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A Retrospective Analysis Assessing the Frequency of Patients Willing to Undergo Retreatment of Orthodontic Treatment after Relapse

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ABSTRACT

Introduction: Orthodontic relapse is the tendency for teeth to return to their pre-treatment position. It is difficult for the tooth to be maintained in the corrected position that was achieved by orthodontic treatment without proper retention. Factors that cause the teeth to move back to original malocclusion include periodontal, gingival, occlusal and growth related factors. The aim of the study is to assess the frequency of patients willing to undergo retreatment of orthodontic treatment after relapse.

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Materials and methods: 588 data were collected of the study population between June 2010 to April 2020 that had removable orthodontic treatment done due to relapse.The data was imported to the software IBM SPSS Version 23.0 and analyzed using descriptive statistics and Pearson's correlation. Graphs were obtained and the results were tabulated. Statistical significance was set at <0.05.

Results: Out of the total study population who have been treated with removable appliances, 33.50%of the study population had undergone retreatment and 28.57% of the population had undergone treatment were new cases which were in the age group of 21 to 30 years. 54.08% of the study population that underwent orthodontic treatment were females of which 27.04% were retreatment and 27.04% were new cases and 45.92% were males of which 23.64% were retreatment and22.28% were new cases..

Conclusion: Relapse being unpredictable, it is important to educate the patients to be fully committed when undergoing orthodontic treatment. Patient should be dedicated towards wearing retainer and also made to understand that by wearing retainer as directed, it will help the teeth along with the surrounding hard and soft tissues to realign, stabilizing the new bite.

Keywords : Aesthetics;orthodontic therapy; relapse; retainers;retreatment

INTRODUCTION

In orthodontic treatment, retention is the attempt to keep teeth in the corrected positions after treatment. Traditionally, relapse from orthodontic treatment tends to move back to the original occlusion[(Rogers, 1922),(Jain, Kumar and Manjula, 2014)]. Though it doesn't always tend to move back to the original occlusion, it is considered as an unfavorable change far away from corrected malocclusion[(Felicita, 2017b)].

Orthodontic treatment not only is indicated for aesthetics, but it also plays a role in maintaining oral hygiene, managing occlusion that can cause problems in the temporomandibular joints and conditions like obstructive sleep apnea due to craniofacial abnormalities causing reduced blood flow. Hence it is important to maintain the corrected positions after treatment to prevent going back to the complication.[(Viswanath *et al.*, 2015),(Felicita, Chandrasekar and Shanthasundari, 2012), (Krishnan, Pandian and Kumar, 2018)].

In 1934, oppenheim stated, “Retention is one of the most difficult problems in orthodontics; in fact, it is the problem” [(Oppenheim, 1934)]. Over the decades, many theories have been proposed regarding retention.Some of the theories are: a)Kingsley felt that occlusion was the key to stability[(‘Recent Literature A Treatise on Oral Deformities as a Branch of Mechanical Surgery . By Norman W. Kingsley, M. D. S., D. D. S., etc., etc. With over three hundred and fifty Illustrations. New York: D. Appleton & Co. 1880’, 1880)].

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b)An alternative theory was that the apical base had to be respected[(Lundström, 1925)].
c)Another idea was that mandibular incisors had to be placed over the basal bone in order for stability[(Tweed, 1944)].
d)Rogers proposed that proper function and muscle balance was related to stability[(Rogers, 1922)].

Once these theories are understood, better data can be used to provide evidence based recommendations to patients. Relapse can be caused by orthodontic factors like periodontal, gingival, occlusal factors, soft tissue pressure, limits of dentition and age changes[(Littlewood, Russell and James Spencer, 2009)]. In case of fixed retention appliances, failure to bond the appliance with the proper adhesives and skipping reviews can affect the quality of treatment[(Kumar *et al.*, 2011),(Samantha *et al.*, 2017)]. Temporary anchorage devices like mini implants are placed to treat impacted teeth. Though the chances of relapse in impacted teeth are considered to be less likely, failure to maintain retention procedures can lead to atleast a small degree of relapse[(Felicita and Sumathi Felicita, 2018),(Vikram *et al.*, 2017),(Felicita, 2017a)]

The muscles of the tongue act to give forces lingually and the lips and cheeks act on the labial aspect. Although the muscles of the tongue exert strong forces that are overcomed by the healthy peciodontion maintaining occlusion[(Proffit, 1978)]. If the teeth are moved farther away from the 'neutral zone', particularly in the lower arch, relapse is more likely. If the above mentioned factors are not followed during orthodontic treatment, though stability is achieved, aesthetics will be compromised[(Sivamurthy and Sundari, 2016)]. Bisphosphonates have an effect on bone metabolism and it is said to have an influence on orthodontic treatment and tooth movement[(Krishnan, Pandian and Kumar S, 2015)].

