Correlation Between Master Cone Size Between Anterior Single Visit and Multi Visit Root Canal Treatment

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Abstract:

Background: The basic principles of RCT are the eradication of root canal irritant, obturation of the root canal system, and preservation of the natural dentition. The procedure can be done in a single visit or multiple visits. It is directed toward the prevention and/or the elimination of the pulpal periradicular microorganisms. **Aim:** The aim of this study is to correlate the master cone size between anterior single and multi visit root canal treatment. **Materials and method:** A retrospective study was carried out and the case records of patients undergoing root canal treatment were collected by reviewing patient records and analyzing the data of 86000 patients from June 2020 to April 2021. Patients undergoing anterior root canal treatment were selected. The data was collected and subjected to statistical analysis and correlation using SPSS software. **Results:** In this study, 38% of the total anterior root canal treatments were done in multi visits in the upper teeth and 9% of them were done in lower anterior teeth. 29% of the master cone size used in the root canal treatments was size 30, followed by size 25 (17%), size 40 (14%) and size 50 (11%). On doing chi square correlation, it was found that anterior teeth multi visit treatment in the upper teeth was more commonly done in males and anterior teeth single visit treatment in the upper teeth was done more commonly in females. This difference was found to be statistically significant ($p=0.011<0.05$). **Conclusion:** The findings of this study revealed that the majority of the treatments used master cone size 30 and the majority of the upper root canal treatments were done in a single visit. Majority of the master cone size used in upper anteriors multi visit root canal treatment was size 40 and this difference was found to be statistically significant.

Keywords: Anterior teeth; Innovative method; Master cone; Multivisit; Single visit

1. Introduction:

Pulpal diseases have been associated with bacterial contamination and the effects of their toxins. Bacterial contamination could be via a break in the tooth structure due to dental caries, trauma, tooth wear, and iatrogenic causes or from the periodontium via accessory and lateral root canals (1).

The main principle of pulp therapy is the elimination of the bacterial, chemical, mechanical and physical etiological agents. Systemic and periodontal conditions should be carefully examined before RCT. Preoperative diagnosis of dental pulp and/or periapical tissues is an important reference to establish case prognosis (2)**.** Despite all the obstacles inherent in combating infection in the root canal system, studies show a high success rate of endodontic treatment: between 85 and 95% (3). Although endodontic treatment may be a reliable procedure with high success rates, failures might occur either through continous infection or through recontamination of the canal at an interval after endodontic intervention (4).

According to a study, the endodontic treatment of the upper central incisors most often occurs without intercurrences or iatrogenics, which justifies the highest percentage of successful cases (10.6% for the 11 tooth and 11.6% for the 21 tooth) compared to the other teeth (3).

It is obvious that one-visit root canal treatment (RCT) compared to multi-visit treatment allows a reduction in the total duration of treatment as well as the complications related to repeated injections and rubber dam placement. However, it remains uncertain whether completion of RCT in one-visit or two-visit would make any difference in the clinical and radiographic outcomes or the incidence of complications (5). One of the main difficulties when endodontic procedure is performed in multiple visits is effectively sealing off the canal system from the oral cavity between visits (6) but if the pulp is necrotic and/or associated with a periradicular disease, there is ample evidence that the root canal system is infected (7). In these cases, the root canal system should ideally be cleaned and shaped, an intracanal medication placed, and the canal filled at a second appointment. Obturation should only be performed after complete chemo-mechanical debridement of the root canal system and, if the canal system is dry and time permits, obturation can be done in the same visit (8). However, if the canal is not freed from blood or exudate, then the ideal treatment plan would be to dress the tooth with an inter-appointment dressing (9).

Lateral condensation is probably the most commonly used method for root canal obturation8 and is achieved by placing conventionally tapered (0.02) gutta-percha followed by adaptation of accessory cones (10). gutta percha cones which match the exact size and taper of canals prepared with rotary instruments have been introduced and such gutta percha points matched to the exact size and taper of the master apical rotary files could obturate the root canal effectively when used as a single cone (11). Cones are available in a variety of sizes, which include: standardised 0.02 taper and non-standardised in 0.04, 0.06, 0.08, 0.10, 0.12 taper with feathered or specified tip sizes.

