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ASSOCIATION OF AGE AND GENDER IN TEETH WITH ATTRITION REQUIRING ROOT CANAL TREATMENT - A RETROSPECTIVE ANALYSIS

Type of manuscript: Original study

Running title: Age and gender association in attrited teeth requiring root canal treatment

Kiran K[1], Sowmya K[2], Vivek Narayan[3]

Abstract:*Attrition is a wasting disease of the teeth caused mainly due to tooth to tooth contact. The friction caused by teeth rubbing against each other can wear away the biting surface of the teeth. The treatment for attrition varies based on the extent of tooth structure loss. Excessive loss of tooth structure can lead to pain and periapical changes and might require root canal treatment for its management. The aim of this study was to evaluate the number, teeth, age and gender distribution of teeth with attrition that required root canal treatment. In this retrospective study, case records of patients who visited Saveetha dental college from June 2019 to April 2020 was evaluated. Data of patients with attrited teeth that required root canal treatment was collected, tabulated and imported to SPSS for statistical analysis. Fisher's exact test was done to find the association and the significance level was set at 0.05. Severe attrition requiring root canal treatment was more common in the older age group. Mandibular molars had more attrition than other teeth. Males showed a higher number of attrited teeth requiring root canal treatment than females in the age group less than 40 years (Fisher's exact P value- 0.006). Within the limitations of the study, it can be concluded that severe attrition that requires endodontic treatment increases with age and is more common in males.*

Keywords: *Attrition; pulpitis; root canal treatment; tooth wear*

1. INTRODUCTION

Attrition is loss of tooth structure caused by friction between two surfaces of teeth. Tooth wear is a very common clinical finding that is increasing seen with progressing age (Yadav, 2011). It is considered a physiological process, but when it exceeds a certain limit it can be pathological and lead to a condition which might require treatment (Bowen and Pieren, 2019; Siddique et al., 2019). Tooth wear has a multifactorial origin. Parafunctional habits such as bruxism, developmental defects, hard texture diet, absence of posterior teeth support, class III edge- edge incisal relation

[1]*Saveetha Dental College, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai-77, India. E-Mail: 151701031@saveetha.com*

[2]*Senior lecturer, Department of Conservative Dentistry and Endodontics, Saveetha Dental CollegeSaveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai-77, India. E-Mail: sowmyak.sdc@saveetha.com*

[3]*Senior lecturer, Department of Conservative Dentistry and Endodontics, Saveetha Dental College, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai-77, India. E-Mail: viveknarayan@saveetha.com*

Corresponding Author: Sowmya K

Senior lecturer, Department of Conservative Dentistry and Endodontics, Saveetha Dental College

Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai-77, India. E-Mail: sowmyak.sdc@saveetha.com

predisposes to attrition (Nadiger, Lekha and Meshramkar, 2012). In addition to this, abnormalities in movement or functions of TMJ, as disruption or dysfunctioning of the joints complicates the disease and treatment process (Yadav, 2011). In some cases attrition is also associated with dental erosion (Brunton and Kay, 2003; Jose, P. and Subbaiyan, 2020). Therefore if bruxism and erosion exists together the patient is more likely to develop attrition (Khan, Young and Daley, 1998).

Attrition usually begins in the incisal part of anteriors and occlusal part of posterior teeth (Ramamoorthi, Nivedhitha and Divyanand, 2015; Ramanathan and Solete, 2015).It is best to identify and treat attrition at the earliest possible as enamel cannot be regenerated once it is lost. The process of odontogenesis, wherein amelogenesis is achieved by the decease of ameloblasts before dental eruption, ensures that a repair mechanism does not exist for the repair of worn out or damaged enamel post-eruption (Davies, Gray and Qualtrough, 2002; Rajakeerthi and Ms, 2019; Kumar and Delphine Priscilla Antony, 2018).

