Journal of Contemporary Issues in Business and Government Vol. 27, No. 2, 2021
https://cibg.org.au/

P-ISSN: 2204-1990; E-ISSN: 1323-6903
DOI: 10.47750/cibg.2021.27.02.273

Association of Irreversible Pulpitis and Multi Visit Root Canal Treatment.

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Abstract: Irreversible pulpitis is a persistent inflammatory condition of pulp caused by noxious stimuli. It may be symptomatic or asymptomatic. Multi visit root canal treatment is safer and commonly used method which is given 2 to 3 appointments and this method reduces error and infection. The aim of this study is to find out the association of multi root canal treatment in irreversible pulpitis patients visiting Saveetha Dental College. A retrospective study was carried out in University in Chennai between July 2019-March 2020.The data were collected from patients records analysed from the data of 86000 patients between June 2019-March 2020 . The data were entered in an Excel sheet and subjected to statistical analysis using SPSS software.A chi square test was done between age and gender, age and number of visits,gender and number of visits and teeth number and number of visits. The results were formulated in tables and graphs. The results showed that a total of 5366 patients were diagnosed with irreversible pulpitis of which 3037 patients underwent multi visit root canal treatment. .The study concludes that mandibular first molars were highly affected with irreversible pulpitis and underwent multi root canal treatment .

Keywords: Age, Gender, Obturation technique, Root canal treatment, Teeth number.

INTRODUCTION

Irreversible Pulpitis is subjective and objective findings in which vital inflamed pulp is incapable of healing and requires root canal treatment. Irreversible pulpitis are characterized by sharp pain upon thermal stimulus, lingering pain (often 30 seconds or longer after stimulus removal), spontaneity (unprovoked pain) and referred pain. Sometimes the pain may be prominent in postural changes such as lying down or bending over and over-the-counter analgesics are typically ineffective (Dabuleanu, 2013).

Root canal treatment in a common procedure in dentistry . The main indications for root canal treatment are irreversible pulpitis and necrosis of dental pulp caused by caries or dental trauma (R, Rajakeerthi and Ms, 2019) Diagnosing exact pulpal status by direct examination is uncertain due to the fact that pulp is enclosed by hard tissue (Nandakumar and Nasim, 2018; Janani, Palanivelu and Sandhya, 2020). Root canal treatment is a procedure preferred to remove organisation and pathogenic bacteria from the root canal system by means of mechanical instrumentation associated with irrigation. Irrigants play a crucial role in debridement and disinfection of the root canal space (Siddique *et al.*, 2019),(Ramamoorthi, Nivedhitha and Divyanand, 2015). An ideal irrigant should have a broad spectrum antimicrobial activity, able to dissolve pulpal and necrotic tissue, remove organic and inorganic smear layer, be an effective lubricant during instrumentation of root canals, reduce bacterial endotoxin levels and be least cytotoxic (Ramanathan and Solete, 2015; Teja and Ramesh, 2019). MMPs(matrix metalloproteinase) are produced by odontoblasts and they have a wide role in dental caries and periapical inflammation (Hussainy *et al.*, 2018; Teja, Ramesh and Priya, 2018).

Root canal treatment requires a proper knowledge on the root canal anatomy and the variations that can be seen in it (Kumar and Delphine Priscilla Antony, 2018). The goal of root canal treatment is to avoid apical periodontitis (Wahl, 1996). Root canal treatment can be done using two appropriate; first completing the treatment in multiple visits and second is by completing the treatment in a single day. These two approaches have high success rates and least complication is often debated upon by dentists. Complete debridement, disinfection of the pulpal space are considered to be essential for predictable long term success in endodontic treatment (Noor, S Syed Shihaab and Pradeep, 2016).