Hence in these cases, the clinician needs to plan an appropriate retention strategy to overcome the relapse potential[(Little, 1990)]. Age changes will bring about subtle, minor changes in the relationships between both the arches[(Vaden, Harris and Behrents, 1995)].Retainers can be fixed or removable. This study has included a study population that had removable orthodontic treatment either due to relapse or as a new patient. Removable retainers help maintain oral hygiene and in some cases may only need to be worn at night[(Gill *et al.*, 2007)].It is important to make sure that the patient's mentality is taken into consideration before starting treatment as it plays a major role in the success of an orthodontic treatment[(Kamisetty, 2015)]. Good patient compliance is required and if instructions are overlooked, relapse occurs. Full responsibility of the patient to wear the appliance should be emphasized to maintain retention. Our team has rich experience in research and we have collaborated with numerous authors over various topics in the past decade (Subramanyam *et al.*, 2018)('Fluoride, fluoridated toothpaste efficacy and its safety in children - review', 2018; Ezhilarasan, 2018; Felicita, 2018; Kavarthapu and Thamaraiselvan, 2018; Krishnan *et al.*, 2018; Marimuthu *et al.*, 2018; Nair *et al.*, 2018; Padavala and Sukumaran, 2018; Pandian, Krishnan and Kumar, 2018; Rajeshkumar *et al.*, 2018; Rao and Kumar, 2018; Vijayashree Priyadharsini, Smiline Girija and Paramasivam, 2018; Abhinav *et al.*,

2019; Ke *et al.*, 2019; Mehta *et al.*, 2019; Panchal, Jeevanandan and Subramanian, 2019; Ponnulakshmi *et al.*, 2019; Ramesh *et al.*, 2019; Sridharan *et al.*, 2019; Sweta, Abhinav and Ramesh, 2019; Wu *et al.*, 2019; Palati *et al.*, 2020; Paramasivam, Vijayashree Priyadharsini and Raghunandhakumar, 2020). 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; Vijayashree Priyadharsini, Smiline Girija and Paramasivam, 2018; Ezhilarasan, Apoorva and Ashok Vardhan, 2019; Ramadurai *et al.*, 2019; Sridharan *et al.*, 2019; Vijayashree Priyadharsini, 2019; Chandrasekar *et al.*, 2020; Mathew *et al.*, 2020; R *et al.*, 2020; Samuel, 2021)

The objective of this study is to assess the number of patients willing to undergo retreatment of orthodontic therapy after relapse from a study population[(Thickett and Power, 2010)].

MATERIALS AND METHODS

This was a retrospective study which was conducted by using the data collected from the educational software of Saveetha Dental College, Chennai; from June 2010 to April 2020 and it was examined by two examiners. Prior to the start of the study, ethical approval was obtained from Scientific Review Board, Saveetha Dental College, SIMATS university. The study involved a total of 588 sample sizes of the study population that underwent removable orthodontic treatment were obtained between the age group of 10 to 40 years. Patients that needed removable orthodontic treatment, attending the OPD of Saveetha Dental College were enrolled in the study by simple random sampling. 588 case sheets were reviewed and cross verification was done through photographs taken of the oral cavity. The external validation can be generalised among the south indian population.

The data was collected from the health records system used at Saveetha Dental College which was used to record and store information and oral health data of the patients reporting to the college. It helps in retrieval of data as starting from diagnosis to treatments rendered, everything is stored and can be accessed by the physicians. The inclusion criteria included patients that underwent removable orthodontic treatment either as retreatment or as new treatment[Figure 1]. Any other treatment other than removable orthodontic treatment was in the exclusion criteria.
The data was imported to the software IBM SPSS Version 23.0 and analyzed using descriptive statistics and Pearson's correlation. Graphs were obtained and the results were tabulated. Statistical significance was set at <0.05. Ethical clearance was obtained and covered under the following ethical approval number - SDC/SIHEC/2020/DIASDATA/0619-0320.

