

# Association of diagnostic test and type of response in multi-visit molar RCT.

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## Abstract

**Introduction:** Endodontic diagnostic tests are important for treatment planning. The diagnostic evaluation consists of several basic tests like palpation, percussion, periodontal probing, thermal testing- heat and cold and electrical pulp testing. The most rigorous method for evaluating the effectiveness and accuracy of diagnostic tests is by comparing the responses to each test during endodontic single visit root canal treatments.

**Materials and Method:** A cross sectional retrospective study of, with a study population of 1743 patients visiting Saveetha Dental College and Hospital who had been treated with multi visit molar RCT, their diagnostic test responses were noted for them. The data was tabulated and analysed. SPSS by IBM was used for data analysis The Statistical test used was the Chi Square test.

**Results:** From the collected data of 1743 teeth undergoing multi visit RCT and underwent diagnostic test response we see that 896 of them were males (51.4%). 688 of them were from the age of 20 to 30 years (39.5%) which is the most common age group of caries and has a good success rate for root canal treatment. Most common affected tooth was mandibular molars i.e. 1236 (70.9%). Commonly Cold Test showed Normal Response (29%) and Heat Test showed Delayed Response (23.1%).

**Conclusion:** From the study we conclude that males are most commonly affected from caries, mandibular molar are the teeth that are more susceptible to caries than maxillary molar. Cold test and heat test were the most common type of test conducted out of which cold test normal response and heat test delayed response is the most common type of response.

**Keywords:** Multivisit, Molar, RCT, Diagnostic test, Response.

## Introduction

Endodontic treatments used to take multiple visits to complete, with one of the main reasons for this being that it requires a considerable amount of time to complete the treatment [1]. Though multiple visit root canal treatments are well accepted, the concept of single visit root canal treatment was described in the early 1880s [2]. The most important first step in establishing a diagnosis is a thorough history of symptoms because many things patients tell you are important for reaching a diagnosis. Along with that advanced diagnostic tests help arrive at a better treatment planning

Endodontic treatment used to take multiple visits to complete, with one of the main reasons for this being that it requires a considerable amount of time to complete the treatment. Though sometimes mechanical instrumentation alone may not be sufficient to remove bacteria and necrotic tissue from root canals owing to the complex anatomy [3,4].

Dental pulp tests are investigations that provide valuable diagnostic and treatment planning information to the dental clinician [5].

## Pulp vitality testing

**Assessment of the pulp's blood supply:** Pulp tissue may have an adequate vascular supply, but is not necessarily innervated [6]. Hence, most of the current pulp testing modalities do not directly assess the pulp vascularity and this is exemplified by clinical observations that traumatized teeth can have no response to a stimulus (such as cold) for a period of time following injury [7].

**Pulp sensibility testing: assessment of the pulp's sensory response:** Sensibility is defined as the ability to respond to a stimulus, and hence this is an accurate and appropriate term for the typical and common clinical pulp tests such as thermal and electric tests given that they do not detect or measure blood supply to the dental pulp [8].

**Pulp Sensitivity: Condition of the Pulp Being Very Responsive to a Stimulus:** Thermal and electric pulp tests are not sensitivity tests although they can be used as sensitivity tests when attempting to diagnose a tooth with pulpitis since such teeth are more responsive than normal.

The three types of responses can be summarised as follows.

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(i) The pulp is deemed normal when there is a response to the stimulus provided by the sensibility test and this response is not pronounced or exaggerated, and it does not linger.

(ii) Pulpitis is present when there is an exaggerated response that produces pain. Pulpitis can be considered as reversible or irreversible, depending on the severity of pain and whether the pain lingers or not. Typically mild pain of short duration is considered to indicate reversible pulpitis while severe pain that lingers indicates irreversible pulpitis [9].

(iii) The absence of responses to sensibility tests is usually associated with the likelihood of pulp necrosis, the tooth is pulpless, or has had previous root canal therapy [10].

Our team has extensive knowledge and research experience that has translate into high quality publications [10-29].