Single visit treatment is an approach when in access opening, cleaning and shaping with irrigation and obturation is done in a single setting. Whereas multi visits but they are carried out in 3-4 appointments help to reduce chances of error and infection (Peters and Wesselink, 2002).Intracanal medicaments have been used to disinfect root canals between appointments and reduce the interappointment pain (Manohar and Sharma, 2018).
After root canal treatment, teeth can experience short /long term complications. Short term complication includes postoperative inflammation of periapical tissue leading to mild pain and flare up, pain and swelling associated with instrumentation and irrigation transporting medium(Glennon *et al.*, 2004). Long term outcome includes persisting inflammation and infection, resulting in abscess,since track formation, periapical bone resorption (Figini *et al.*, 2008)
Previously our team had conducted numerous clinical trials (Ramamoorthi, Nivedhitha and Divyanand, 2015; Hussainy *et al.*, 2018; Janani, Palanivelu and Sandhya, 2020), in vitro studies (Ramanathan and Solete, 2015; Nandakumar and Nasim, 2018; Teja, Ramesh and Priya, 2018; Rajendran *et al*., 2019) and surveyed (Manohar and Sharma, 2018; Jose, P. and Subbaiyan, 2020) and reviewed (Noor, S Syed Shihaab and Pradeep, 2016; Kumar and Delphine Priscilla Antony, 2018; Ravinthar and Jayalakshmi, 2018; R, Rajakeerthi and Ms, 2019; Siddique *et al.*, 2019; Teja and Ramesh, 2019).various aspects of endodontics and conservative dentistry over the past five years. Now we are focusing on retrospective studies, the idea for which has stemmed from the current interest in our community. Our team has rich experience in research and we have collaborated with numerous authors over various topics in the past decade (Deogade, Gupta and Ariga, 2018; Ezhilarasan, 2018; Ezhilarasan, Sokal and Najimi, 2018; Jeevanandan and Govindaraju, 2018; J *et al.*, 2018; Menon *et al.*, 2018; Prabakar *et al.*, 2018; Rajeshkumar *et al.*, 2018, 2019; Vishnu Prasad *et al.*, 2018; Wahab *et al.*, 2018; Dua *et al.*, 2019; Duraisamy *et al.*, 2019; Ezhilarasan, Apoorva and Ashok Vardhan, 2019; Gheena and Ezhilarasan, 2019; Malli Sureshbabu *et al.*, 2019; Mehta *et al.*, 2019; Panchal, Jeevanandan and Subramanian, 2019; Rajendran *et al.*, 2019; Ramakrishnan, Dhanalakshmi and Subramanian, 2019; Sharma *et al.*, 2019; Varghese, Ramesh and Veeraiyan, 2019; Gomathi *et al.*, 2020; Samuel, Acharya and Rao, 2020) The aim of this study is to find out the association of irreversible pulpitis and multi visit root canal treatment.

MATERIALS AND METHOD

Study population: A retrospective study was carried out in patients who visited University in Chennai with irreversible pulpitis and underwent multi visit root canal treatment . The data were collected from patients records between June 2019-March 2020.The data contains details of patients,intraoral photographs and treatment being done.

Inclusion criteria:
Patients with irreversible pulpitis
Underwent multi visit root canal treatment
Above 17 years

Exclusion criteria:
Patient with reversible pulpitis
Pulp necrosis
Patients with periradicular disease

Sample size
Sample size(N=3037) is the total number of patients who visit University in Chennai with irreversible pulpitis and underwent multi visit root canal treatment.Their distribution according to age,gender, teeth number ,obturation technique were recorded.