RESULTS AND DISCUSSION

33.50% of the study population had undergone retreatment and 28.57% of the population had undergone treatment as new cases which were more between the age group of 21 to 30 years.[Figure 2] 54.08% were females among the study population and 45.92% were males that underwent removable orthodontic treatment.[Figure 3] 50.68% of the study population had retreatment due relapse while 49.32% were new patients.[Figure 4], of which most of the

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patients were females 27.04%, for both retreatment and new cases.[Figure 5].Most of the patients were females that underwent retreatment. They were mostly young patients that had to undergo retreatment due to relapse.62.07% of the study population that underwent removable orthodontic treatment were between the ages of 21 to 30 years of which 33.50% had undergone retreatment and 28.57% of the population were new patients.[Figure 1]. Most of the patients were young adults as they were the ideal age for treatment[(Hassan and Amin, 2010)]. Patients that underwent treatment failed to follow the instructions. They were prone to relapse due to the lack of awareness. Most of the patients were forced into the treatment due to their parents[(Dinesh *et al.*, 2013)].54.08% of the study population were females while 45.92% of the study population were males[Figure 2]. Based on other studies as well, most of the females were aware of their aesthetics among which 77% of the population were females while 23% were males[(Rubika, Sumathi Felicita and Sivambiga, 2015)]. While some studies showed no relevance and were just a simple error due to sampling bias[(Little, 2002)].

Retreatment was done by 50.68% of the population while 49.32% were new patients[Figure 3]. Most of them that underwent retreatment were females that were 27.04%[Figure 4]. It should be taken into consideration that most of the patients underwent retreatment which shows the lack of awareness[(Danz *et al.*, 2014)]. Orthodontics is unpredictable, increases the risk of relapse and it is important that all clinicians need to treat all patients as they have high potential to relapse[(Pollard *et al.*, 2012)].

When relapse has taken place, for retreatment,a detailed amendment should be done with X-rays, models and photographs of the teeth. Patients should be counselled on the importance of consistent retainer wear after retreatment to avoid relapse for the second time[(Little, Wallen and Riedel, 1981)].If relapse from the first treatment is not addressed, the quality of the treatment will be compromised.Retreatment after relapse will still show adequate results[(Reitan, 1967)]. It is the clinicians responsibility to ensure that patients are appropriately instructed regarding the care of the retainers and provided advice about the timing of retainer review[(R *et al.*, 1995)].

CONCLUSION

Maintaining teeth in their corrected and stable positions even after orthodontic treatment is essential. In this study, 50.68% of the study population that already underwent orthodontic treatment were willing to accept retreatment after relapse. Majority of the patients that underwent retreatment were females. Patient mentality is very important in the success of an orthodontic treatment and they must be willing to follow the instructions to maintain stability and avoid relapse. Properly spaced teeth will help prevent accumulation of food, maintain aesthetics and maintain oral hygiene.

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AUTHORS CONTRIBUTION

Monica Antony carried out the present design of the study, data collection and data analysis with interpretation. Dr.Remmiya Mary Varghese aided in the conception of the topic, has participated in the study design, statistical analysis and has supervised the preparation and drafting of the manuscript and Dr. L.Leelavathi carried out the critical revision of the article. All the authors have discussed the results among themselves and contributed to the final manuscript

CONFLICT OF INTEREST

There was no potential conflict of interest declared by the authors.

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LIST OF FIGURES

Figure 1- The Figure shows the Removable Retainer in the upper and lower arch which is given after fixed appliance therapy to prevent relapse.

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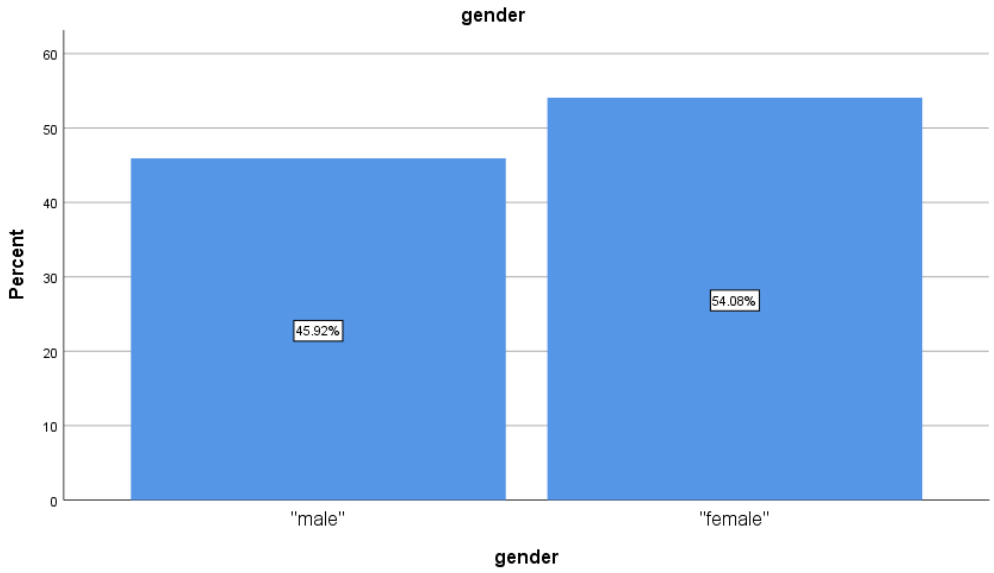

Figure 2 - Bar graph showing gender wise distribution with gender in x axis and frequency in y axis. Nearly 54.08% of the study population was found to be females who underwent removable orthodontic treatment followed by males with 45.92%.

