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PREVALENCE OF FREQUENCY OF PATIENTS UNDERGOING EXTRACTION FOR ORTHODONTIC TREATMENT - AN INSTITUTIONAL BASED RETROSPECTIVE STUDY

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Abstract

Extraction of permanent teeth as a part of orthodontic treatment has been the topic of discussion for many years, including periods when it was widely used in treatment, including the present, during which other methods are used to avoid dental extractions. The aim of the study was to evaluate the frequency of patients undergoing extraction for orthodontic treatment at Private dental college. The clinical records of 987 patients undergoing orthodontic treatment were evaluated. The frequency of extractions was evaluated with regard to sex, gender and the different combinations of extractions was assesed. Chi-square test was used to determine correlations between variables, while the chi-square test for trends was used to assess the frequency of extractions. The most frequently extracted teeth were first premolars. There was a statistical significant differences seen in patients undergoing extraction for orthodontic treatment with regard to age. New features introduced into the orthodontic clinic and new esthetic concepts contributed to reducing the number of cases treated with dental extractions. However, dental extractions for orthodontic treatments are still well indicated in certain cases.

Keywords: *Esthetic concepts; Extraction; Occlusion; Orthodontics.*

I. Introduction

The decision to extract teeth or not and the number of teeth to be extracted can influence the final result of orthodontic treatment, including esthetics, occlusion, satisfaction of patients and their families, as well as the treatment time.[1,2] Currently, the criteria that guide orthodontic extractions go beyond cast analysis and the position of teeth in the bone base. The decision for tooth extraction, especially in borderline cases, requires dental, facial and skeletal evaluations to obtain an accurate diagnosis and effective treatment plan. Patient's cooperation, facial profile and skeletal age, the presence of dental asymmetry and anteroposterior relations, as well as the presence of pathology, are determining factors in the decision-making involving dental extraction in Orthodontics.[3–5] The controversy regarding extractions for orthodontic treatment continues and today is invoked by some as a feature of the "standard of care." For this and other reasons, it is necessary to have contemporary data on the general prevalence of orthodontic extractions and the interpractice ran of extraction rates in current specialty practice.

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A telephone survey of all licensed orthodontists in Michigan was conducted to determine their subjective estimates of extraction rates for patients in their practices. There were 238 respondents, for a response rate of 90.2%. Peck and Peck reviewed previous reports of extraction percentages, noting a large range with more than 80% of extractions. Jane .A et al, in his study found that about half of the orthodontic patients have teeth extracted as part of their treatment. About 70% of this group had four premolars extracted. The rest had other combinations of teeth or fewer than four teeth extracted. Although the goal of the dental profession is to preserve teeth and prevent tooth loss, presumably teeth are extracted for orthodontic treatments for the long-term benefit of the entire dentition.[6]

Retrospective studies with extraction frequencies for orthodontic treatment are scarce and reflect reality. Therefore, it is interesting to verify extraction frequencies for orthodontic treatment. Previously our team had conducted numerous clinical trials [7–11], in-vitro studies [12–17], systematic reviews [18–21] over the past 5 years. This experience led us to work on the current topic. Therefore, the study was aimed to evaluate the frequency of patients undergoing extraction for orthodontic treatment.

II. MATERIALS AND METHODS:

A single centre retrospective study was done in an institutional setting. The ethical approval was received from the institution's ethical committee. The study involved selected patients data who underwent extraction for orthodontic treatments in the institution. The necessary approvals in gaining the data were obtained from the institutional ethical committee (SDC/SIHEC/DIASDATA/0619-0320). The number of people involved in this study includes 3 i.e guide, reviewer and researcher.

Selection of Subjects:

All patients who underwent extraction for orthodontic treatment in the institution from the time period of June 2019 to April 2020 were selected for this study. There were three people involved in this study (guide, reviewer, and researcher). All available data were taken into consideration and there was no sorting process.

Data Collection:

The patient's details were retrieved from the institution's patient record management software. Data regarding patients' name, age, gender, tooth extracted for orthodontic treatments were taken into consideration for this study. Cross verification of the data was done with the help of photographs and radiographs. The data was manually verified, tabulated and sorted.

Inclusion Criteria:

All patients who underwent extraction for orthodontic treatment in the institution in the age group between 11-45 years were included in the study.

Exclusion Criteria:

Patients' records that were incomplete were removed from the study. Repetitive entries were excluded as well. Patients aged less than 11 years and more than 45 years were not included in the study.

Statistical Analysis:

The tabulation of data was analysed using SPSS software. (IBM SPSS Statistics 26.0). The data was assessed by being subjected to descriptive analysis with the help of frequencies, percentages. The data was represented by the means of bar graphs. Non parametric Chi square test was used and results were correlated and associated. In this present study, the significance level was predetermined at the probability value of 5% or less. $p<0.05$ was considered to be as the level of statistical significance.The associations were done for different patterns of extraction with respect to different age groups and gender in this study.