Attrition can present with several clinical features including loss of tooth anatomy, discolouration of tooth, sensitivity, pain, compromised periodontal support, loss in posterior occlusal stability, mechanical failure of restoration and periapical changes (Wazaniet al., 2012; Nasim et al., 2018).The clinical presentation of attrition depends on its severity. It can range from mild wear facets to severe tooth structure loss. In severe cases, it can lead to complete removal of enamel leading to exposure of the underlying dentin, which further causes an increased risk of dental caries, dentine hypersensitivity and pain (Rajendran et al., 2019; Wazaniet al., 2012; Nasim et al., 2018; Ravinthar and Jayalakshmi, 2018; Teja and Ramesh, 2019)

Severe wear of anterior teeth can also lead to loss of anterior guidance (Ramesh, Teja and Priya, 2018), which protects the posterior teeth from wear during exclusive movements (Noor, S Syed Shihaab and Solete, 2016). The collapse of posterior teeth results in the loss of the normal occlusal plane and reduction of the vertical dimension (Ramesh, Teja and Priya, 2018; Janani, Palanivelu and Sandhya, 2020). Such cases require a rise in vertical dimension along with full mouth rehabilitation. (Nasim and Nandakumar, 2018; Davies, Gray and Qualtrough, 2002).

Hence the aim of this study was to evaluate the number, teeth, age and gender distribution of teeth with attrition that required root canal treatment.

2. MATERIALS AND METHODS

This is a retrospective study conducted in a university setting. An institutional committee approval was obtained to access the personal data of the patients.The case records were reviewed from June 2019 to April 2020 and the patient data who had attrition approximating pulp, pulpitis or periapical lesion were collected and evaluated. A total of 114 patients and 226 teeth were identified by photographic and radiographic evaluation that fitted into our inclusion criteria. Cross verification was done by two reviewers to minimise bias. The samples were divided into 2 groups based on their age: below 40 years and above 40 years. The type of tooth and the gender of the patient was also recorded. The data was tabulated and analysed using IBM SPSS software version 20. Descriptive statistics was done to determine the frequency percentage of age, gender, type of teeth (anteriors, premolars and molars) and Fisher's exact test was done to find the association between the attrited teeth requiring RCT with age and gender. The level of significance was set at 0.05. The results were presented in tables and graphs.

3. RESULTS AND DISCUSSION

The parameters included where age, sex and type of teeth. A total of 114 patients and 226 teeth were identified with attrition requiring endodontic treatment.

Among the teeth evaluated, 87.6% of attrited teeth requiring RCT were for patients above 40 years of age while 12.4% were for patients below 40 years [Figure 1]. The gender distribution revealed attrited teeth requiring RCT to be 79.2% in males and 20.8% in females [Figure 2]. Among the teeth evaluated in this study, the highest number of attrited teeth requiring RCT were lower molars (33.6%), followed by lower anteriors (19.9%), lower premolar (16.8%), upper premolar (10.6%), upper anterior (9.7%) and the least affected were the upper molars (9.3%) [Figure 3].

Association between type of tooth requiring RCT due to attrition and gender for patients below and above 40 years of age is given in Table 1 and Figures 4 & 5. In patients below 40 years of age, males had a higher number of attrited teeth requiring RCT than females and this was statistically significant (Fisher's exact P value- 0.006). But for patients above 40 years of age, this was not statistically significant.

Association between type of tooth requiring RCT due to attrition and age of patients in males and females is given in Table 2 and Figures 6 & 7. Among males, patients undergoing RCT due to attrition were higher in the group above 40 years of age and this was statistically significant (Fisher's exact P value- 0.001). Among females no statistical significance was found between the two age groups.

Attrition is the progressive loss of the hard tooth surface caused by mastication or grinding between opposite teeth. The extent of attrition is based on the amount of force applied by the person at the time of mastication or biting. One of the major reasons for attrition is bruxism. Attrition if not diagnosed early may become symptomatic and when it approximates to pulp causes acute pulpitis, this causes severe pain to the patients.(Saad and Al Shareef, 2013; Manohar and Sharma, 2018)

In the current study, patients above 40 years of age were found to have a greater number of attrited teeth requiring RCT [Figure 1]. Above 40 years, no difference in the number of affected teeth was found among males and females.The results are similar to another study (Richards and Miller, 1991; Song and Jia, 1989; Richards and Miller, 1991) that showed prevalence of attrition to be higher in the older population as it is a reflection of a person's duration of exposure to physiological and pathological influences (Saad and Al Shareef, 2013; Bajpai and Rahman, 2015; Saad and Al Shareef, 2013).

