higher frequency of pain post-treatment was seen in multiple visit RCT as compared to that of single visit RCT. Mulhern et al. concluded that there was no significant difference in the incidence of postoperative pain between single visit and multi-visit RCT (Siddique et al., 2019). Moreover, pain associated with RCT is a poor predictor of long term success. Single-visit and multi-visit RCT have pros

and cons in relation to long term and short term complications (AL-Omiri et al., 2013). Many studies found no significant difference between a single visit and multi-visit RCT regarding flare-ups. However, Eleazer and Eleazer reported more flare-ups for a multi-visit (8%) and (3%) for single visit groups in necrotic molars. In contrast, Orginni and Udoye reported more flare-ups in a single visit (18.3%) than in multi-visit groups (8.1%) (Schwendicke and Göstemeyer, 2017).

The aim of the present study was to know the frequency of distribution of single and multi-visit RCT in mandibular teeth in a population confined to a dental hospital.

## MATERIALS AND METHODS

With the approval from the Institutional Review Board of Saveetha Dental college, the data of 3887 patients between June 2019 to March 2020 was retrieved from the patient records and analyzed. Data was collected from 3887 patients and were divided into the criteria of a single visit and multi-visit RCT. The data were tabulated into excel sheets under the headings age, gender, teeth, type of treatment. It is an Institutional based Retrospective study.

Data were collected from July 2019 to March 2020. Inclusion criteria-patients of age 18 to 60 years and completely obturated teeth. Exclusion criteria- maxillary teeth and incompletely treated teeth.

The data includes all completed cases- mandibular root canal treated teeth, including both single visit and multi-visit RCT. The data was collected in chronological order. The data collected were tabulated in an excel sheet. The data were analyzed by descriptive and inferential statistics. Data analysis was performed using SPSS software. The dependent variables are age, gender, type of treatment, i.e., single visit and multi-visit RCT. Independent variables include mandibular teeth.

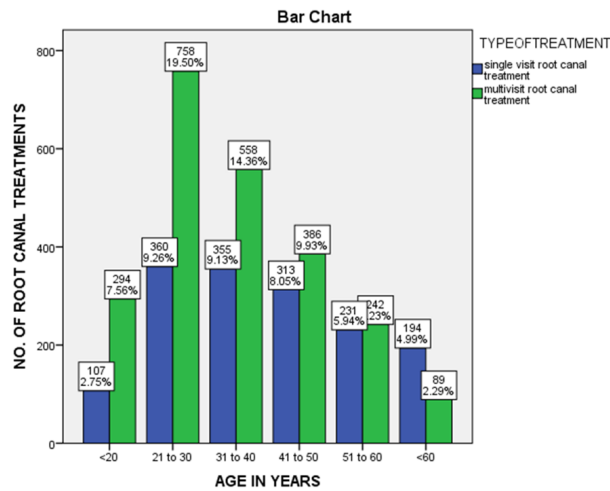
## RESULTS AND DISCUSSION

In this study, we have observed that there was a statistically significant association in the age and gender of patients who underwent single visit and multi-visit RCT in mandibular teeth. The probability value  $P < 0.05$  was obtained after performing a Chi-square test, showing that multi-visit RCT cases were higher than single visit RCT.

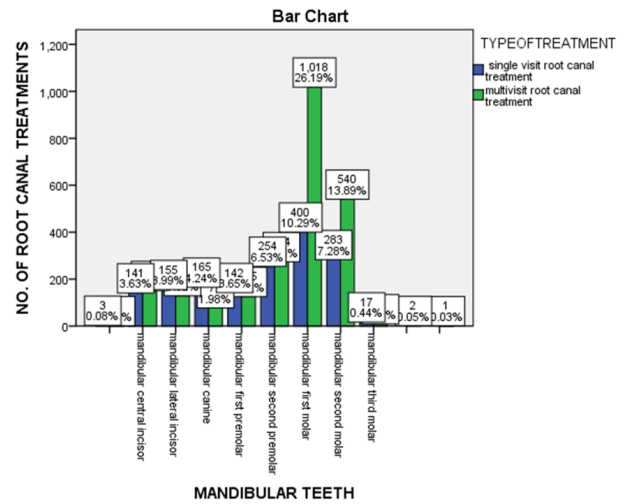
In the present study, the aim is to determine the frequency & distribution of mandibular teeth treated by single visit RCT & multi-visit RCT in a group of the