Ethical approval
Ethical clearance was obtained from the Institutional Ethical Committee and Scientific Review Board (SRB) of University in Chennai. SDC/SIHEC/2020/DIASDATA/0619-0320

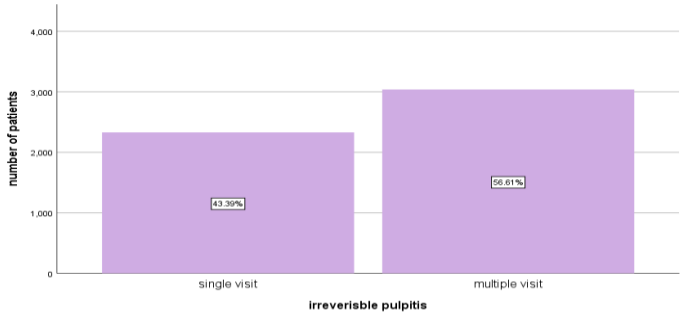
Data analysis
The data collected were entered in Excel sheet and subjected to statistical analysis using SPSS software. Descriptive statistics was done i.e frequency and cross tabulation. A chi square test was done between age and teeth number, gender and teeth number. Mean and standard deviation was done for age and gender. Independent variables are age and gender while dependent variables are teeth number and obturation technique .The level of significance was $p<0.05$.

RESULTS AND DISCUSSION

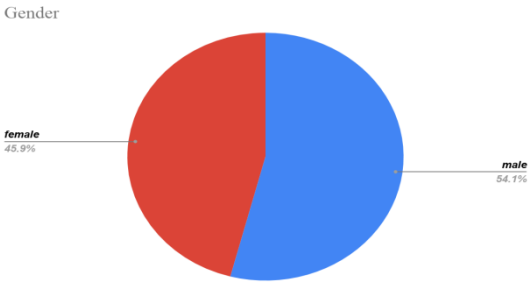
Success of root canal treatment is based on eliminating micro-organisms and establishments of an environment which is most favourable for healing. Multi visit root canal treatment requires the instrumentation in first visit and obturation in second visit ,which the disinfection is provided in both visits via irrigation (Su, Wang and Ye, 2011).

The Aim of this study is to find out the association of irreversible pulpitis and multi visit root canal treatment. Totally 5370 patients were included in this study. Out of 5366 patients,56.62% patients underwent multi root canal treatment (graph 1) of which 54.1% were males and 45.9% were females (graph 2). About 61.6% were 18-38 age group,32.99% were 38-58 age group and 5.4% were 58-88 age group (graph 3). In the 18-38 age group, 35.43% were male and 26.21 % were females while the 38-58 age group had 15.34% were males and 17.65% were females which was found to be highly significant (graph 4,table 1). Mandibular first molars were frequently undergone multi visit root canal treatment and least one by third molars.(graph 5,table 2).Male patients with irreversible pulpitis were most commonly undergoing multi visit root canal treatment whereas female patients were commonly undergoing single visit root canal treatment (graph 6,table 3). The 18-38 age group most commonly underwent both single and multi visit root canal treatment (graph 7,table 4).

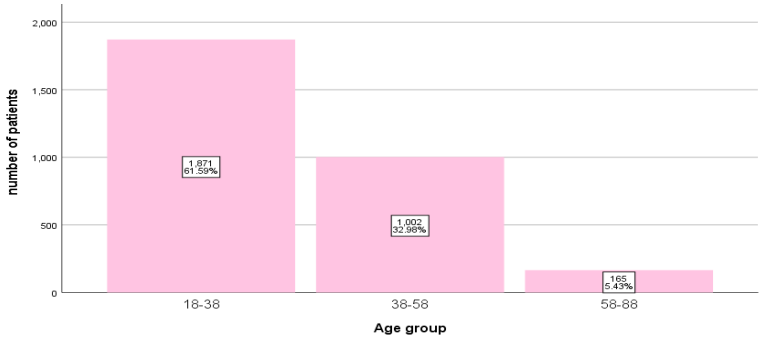
There is no previous research showing the association of irreversible pulpitis and multi visit root canal treatment but shows about post operative complications,success rates between single and multi visit root canal treatment (Ng *et al.*, 2007). A study done by Schwendivk et al concludes that insufficient evidence to rule out important differences in outcomes between single visit vs multi visit root canal treatment (Schwendicke and Göstemeyer, 2017). A study done by Alomaym et al concludes that less incidence of pain in multi visit root canal treatment than single visit group,which is statistically significant (Alomaym *et al.*, 2019).A study done by Adbel Hameed et al concludes that no significant difference exists in post operative pain after single visit or multi visit root canal treatment (El Mubarak, Abu-bakr and Ibrahim, 2010).A study done by Maira et al concludes that single and multi visit showed similar pain or success rates regardless of the precondition of pulp and periapex (Moreira *et al.*, 2017)Our institution is passionate about high quality evidence based research and has excelled in various fields ((Pc, Marimuthu and Devadoss, 2018; Ramesh *et al.*, 2018; Ezhilarasan, Apoorva and Ashok Vardhan, 2019; Ramadurai *et al.*, 2019; Sridharan *et al.*, 2019; Vijayashree Priyadharsini, 2019; Mathew *et al.*, 2020)