The accessory points from various manufacturers are sized differently and have specific matched spreaders, for example A, B, C and D systems (Dentsply Maillefer, Ballaigues, Switzerland). It has been shown that lateral condensation of 0.02-tapered gutta-percha master cones lack homogeneity, owing to spaces found between master and accessory cones, and poorly adapted to the root walls. To overcome this potential problem, the goal is to maximize the amount of solid material and minimize the amount of the sealer (12). Providing a well condensed root filling

ending just coronal to the apical foramen is essential and also important for periapical health to ensure that the obturating material is not extruded into the periapical tissues. Our team has extensive knowledge and research experience that has translate into high quality publications (13–22)

Hence the aim of this study is to correlate the master cone size used between single and multi visit anterior root canal treatment.

2. Materials and Methods:

This is a retrospective study regarding patients with fluorosis who have visited Saveetha Dental College and Hospitals in between June 2019- April 2020. The approval for this study setting was obtained from the Institution Ethics Board. The sample size of n= 5837 patients in which sampling bias was minimized with the verification of photographs. The study was reviewed by two reviewers and it had been cross verified. Data of patients undergoing anterior tooth root canal treatment were included for the data analysis. Cases with Incomplete record entry in the system were excluded from the study.

The case records of patients undergoing root canal treatment were collected by reviewing patient records and analyzing the data of 86000 patients. The data of these patients was collected and tabulated. It included parameters – Patients ID, Age , Gender, tooth number and master cone size. Age was categorized into 18-25 years, 26-35 years, 36-45 years and more than 45 years. Anterior teeth were categorized into maxillary and mandibular anterior teeth.

All the parameters were tabulated in the Excel sheet and assessed for statistical significance using the SPSS software v23. Percentage , mean, standard deviation, frequency of the following parameters were calculated in the analysis: age, gender, master cone size and teeth involved. Chi square test was used to detect the significance between age, gender, master cone size and tooth undergoing root canal treatment. P value found to be less than 0.05 was considered to be statistically significant.

3. Results and Discussion:

A total of 5,837 were screened in this study, out of which 31% of the patients were more than 45 years old, 24.5% of the patients were 36-45 years old, 24% of the patients were 26-35 years old and about 21% of the patients were in the age group 18-25 years [Figure 1]. About 51% of the total subjects in this study were males and 49% of them were females [Figure 2]. In this study, 38% of the total anterior root canal treatments were done in multi visits in the upper teeth and 9% of them were done in lower anterior teeth. About 40% of the anterior tooth single visit root canal treatments were done in upper teeth whereas 13% of them were done in lower teeth [Figure 3]. 29% of the master cone size used in the root canal treatments was size 30, followed by size 25 (17%), size 40 (14%), size 50 (11%), size 45 (9%), size 35 (7%), size 20 (5%) and size 55 (4%) [Figure 4].

On doing chi square correlation between master cone size and type of root canal treatment, it was found that the majority of the master cone size was found to be 30 in both single and multi visit root canal treatments. Majority of the master cone size used in upper anteriors multi visit root canal treatment was size 40 and this difference was found to be statistically significant ($p=0.00<0.05$) [Figure 5]. On doing chi square correlation between the gender of the patients and teeth involved, it was found

that anterior teeth multi visit root canal treatment in the upper teeth was more commonly done in males and anterior teeth single visit root canal treatment in the upper teeth was done more commonly in females. This difference was found to be statistically significant ($p=0.011<0.05$) [Figure 6]. On doing chi square correlation between the gender of the patients and master cone size, it was found that master cone size 30 was more common in both male and female patients. This difference was found to be statistically significant ($p=0.00<0.05$) [Figure 7].