### **Objective**

The aim of the study was to assess various diagnostic test responses in multi visit molar RCT.

### **Materials and Method**

#### **Study design**

A prevalence study.

#### **Study setting**

OPD Department in a private dental institution in Chennai.

#### **Study size**

1743 outpatients attending the OPD department.

#### **Sampling and scheduling**

Owing to the nature of the study design and setting, a convenience sampling method was used, and the data was collected.

#### **Survey instrument**

An online platform called DIAS was used to collect the data and the data of patients undergoing trans alveolar extraction was tabulated and analyzed.

#### **Inclusion and Exclusion criteria**

All those who underwent multi visit molar RCT in Saveetha Dental College and Hospital were included in the study. Patients who were below the age of 18 were not included in the study.

#### **Ethical clearance**

Prior to the study, ethical clearance was obtained from the institution ethical committee of Saveetha University.

#### **Statistical analysis**

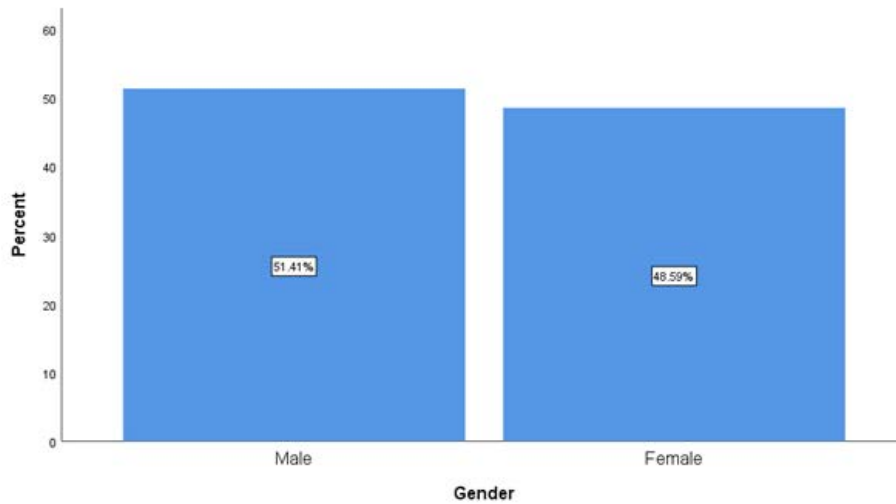
The collected data was tabulated in excel and were then imported to SPSS by IBM software, (version 25). Descriptive statistics were done using frequency and percentage. Inferential

statistics were done using the Chi-square test. Interpretation was based on a p value less than 0.05, which was considered statistically significant. Comparisons were done between independent variables like age, gender, occupation and knowledge, attitude, practice responses by the participants.