**Table 1: Distribution of type of root canal treatment performed in mandibular teeth**

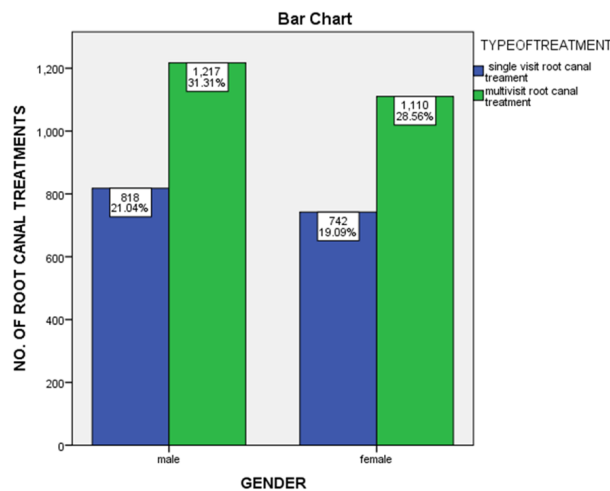
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	RCT single visit	1560	40.1	40.1	40.1
	RCT multi-visit	2327	59.9	59.9	100.0
	Total	3887	100.0	100.0	



**Figure 1: Association of the age of patients and patients undergoing single visit and multi-visit RCT**



**Figure 3: Association of mandibular teeth and the type of treatment-single visit or multi-visit RCT**



**Figure 2: Association between gender and patients undergoing single visit and multi-visit RCT**

Indian population. In this study, we observed that there is a significant association in the age & gender of patients who underwent single visit & multi-visit RCT. Chi-square statistical test was performed between the variables age, gender and mandibular teeth with the type of treatment. The probability value obtained was P - 0.00, P < 0.05, which states that there is a statistically significant associ-

ation between the variables age and type of treatment (single visit and multi-visit RCT). Total sample size (n) is 3887. In the age distribution of patients treated by single visit & multi-visit RCT, the age group 21 to 30 underwent more number of procedures compared to other age groups (1118); out of which 758 underwent multi-visit RCT and 360 underwent single visit RCT. (Figure 1) Most numbers of multi-visit RCT cases were done in the age group 21-30(19.5%). Chi-square test - p- 0.00, p value<0.05, significant association.

In the gender distribution of patients treated by a single visit and multi-visit RCT, males underwent more number of procedures compared to females [males-2035; females-1852]. Out of the total 2035 males, 1217 underwent multi-visit RCT, whereas 818 underwent single RCT. Out of the total 1852 females, 1110 underwent multi-visit RCT and 742 underwent single visit RCT (Figure 2). Males have undergone more number of multi-visit root canal treatments (31.3%) than females(28.5%).Chi-square test, p - 0.00, p value<0.05, significant association

In the teeth distribution treated by single visit & multi-visit RCT, mandibular first molar underwent the highest number of procedures (1418) followed

by mandibular second molar (823) followed by second premolar (528). Out of 1418 mandibular first molars, 1018 teeth were treated by multi-visit & 400 teeth were treated by single visit RCT. Out of 823 mandibular second molars, 540 teeth were treated by multi-visit RCT & 283 teeth were treated by single visit RCT. Out of 528 premolars, 274 were treated by multi-visit RCT & 254 were treated by single visit RCT (Figure 3). Multi visit RCT cases were done more often in mandibular first molar (26.19%) followed by mandibular second molar (13.89%). Chi-square test,  $p = 0.00$ ,  $p\text{-value} < 0.05$ , significant association. In the type of treatment performed, the frequency of single visit RCT was 1560 out of total sample  $n = 3887$ , which accounts for 40.56%; whereas the frequency of multi-visit RCT was 2327 which accounts for 59.9% (Table 1).

Chi-square statistical test was performed between the variables age, gender, mandibular teeth and type of treatment. The probability value obtained was  $P < 0.05$  ( $p = 0.00$ ), which showed that there was a significant association between age groups and mandibular teeth undergoing single visit RCT and multi-visit RCT (Figure 1). The probability value obtained after performing Chi-Square test between gender and mandibular teeth undergoing single visit RCT and multi-visit RCT was  $p < 0.05$  ( $p = 0.00$ ) which showed that there is a statistically significant association between the variables gender and the type of treatment (Figure 2). The  $p < 0.05$  ( $p = 0.00$ ) was obtained after performing a Chi-square test between teeth undergoing RCT and the type of RCT depicting a significant association (Figure 3).

The main aim of endodontic treatment is to eliminate the microbes, disinfect the canal by removing necrotic pulp tissue by thorough instrumentation and irrigation, followed by providing a fluid-tight seal by making the canal impervious and providing three-dimensional obturation (Rudranaik et al., 2016).

Even after optimal root canal instrumentation, & irrigation, bacteria usually remain within the canal system. The conventional RCT can be done in a single visit or multi-visit. Single and multi-visit RCTs have their own pros & cons (Keerthi and Nivedhitha, 2019). During multi visit RCT, an intracanal medicament like calcium hydroxide is placed in the root canal, which aims to disinfect the canals between treatments (Almeida et al., 2017). On the other hand, in a single visit RCT, any further appointments & medications are omitted. The root canal system is obturated directly after thorough instrumentation & irrigation (Rajendran et al., 2019). As far as the risk of long term & short-term complications are

considered, no big difference was found between single & multi-visit RCT. However, endodontically treated teeth will have certain complications of post-treatment (Patil et al., 2016).