III. RESULTS:

The study included 453 participants. (Figure-1) shows that all the four first premolar (70.1%) were the most frequently extracted teeth followed by all four second premolar extraction (16.6%), single arch premolar extraction (7.7%) and other extractions (5.1%). (Figure-2) shows the association of different patterns of extraction undergone by patients with respect to different age groups. Within different age groups, patients in 11-20 years of age underwent extraction more frequently for orthodontic treatments (58.4%) among first four premolar extraction patients. (Figure-3) shows the association of different patterns of extraction undergone by patients with respect to gender. Females underwent extraction more frequently for orthodontic treatments (56.9%) than males (43.1%) among first four premolar extraction patients.

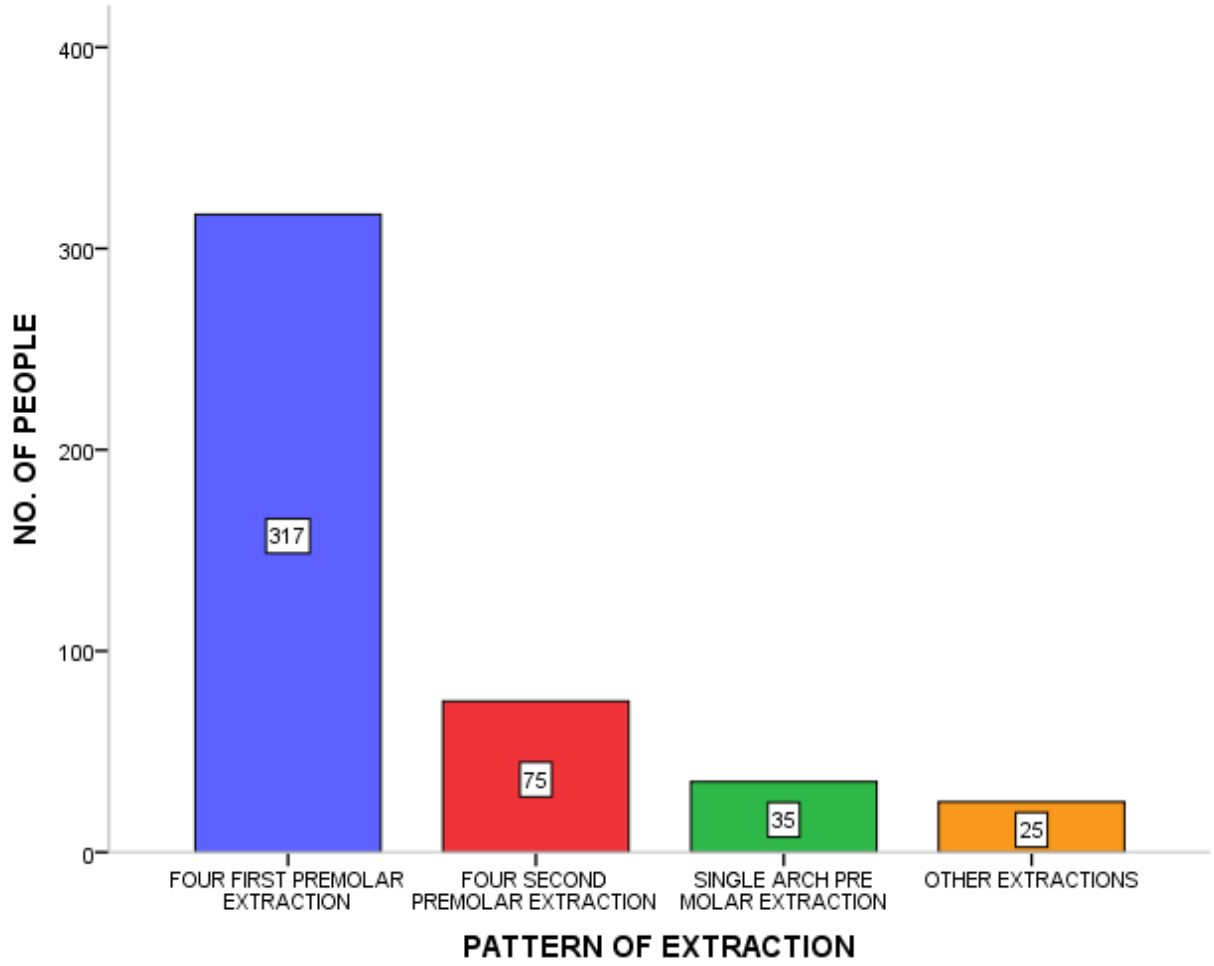

Figure-1: Bar graph representing distribution of different patterns of extraction. X-axis represents different patterns of extraction and Y-axis represents the number of people who underwent extraction for orthodontic treatments. The colour blue represents four first premolar extraction, the colour red represents four second premolar extraction, the colour green represents single arch premolar extraction and the colour orange represents

other extractions.Majority of the patients have undergone extraction of all four first premolar teeth (blue)for orthodontic treatments (70.1%).