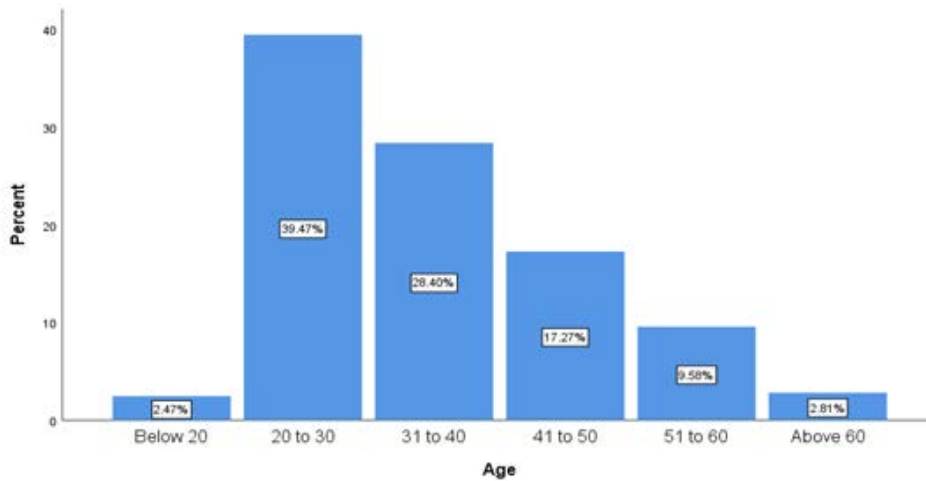
### **Results and Discussion**

From the collected data of 1743 teeth undergoing multi visit RCT and underwent diagnostic test response we see that 896 of them were males (51.4%) and 847 of them were female (48.6%). In a study conducted by Monica Antony showed Male study population was 50.71% and the female population was 49.29%, this correlates to the current study that males are prone to caries. In another study conducted by John R Lukacs shoed among the Guanches, corrected tooth-count carries rates for females (8.8%, 158/1,790) are approximately twice the frequency of caries among males (4.5%, 68/1,498) this does not correlate with the study [30]. We also tabulated the age distribution of the individuals of the study, in which we see that 43 of them were below the age of 20 (2.5%), 688 of them were from the age of 20 to 30 years (39.5%), 495 of them were from the age of 31 to 40 years (28.4%), 301 of them were from the age of 41 to 50 years (17.3%), 167 of them were from the age of 51 to 60 years (9.6%) and 49 of them were above the age of 60 (2.8%). In a study conducted by Blerim Kamberi showed that the prevalence of caries for the whole study was 72.80%, and it decreased with age: 18–34 years (88.80%), 34–44 years (77.90%), 45–64 years (65.50%), 65–74 years (42.40%), and 75+ years (20.90%) (Figures 1 to Figure 6) [31].

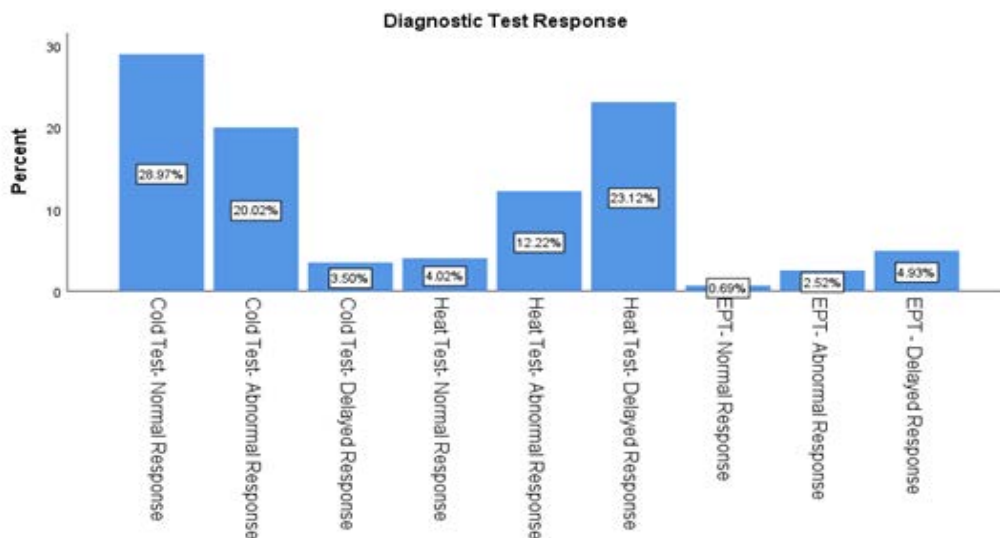
From the study we also found the prevalence of maxillary molars versus mandibular molars and we saw that 507 of them were maxillary molars (29.1%) and 1236 of them were mandibular molars (70.9%). The various diagnostic tests and their responses were noted in the study. In which we found that 505 of them had Cold Test- Normal Response (29%). 349 of them responded as Cold Test- Abnormal Response (20.0%). 61 of them had Cold Test- Delayed Response (3.5%). It is important to maximize the cold sensation. It is recommended that you test the tooth by spraying a fluffed cotton pellet held in a metal forceps and placing it on the buccal surface. The diagnostic test results can be altered by the presence of pulp stones and if the tooth had enamel loss due to remineralization [32]. 70 of them had Heat Test- Normal Response (4.0%). 213 of the teeth showed Heat Test- Abnormal Response (12.2%). Thermal tests were most used as diagnostic tests of which cold tests seemed more accurate. 59.96% of the time a cold test was used. They had greater accuracy, were more sensitive and CO2 was feasible and available [33]. 403 of them showed Heat Test- Delayed Response (23.1%). 12 of the teeth had EPT- Normal Response (0.7%). 44 of them showed EPT- Abnormal Response (2.5%). 86 teeth showed EPT - Delayed Response (4.9%). According to a study conducted by Lin et al. Electrical pulp testing though they were used 20.40% of the times they were not accurate enough to differentiate vital from non-vital pulp [34]. The electrical pulp test is helpful when natural tooth