Single-visit RCTs are less time consuming, cost-effective, less stressful to the patient & instrumentation is also minimal related to the treatment (Jose et al., 2020). Its main disadvantage is that there is no possibility for reevaluation for microbial growth & tissue response after treatment (Paredes-Vieyra and Enriquez, 2012).

On the other hand, multi-visit RCT performs instrumentation in the first visit with proper disinfection & the obturation in the second visit, with disinfection via irrigation. Moreover, an intracanal medicament is placed in the canals between visits to ensure further restriction of bacteria (Anagha, 2019). Moreover, when flare-ups occur during multi-visit RCT, they can be addressed prior to obturation. This is not an option in single visit RCT (Janani et al., 2020).

Mechanical debridement combined with antibacterial irrigation can render the canal bacteria-free up to 40-60%. Law & Messer et al. concluded that placement of  $\text{Ca(OH)}_2$  as an intracanal medicament for 1 week could reduce the bacterial load up to 70% and can enhance healing (Garg and Singh, 2012). Thus the healing rate of multi-visit RCT should be higher than single visit RCT. But the disadvantages of a multi-visit include interappointment flare-ups caused by leakage or use of the temporary seal, prolonged time taken causing operator & patient fatigue, interrupted treatments can cause failure (Su et al., 2011).

The single visit RCT was brought back in the 1950s by 'Ferranti' who advocated the use of diathermy for pulpal disinfection &  $\text{H}_2\text{O}_2$  for irrigation (Manohar and Sharma, 2018; Nasim and Nandakumar, 2018). Oliet et al., in his study, found that there is no difference in the treatment criteria to enhance a successful result between multi-visit & single visit RCT (Mubarak et al., 2010). The main disadvantages include operator & patient fatigue, calcified canal, curvatures & weeping canals cannot be treated in a single visit (Nasim et al., 2018). If flare-ups occur, it would be difficult to establish drainage in an obturated canal.

Many studies, like the study done by Wang C et al., showed there are no significant differences in pain after a single visit & multi-visit RCT. A study done by Oginni et al. reported significantly more post-operative pain for a single visit RCT (Su et al., 2011). Orstavik et al., concluded in his study that one year follow up time are soonest possible to deter-

mine whether or not the lesion has healed (Noor and Pradeep, 2016; Ramesh *et al.*, 2018; Teja and Ramesh, 2019). In a systematic review, it was inferred that single visit RCT appeared to be slightly more effective than multi-visit RCT, i.e., a 6.3% higher healing rate (Sathorn *et al.*, 2009). In a study done by Paredes Vieyra, he found no significant difference in radiographic evidence of healing between single visit & multi-visit RCT. Akbar *et al.*, in his study, found that there was no significant difference in flare-up rate between single & multi-visit RCT groups (Kumar and Antony, 2018). Gesi *et al.* stated that with proper use of aseptic treatment procedures, proper instrumentation, irrigation and use of interappointment dressing with intracanal medication does seem to influence the outcome (Paredes-Vieyra and Enriquez, 2012).

Studies concerning the healing of periapical radiolucency have shown that smaller sized radiolucency healed better with both single and multi-visit RCT (Ravinthar and Jayalakshmi, 2018). At the same time, larger-sized radiolucency required the placement of intracanal medicament for effective healing. Another study by Rudranaik *et al.* showed that periapical healing was poor in diabetics and that single visit root canal treatment was ineffective in diabetics in order to control periapical pathology (Rudranaik *et al.*, 2016).

In this study, we have observed that there was a significant association between the age, gender, distribution of teeth and the type of root canal treatment, i.e. single visit & multi-visit RCT. Chi-square test was performed between each variable and  $P < 0.05$  was obtained, proving that multi-visit RCT cases performed higher than single visit RCT.

The limitations of this study are the population is limited to a single hospital; only one group of the Indian population was studied. Hence, in the future, the multicentric study is advised and also to include all groups of Indian population as larger sample size minimises the bias in the findings.

The likelihood of multi-visit RCT being greater than single visit RCT may be attributed to the presence of periapical pathology/complicated tooth fracture/non-vital tooth which require inter appointment dressing for the lesion to heal and to decrease the microbial load. However, keeping in view, the indications and contraindications of a single visit and multi-visit RCT, the clinician should decide precisely according to the pathology.

## CONCLUSION

Within the limitations of the study, the frequency of multi-visit RCT was higher in mandibular teeth compared to single visit RCT. Frequency of multi-visit RCT was higher in mandibular molars followed by second premolars in comparison to single visit RCT. The frequency of multi-visit RCT was higher in both males and females compared to single visit RCT.

## ACKNOWLEDGEMENT

We thank the institution for providing support in performing this retrospective study.

## Conflicts of Interest

The authors declare that they have no conflict of interest for this study.

## Funding Support

The authors declare that they have no funding support for this study.

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