Microbiological goal of endodontic treatment of teeth is to reduce the microbial bioburden to levels compatible with periradicular tissue healing and prevent microbial recolonization of the treated canal (23). This is accomplished by thorough chemomechanical treatment of the root canal followed by three-dimensional obturation (24). Traditionally, root canal treatment was performed in multiple visits, with medication between root canal preparation and obturation, which mainly aims to reduce or eliminate microorganisms and their by-products from the root canal system before obturation (25). Multiple visit root canal treatment is well accepted as a safe and common therapy (26).

However, in recent years, there is a growing concern about the necessity of multiple appointments in endodontic treatment because no significant differences in antimicrobial efficacies have been reported between the single and multiple visit treatments (27). Single-visit root canal treatment has become common practice and offers several advantages such as a reduced flare-up rate, good patient acceptance, and practice management considerations. It is believed to eliminate the remaining microorganisms or to render them harmless by entombing them by complete obturation immediately after preparing and irrigating the canal space at the same visit (28).

In this present study, it was found that the majority of the anterior teeth root canal treatments were done in multiple visits. This is in concordance with a study where most patients were treated in multiple visits (86.3%), and 13.7% were treated in a single visit. This might be due to complexity of the procedure, fatigue of the patient or the operator, or the need to use calcium hydroxide intracanal medication between appointments (29). According to another study, it was found that the majority of the treatments (123 patients) were done in multiple visits (30). A similar study reported that 60% of the RCTs done by the undergraduate students were performed in multiple visits (31) whereas researchers in another study found that 55.8% of the endodontists completed RCT for vital teeth in a single visit (32). Hence the present study reported higher incidences of multi visit root canal treatments when compared to single visit. However, single visit endodontic therapy has been shown to be a safe and effective alternative to multiple visit treatment, especially in communities where patients default after the first appointment at which pain is relieved.

4. Conclusion:

Within the limitations of this study it was found that the majority of the treatments used master cone size 30 and the majority of the upper root canal treatments were done in a single visit. It was also found that the majority of the anterior root canal treatments were done in the upper arch in multiple visits.

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7. Conflict of interest: None declared

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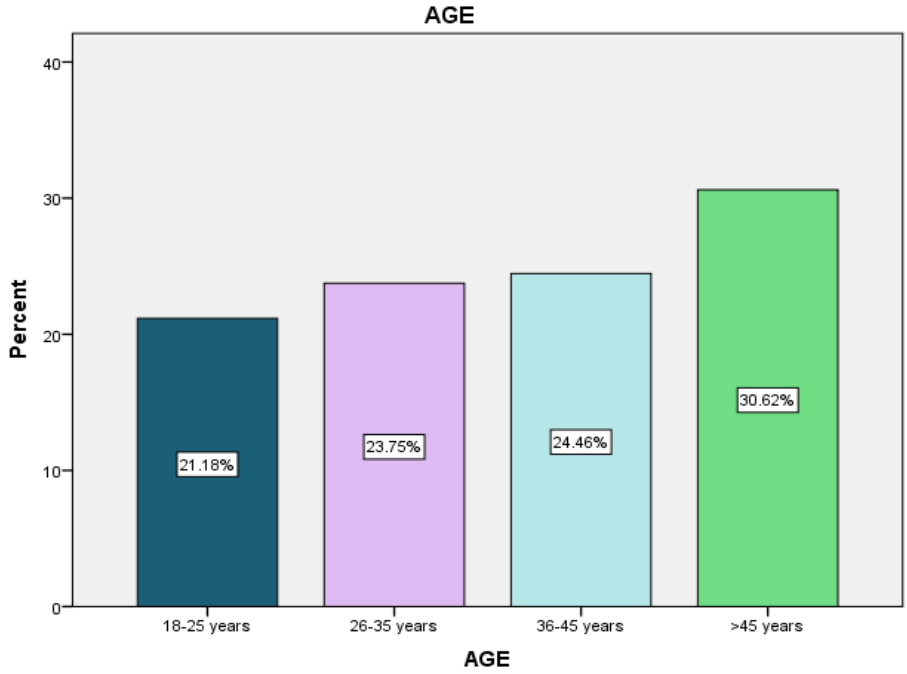

Figure 1: Bar graph showing age wise distribution of the students. The X axis represents the age of the patients and the Y axis represents the number of patients. Majority of the patients belonged to the age group of more than 45 years.