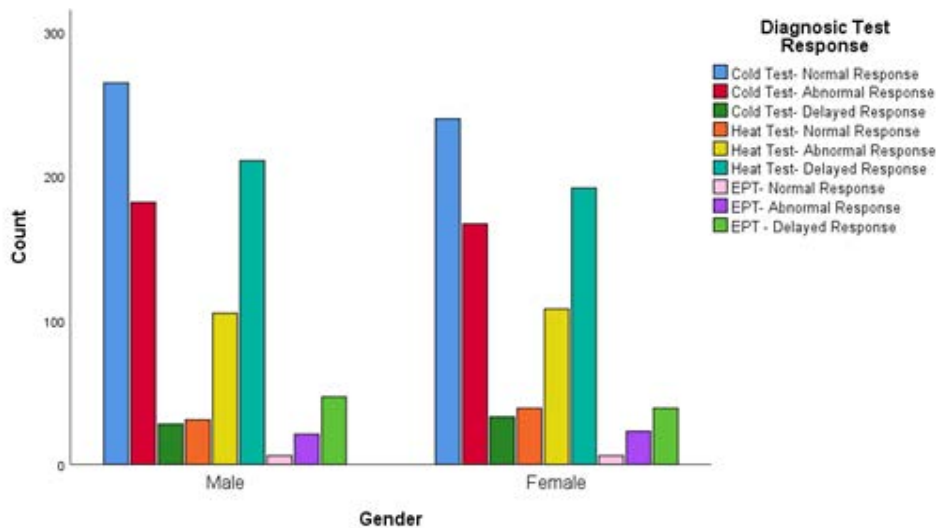
**Figure 1:** Graph showing the gender prevalence of patients included in the study, which shows that 896 of them were males (51.4%) and 847 of them were female (48.6%).



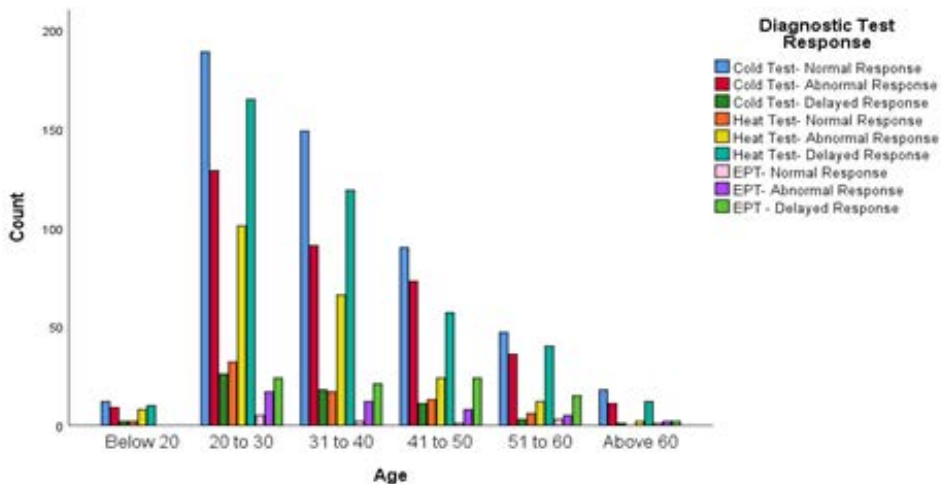
**Figure 2:** Graph showing age distribution of the individuals of the study, in which we see that 43 of them were below the age of 20 (2.5%), 688 of them were from the age of 20 to 30 years (39.5%), 495 of them were from the age of 31 to 40 years (28.4%), 301 of them were from the age of 41 to 50 years (17.3%), 167 of them were from the age of 51 to 60 years (9.6%) and 49 of them were above the age of 60 (2.8%).