It was also seen that severe attrition requiring RCT was more common in males (79.2%) than females. Males below 40 years of age showed a significantly higher number of attrited teeth requiring RCT than females.This corroborates the findings of previous studies with similar results (Yadav, 2011). This could be attributed to the strong masseter function, greater muscle fibre mass and strong ligaments in males.This supports the joint better in men and possibly the reason why men have high chances of having more number of attrited teeth. No significant difference was seen among male and female patients above 40 years. This could have been due to the teeth being in function in the oral cavity for longer periods of time and associated oral habits.

Figure 3 showed lower molars to more commonly have severe attrition (33.6%). These results are supported by previous studies that states mandibular molars and mandibular anteriors followed by maxillary molars to have the highest prevalence of attrition (Khan, Young and Daley, 1998; Yadav, 2011; Sun et al., 2017). This can be probably due to the

reason that molars take up most of the masticatory load. However, in our study maxillary molars showed the least amount of severe attrition (9.3%). This may be because of the small sample size of our study.

The drawback of the study is that it had limited sample size and the etiology and risk factors for attrition were not considered. Future studies should focus on the factors contributing to the tooth wear like parafunctional habits and the type of occlusion. can be done by evaluation of contributing factors, formulating effective treatment plan and early interception

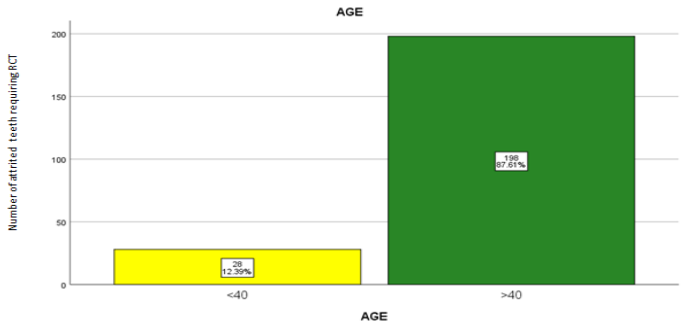

Figure 1: Bar chart shows frequency distribution of attrited teeth requiring RCT in different age groups. X-axis represents the different age groups and Y-axis represents the number of attrited teeth requiring RCT. Attrited teeth requiring RCT were found to be higher in the age group >40 years (Green) than age group of <40 years (Yellow).

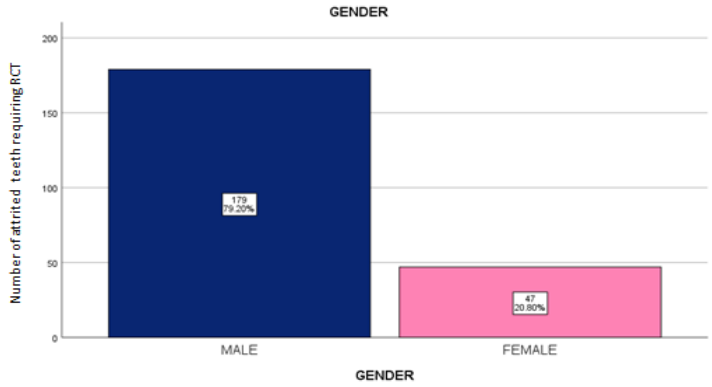

Figure 2: Bar chart shows frequency distribution of attrited teeth requiring RCT among gender. X-axis represents gender and Y-axis represents number attrited of teeth requiring RCT. Attrited teeth requiring RCT were found to be higher in males (Dark blue) than females (Pink).