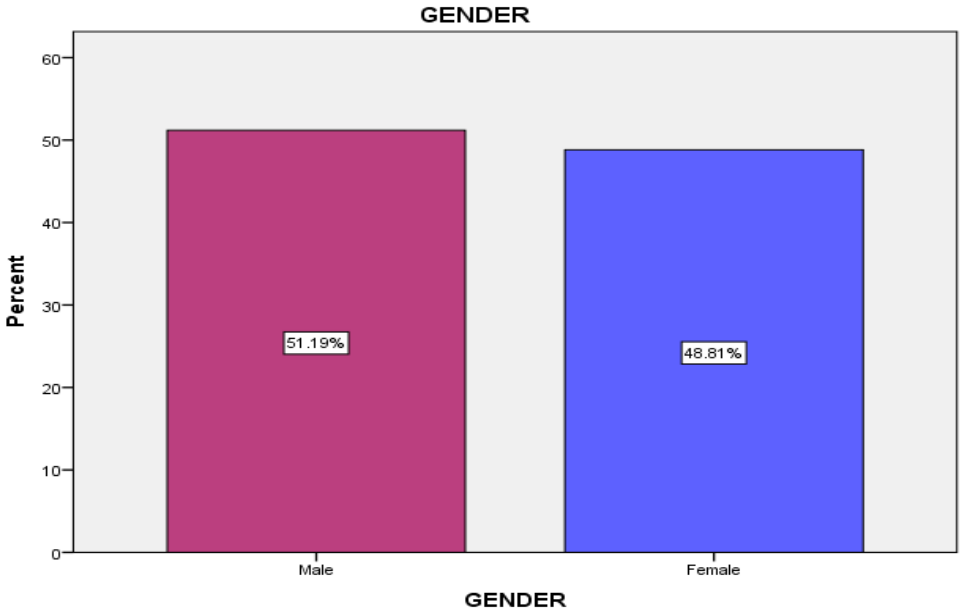

Figure 2: Bar graph showing gender wise distribution of the students. The X axis represents the gender and the Y axis represents the number of patients. It was found that males dominated the study population