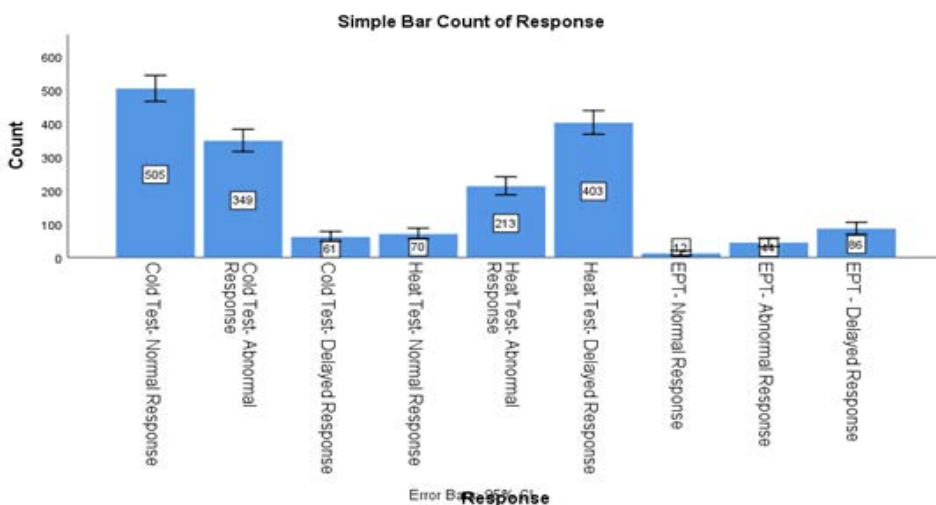
**Figure 3:** Graph showing the prevalence of maxillary molars versus mandibular molars and we saw that 507 of them were maxillary molars (29.1%) and 1236 of them were mandibular molars (70.9%).



**Figure 4:** Graph showing diagnostic tests and their responses were noted in the study, in which we found that 505 of them had Cold Test-Normal Response (29%). 349 of them responded as Cold Test- Abnormal Response (20.0%). 61 of them had Cold Test- Delayed Response (3.5%). It is important to maximize the cold sensation. 70 of them had Heat Test- Normal Response (4.0%). 213 of the teeth showed Heat Test-Abnormal Response (12.2%). 403 of them showed Heat Test- Delayed Response (23.1%). 12 of the teeth had EPT- Normal Response (0.7%). 44 of them showed EPT- Abnormal Response (2.5%). 86 teeth showed EPT - Delayed Response (4.9%).



**Figure 5:** Showing the cross tabulation between Gender of the population and diagnostic test response of the tooth the -value was found to be 0.891 which is not significant.



**Figure 6:** Showing the cross tabulation between Age of the population and diagnostic test response of the tooth the -value was found to be 0.064 which is not significant.

structure is available and the results of the thermal tests are inconclusive. The EPT cannot be used on restorations and is not reliable when placed too close to the gingiva. Ideally, the area should be isolated and the tooth dries [35].

## Conclusion

From the study we conclude that males are most commonly affected from caries, mandibular molar are the teeth that are more susceptible to caries than maxillary molar. Cold test and heat test were the most common type of test conducted out of which cold test normal response and heat test delayed response is the most common type of response.

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## Conflict of Interest

The authors declare no conflict of interest.

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