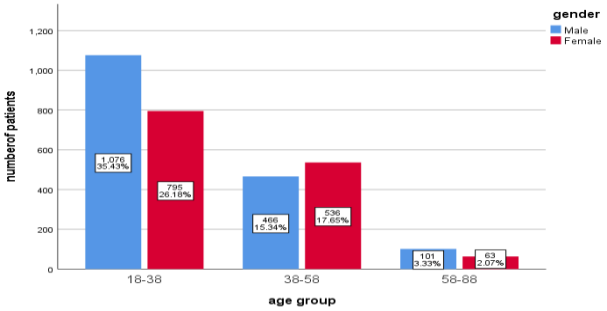
Graph 1: Bar chart showing incidence of multi visit root canal treatment among irreversible pulpitis across the scale of patient count in y-axis.There is significantly higher incidence of multi visit root canal treatment among irreversible pulpitis



Graph 2: Depicts that distribution of study population based on gender .Blue denotes male and red colour denotes female.It shows that more number of male patients (54.10%) were underwent multi visit root canal treatment when compared to female patients(45.90%)



Graph 3: Bar chart showing the distribution of study population based on age across the scale of patient count in the y-axis and age group in x-axis.It shows that higher incidence of multi visit root canal treatment were done in the age group 18-38(61.59%) followed by 38-58 age group(32.88%) and least one is 58-88 age group(5.43%)

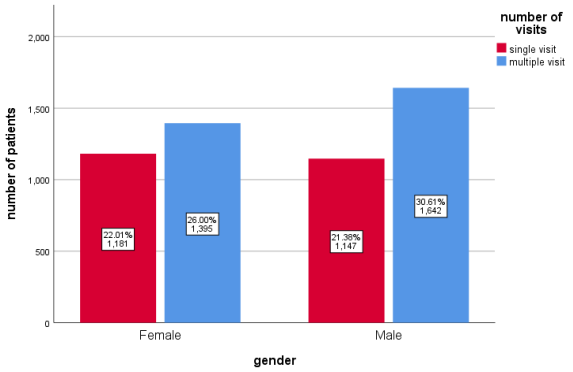


Graph 4: Bar chart showing the association of age and gender among multi visit root canal treatment across the scale of patient count in the y-axis and age in x-axis.Blue colour denotes male and red colour denotes femaleThere is significantly higher number in 18-38 with more number of male patients among irreversible pulpitis patients who underwent multi visit root canal treatment.(Chi square test,p<0.05)

Table 1: Shows chi square test between age and gender which was found to be highly significant

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi square test	35.928[a]	2	.000
Likelihood Ratio	35.916	2	.000
N of Valid Cases	3037		