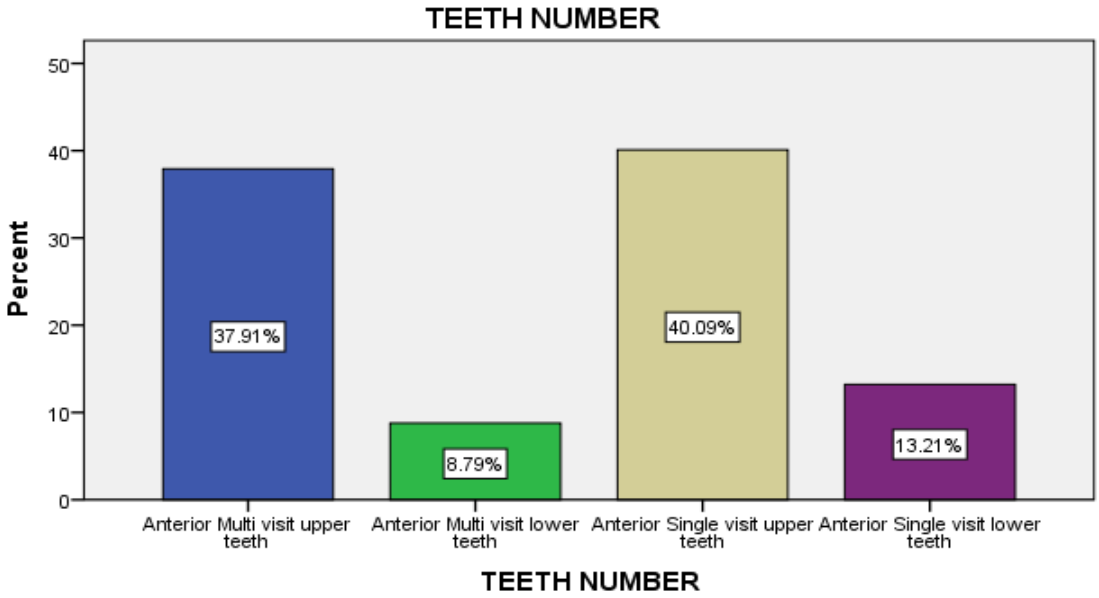

Figure 3: Bar graph showing arch wise distribution of the patients. The X axis represents the arch involved and the Y axis represents the number of patients. It was found that the majority of the root canal treatments were done in single visits involving the upper teeth.

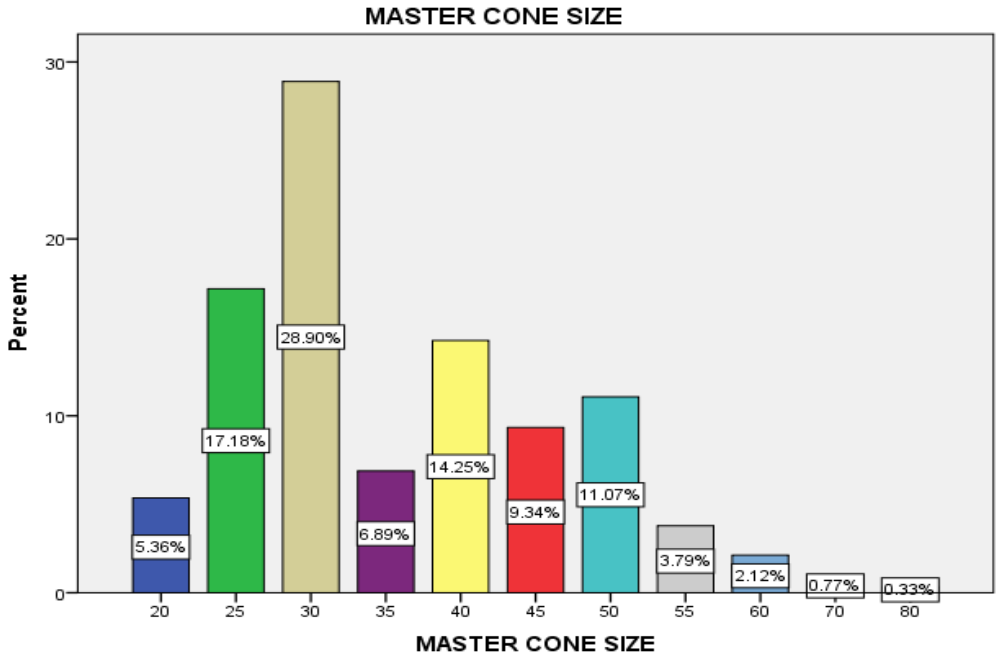

Figure 4: Bar graph showing size wise distribution of the master cone. The X axis represents the size of the master cone and the Y axis represents the number of patients. It was found that master cone size 30 was most commonly used in the root canal treatment.