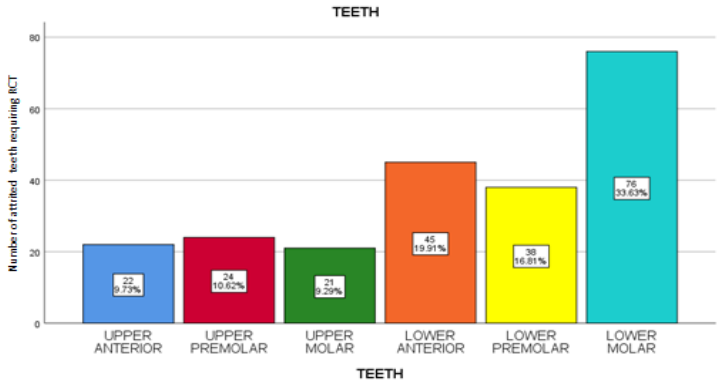

Figure 3: Bar chart shows frequency distribution of attrited teeth requiring RCT among the different types of teeth. X-axis represents type of teeth and Y-axis represents number attrited of teeth requiring RCT. The highest number of attrited teeth requiring RCT were lower molars (Turquoise), followed by lower anteriors (Orange), lower premolar (Yellow), upper premolar] (Maroon), upper anterior (Blue) and the least affected were the upper molars (Green).

AGE			TEETH						Total	Fisher's exact test P value
			UPPER ANTERIOR	UPPER PREMOLAR	UPPER MOLAR	LOWER ANTERIOR	LOWER PREMOLAR	LOWER MOLAR		
<40	GENDER	MALE	1	6	0	10	2	3	22	
		FEMALE	0	0	1	0	1	4	6	
	Total		1	6	1	10	3	7	28	0.006
>40	GENDER	MALE	15	15	18	25	27	57	157	
		FEMALE	6	3	2	10	8	12	41	
	Total		21	18	20	35	35	69	198	0.524

Table 1: Shows the association between type of teeth requiring RCT due to attrition and gender for patients above and below 40 years of age. In the <40 years age group, the frequency of attrited teeth requiring RCT was highest in lower anteriors, while in the >40-year age group, it was highest in lower molars. In the age group of <40 years, males had higher number of attrited teeth requiring RCT and this was statistically significant (Fisher's exact p value- 0.006); no significance was found in age group >40 years.

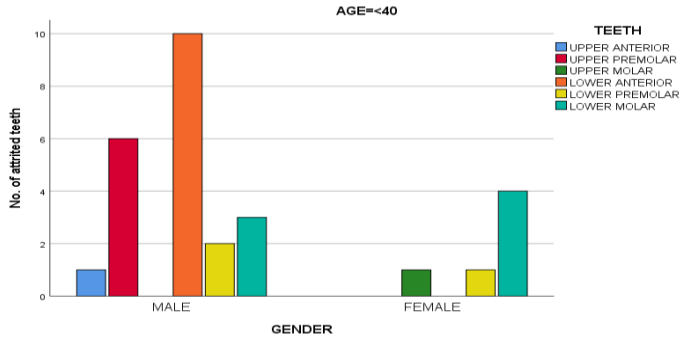

Figure 4- Shows association between type of tooth requiring RCT due to attrition and gender for patients below 40 years of age. X-axis represents the gender and the Y-axis represents the number of attrited teeth requiring RCT. The frequency of attrited teeth requiring RCT was highest in lower anteriors(orange). In the age group of <40 years, males had a higher number of attrited teeth requiring RCT and this was statistically significant (P value- 0.006; Fisher's exact test).

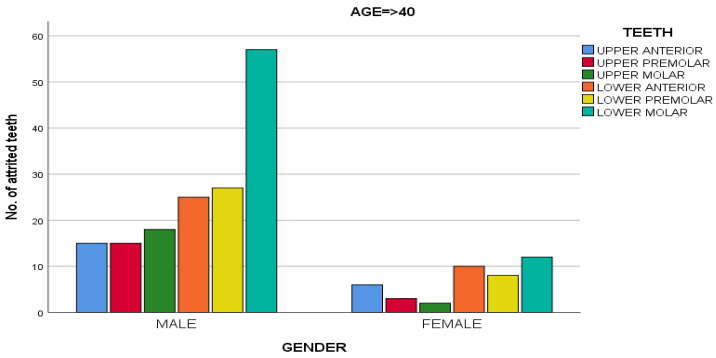

Figure 5: Shows association type of tooth requiring RCT due to attrition and gender for patients above 40 years of age. X-axis represents the gender and the Y-axis represents the number of attrited teeth requiring RCT.The frequency of attrited teeth requiring RCT was highest in lower molars(turquoise). In the age group of >40 years, no significant association was found between gender and attrited teeth requiring RCT (P value- 0.524; Fisher's exact test)