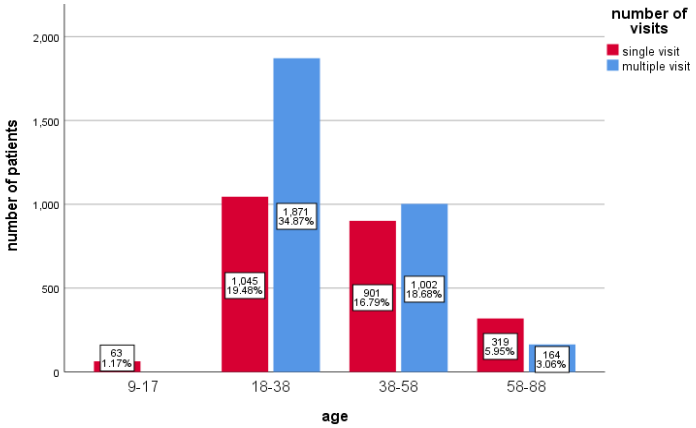
a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 74.82.



Graph 5: This graph represents the association between gender and number of visits, where red colour denotes single visit and blue colour denotes multi visit. X-axis represents gender and Y-axis represents number of patients who have undergone single and multi visit root canal treatment.Graph 6 shows that males(30.61%) mostly underwent multiple visit root canal treatment when compared to females(26.00%) and females(22.01%) mostly underwent single visit root canal treatment when compared to males(21.38%). P value<0.005, significant association(Chi-square test)

Table 2: Shows chi square test between number of visits and gender which was found to be highly significant

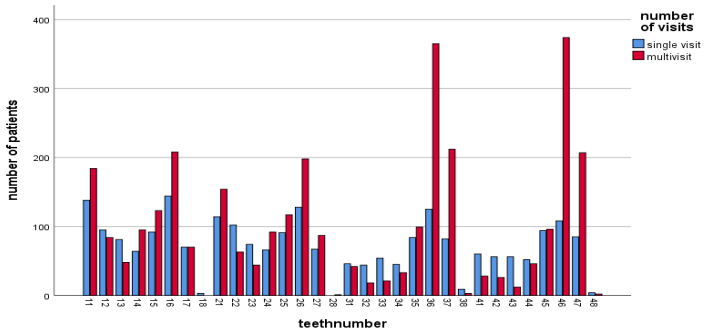
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi square test	433.815[a]	31	.000
Likelihood Ratio	447.178	31	.000
N of Valid Cases	5366		



Graph 6: This graph represents the association between age group and number of visits where blue colour denotes multi visit and red colour denotes single visit.X-axis represents age group and Y-axis represents number of patients who have undergone single and multi visit root canal treatment. Graph 7 shows that most number of multi visit and single visit root canal treatments are seen in the age group of 18-38 years (34.87%&19.46%). P value<0.005, significant association(Chi-square test)

Table 3: Shows chi square test between age and number of visits which was found to be highly significant

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi square test	261.980[a]	3	.000
Likelihood Ratio	285.553	3	.000
N of Valid Cases	5366		



Graph 7: This graph represents the association between teeth number and number of visits where red colour denotes multi visit and blue colour denotes single visit.X-axis represents teeth number and Y-axis represents number of patients who have undergone single and multi visit root canal treatment .Graph 7 shows that most number of multi visit were undergone in mandibular first molars followed by maxillary first molars while single visit root canal treatment were undergone in maxillary first molar and maxillary central incisors.P value<0.005, significant association(Chi-square test)

Table 4: Shows chi square test between teeth number and number of visits which was found to be highly significant

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi square test	1952.018[a]	62	.000
Likelihood Ratio	1103.412	62	.000
N of Valid Cases	5366		

LIMITATIONS

The main limitations of this study are limited geographic location and confined to specific sample size.This can be corrected by conducting study in different states and universities to get more responses.

CONCLUSION

Within the limitation of this study, it can be concluded that male patients frequently underwent multi visit root canal treatment. More number of multi visit root canal treatments were seen in the 18-38 age group. Mandibular first molars are frequently affected with irreversible pulpitis. Female patients underwent more number of single visit root canal treatments when compared to male patients.

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