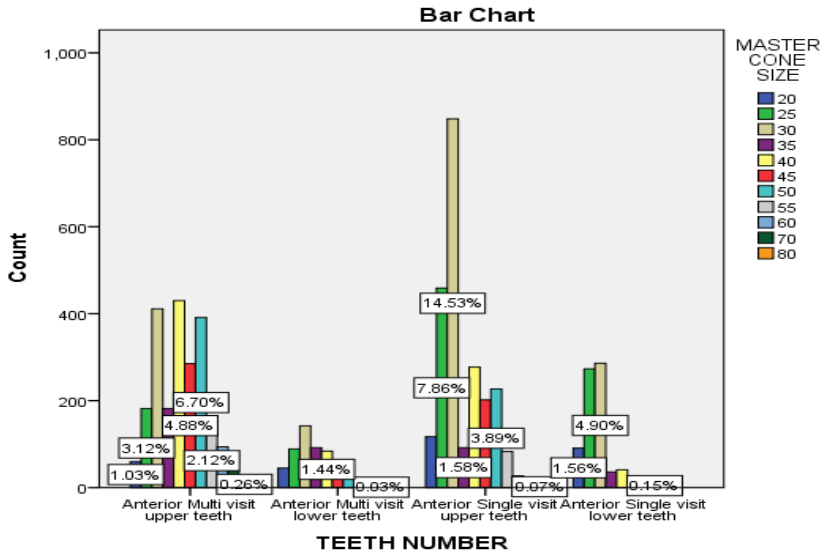

Figure 5: Cluster graph showing association of teeth number with the master cone size. X axis shows the arch involved in the root canal treatment, Y axis shows number of patients. Chi square association was done and found to be significant [p value : 0.00 < 0.05].

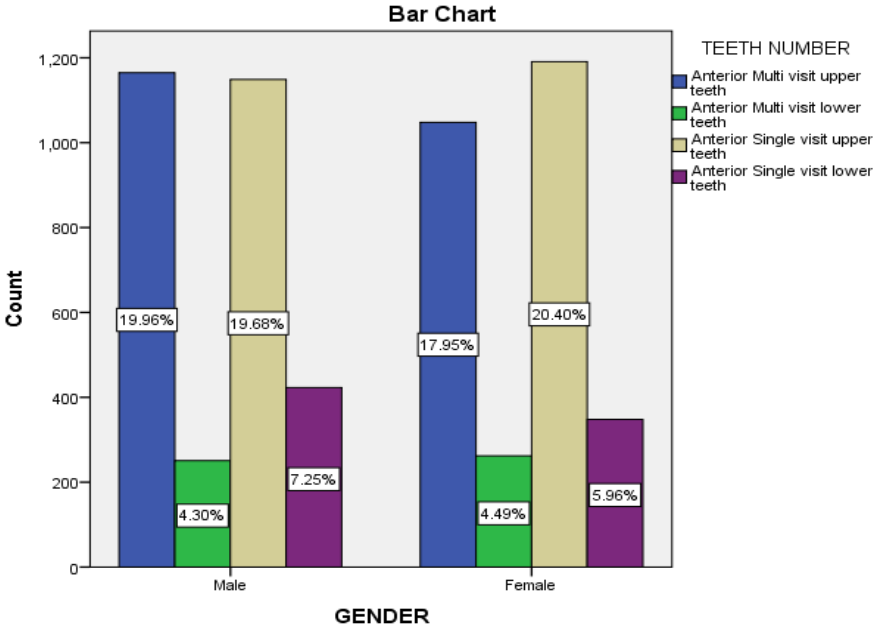

Figure 6: Cluster graph showing association of gender of the patients with the arch involved in the root canal treatment. X axis shows the gender, Y axis shows number of patients. Chi square association was done and found to be significant [p value : 0.01 < 0.05].