AGE * TEETH * GENDER Cross Tabulation										Fisher's exact test P value
GENDER			TEETH						Total	
			UPPER ANTERIOR	UPPER PRE MOLAR	UPPER MOLAR	LOWER ANTERIOR	LOWER PRE MOLAR	LOWER MOLAR		
MALE	AGE	<40	1	6	0	10	2	3	22	
		>40	15	15	18	25	27	57	157	
	Total		16	21	18	35	29	60	179	0.001
FEMALE	AGE	<40	0	0	1	0	1	4	6	
		>40	6	3	2	10	8	12	41	0.294
	Total		6	3	3	10	9	16	47	

Table 2: Shows association between type of tooth requiring RCT due to attrition and age of patients in males and females. Among both males and females, the frequency of attrited teeth requiring RCT was highest in lower molars.

Among males, the age group of>40 years had a higher number of attrited teeth requiring RCT and this was statistically significant (Fisher's exact p value- 0.001); no significance was found in females.

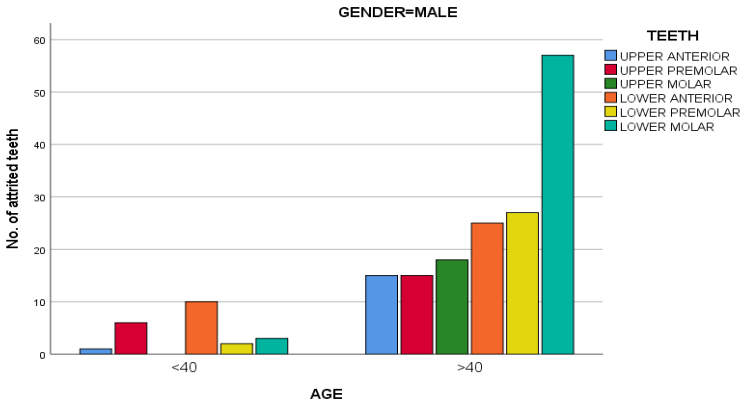

Figure 6: Shows association between type of tooth requiring RCT due to attrition and age among males. X-axis represents the age and the Y-axis represents the number of attrited teeth requiring RCT. The frequency of attrited teeth requiring RCT was highest in lower molars(turquoise). Among males, age group of >40 years had higher number of attrited teeth requiring RCT and this was statistically significant (P value- 0.001; Fisher's exact test)

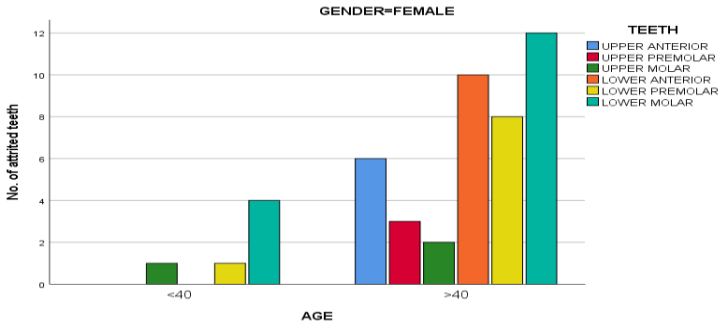

Figure 7: Shows association between type of tooth requiring RCT due to attrition and age among females. X-axis represents the age and the Y-axis represents the number of attrited teeth requiring RCT. The frequency of attrited teeth requiring RCT was highest in lower molars (turquoise). Among females, no significant association was found between age and teeth requiring RCT (P value- 0.294; Fisher's exact test)

4. CONCLUSION

Within the limitations of the study, it can be concluded that severe attrition that requires endodontic treatment increases with age and is more common in males. Careful evaluation of etiology and risk factors and prompt interception can reduce the severity of tooth loss.

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