Figure 3- Bar graph showing distribution of study population on the basis of treatment done. X-axis denotes the frequency of the treatment done and Y--axis denotes the type of treatment done. Majority of the patients have undergone retreatment(50.68%) due relapse as compared to new cases (49.32%).

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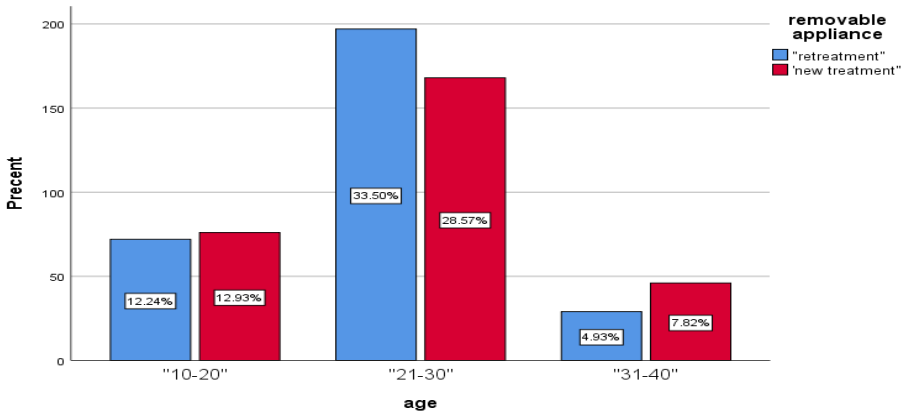

Figure 4 - Bar graph showing the correlation between age groups of the study population from 10 to 40 years and the type of treatment done. x axis represents age groups and y axis represents percentage of the patient undergoing treatment.Blue colour denotes retreatment and red colour denotes new treatment. Majority of the population undergoing retreatment(blue) was in the age group of 21-30 years and the population undergoing treatment as a new patient were more between the age group of 21 to 30 years. Chi square test was done . Pearson- chi square value is 6.158 and the p value is 0.046(<0.05) showing that the study is statistically significant.

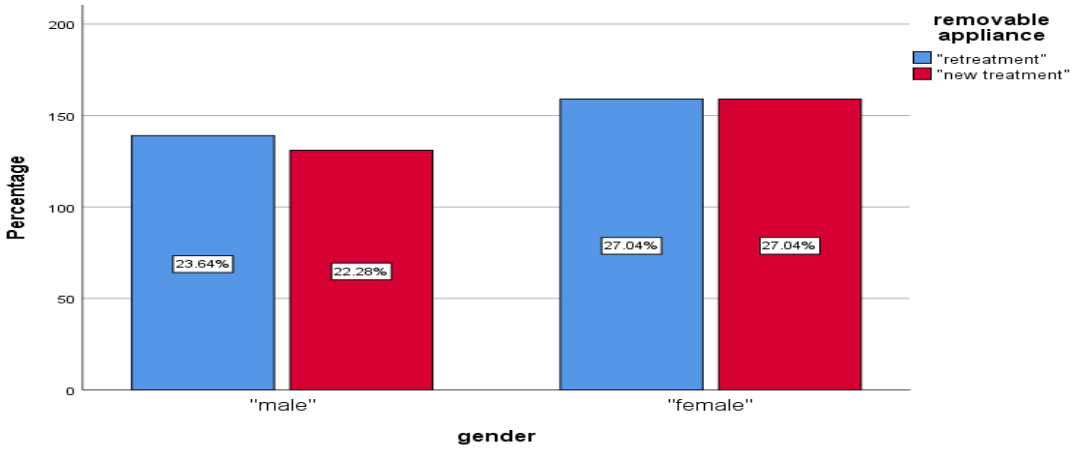

Figure 5 - Bar graph showing the association between gender of the study population and the type of the treatment done .x axis represents the gender and y axis represents percentage of patients. Blue colour denotes retreatment and red colour denotes new treatment. Females were more likely to undergo treatment as retreatment(blue) and as well as new treatment(red) as compared to male patients.Chi square test was done ,Pearson-chi square value - 0.128 and the p value - 0.720 (>0.05) .Hence, statistically not significant.