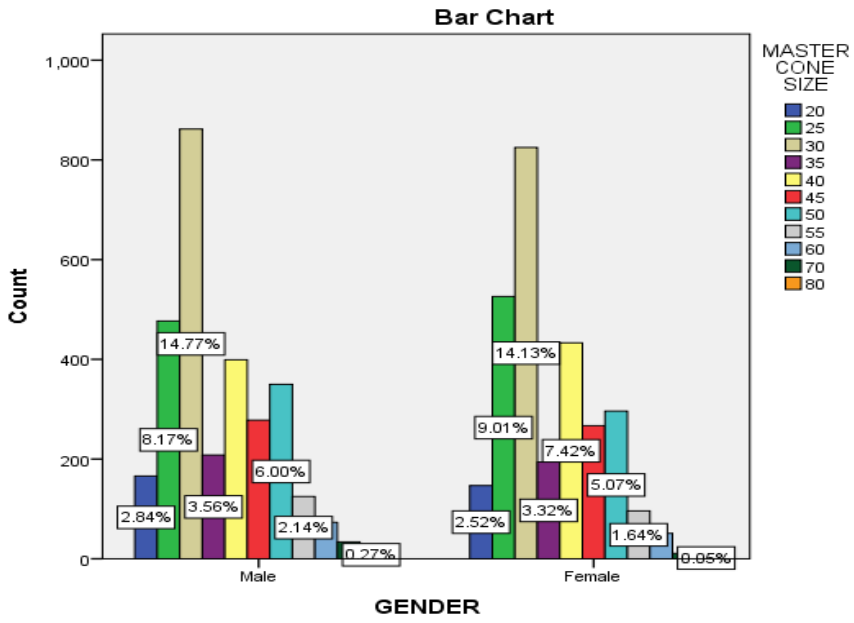

Figure 7: Cluster graph showing association of gender with the master cone size. X axis shows the gender of the patients, Y axis shows number of patients. Chi square association was done and found to be significant [p value : 0.00 < 0.05].

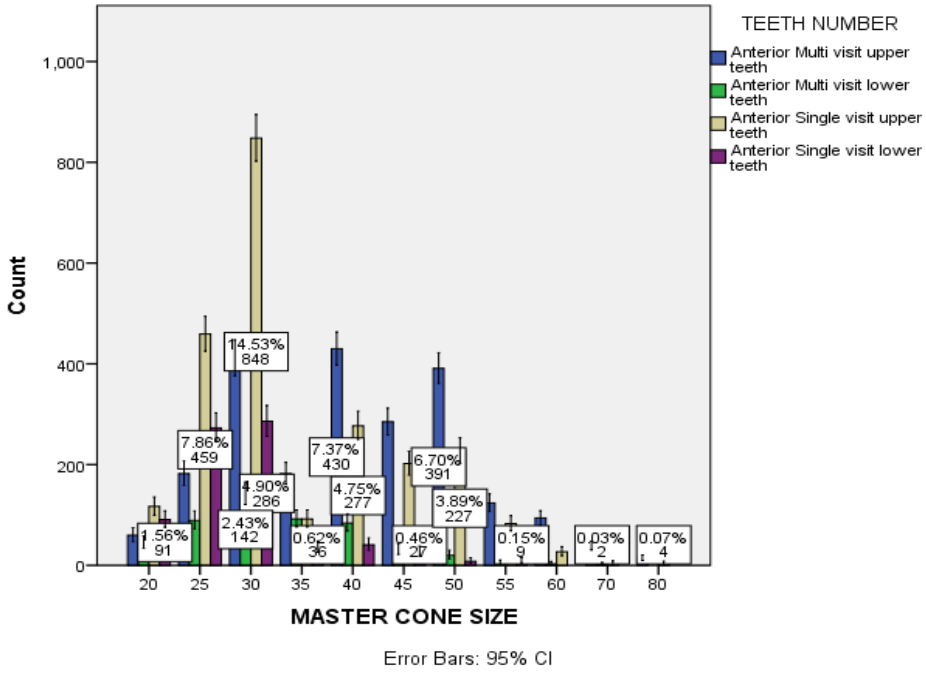

Figure 8: Bar chart representing the comparison of master cone size and teeth involved in single and multiple visit root canal therapy. X-axis represents the master cone size and Y-axis represents the teeth involved in single and multi visit root canal therapy. Blue represents anterior multi visit RCT in upper teeth, green represents anterior multi visit RCT in lower teeth, beige represents anterior single visit RCT in upper teeth and purple represents anterior single visit RCT in lower teeth.

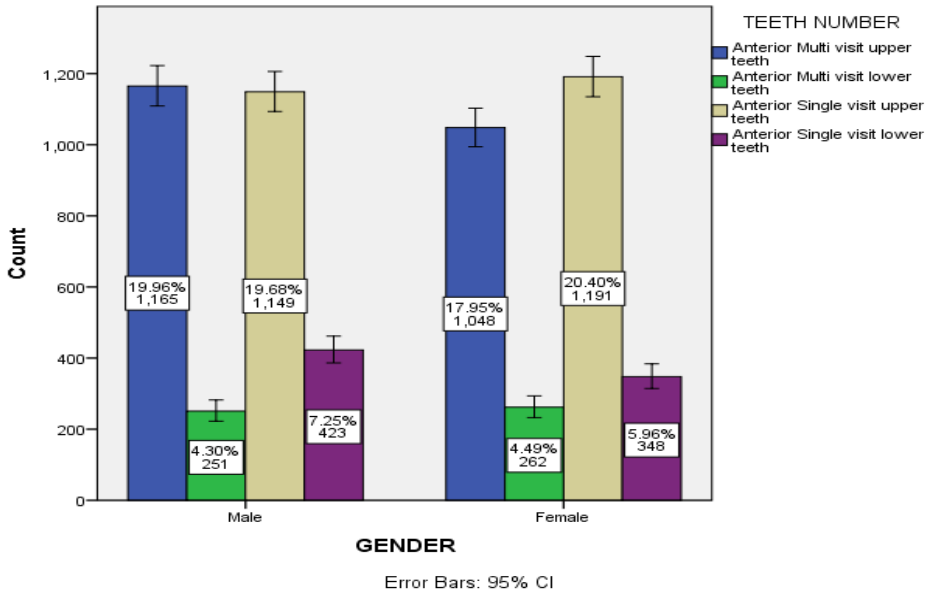

Figure 9: Bar chart representing the comparison of gender of the patients and teeth involved in single and multiple visit root canal therapy. X-axis represents the gender and Y-axis represents the teeth involved in single and multi visit root canal therapy. Blue represents anterior multi visit RCT in upper teeth, green represents anterior multi visit RCT in lower teeth, beige represents anterior single visit RCT in upper teeth and purple represents anterior single visit RCT in lower teeth.

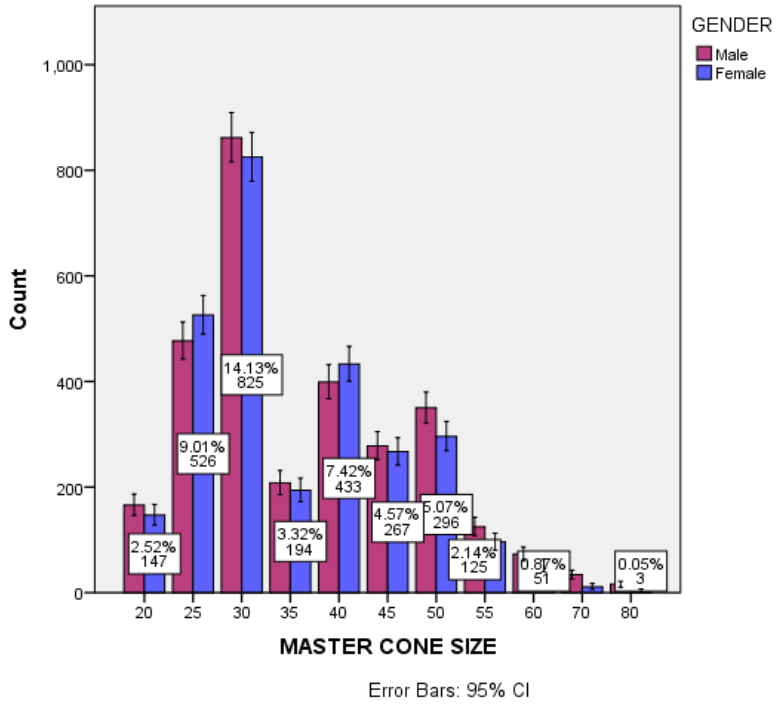

Figure 10: Bar chart representing the comparison of master cone size and gender. X-axis represents the master cone size and Y-axis represents the master cone size. Color pink represents males and blue represents females.