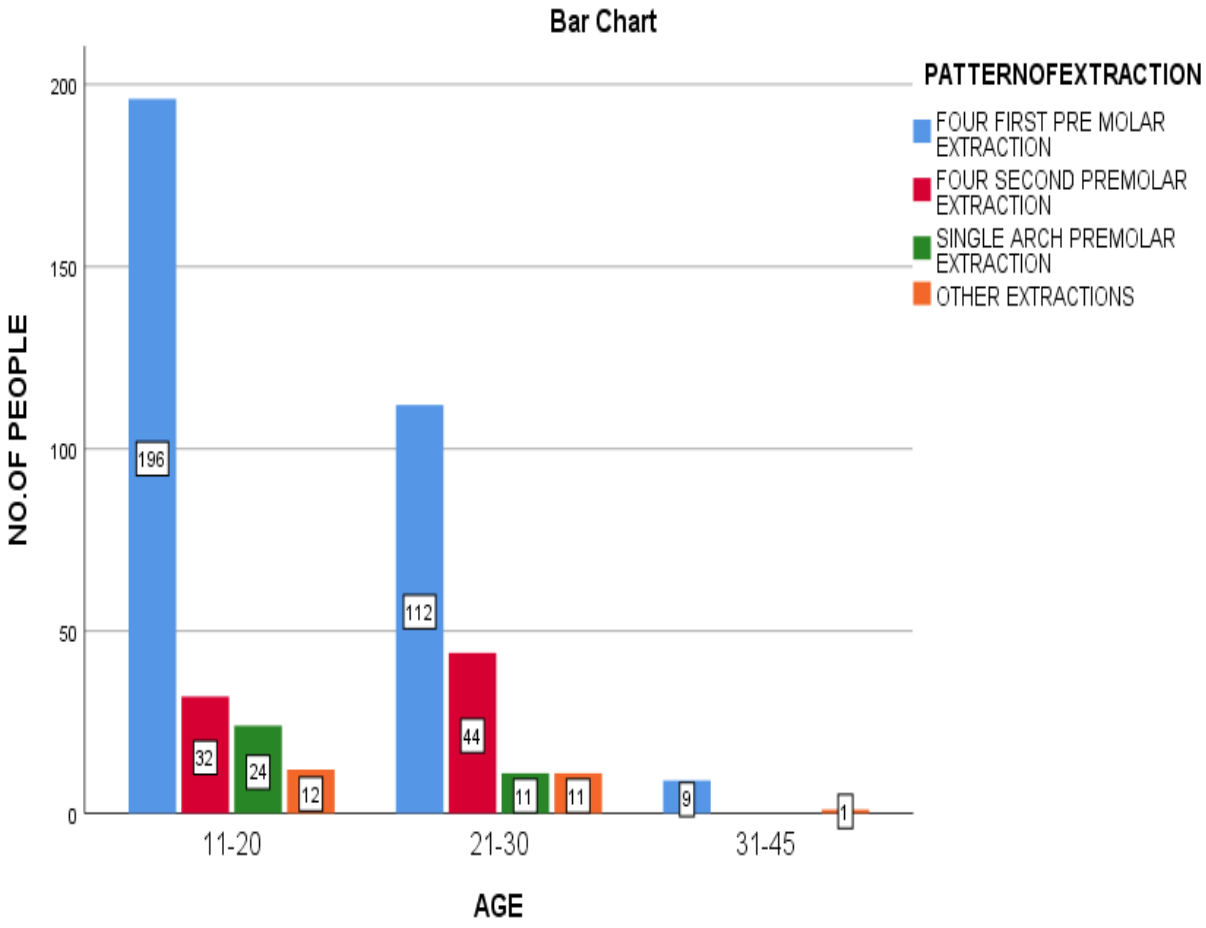

Figure-2: Bar graph representing the association of distribution of different patterns of extraction undergone by patients with respect to different age groups. X-axis represents distribution of different age groups and Y-axis represents the number of people who underwent extraction for orthodontic treatment. Within different age groups, patients in 11-20 years of age underwent extraction more frequently for orthodontic treatments (58.4%) among first four premolar extraction patients (blue colour). There was a statistical significant differences seen in patients undergoing extraction for orthodontic treatment with respect to age (chi square value-16.74, p value <0.05).

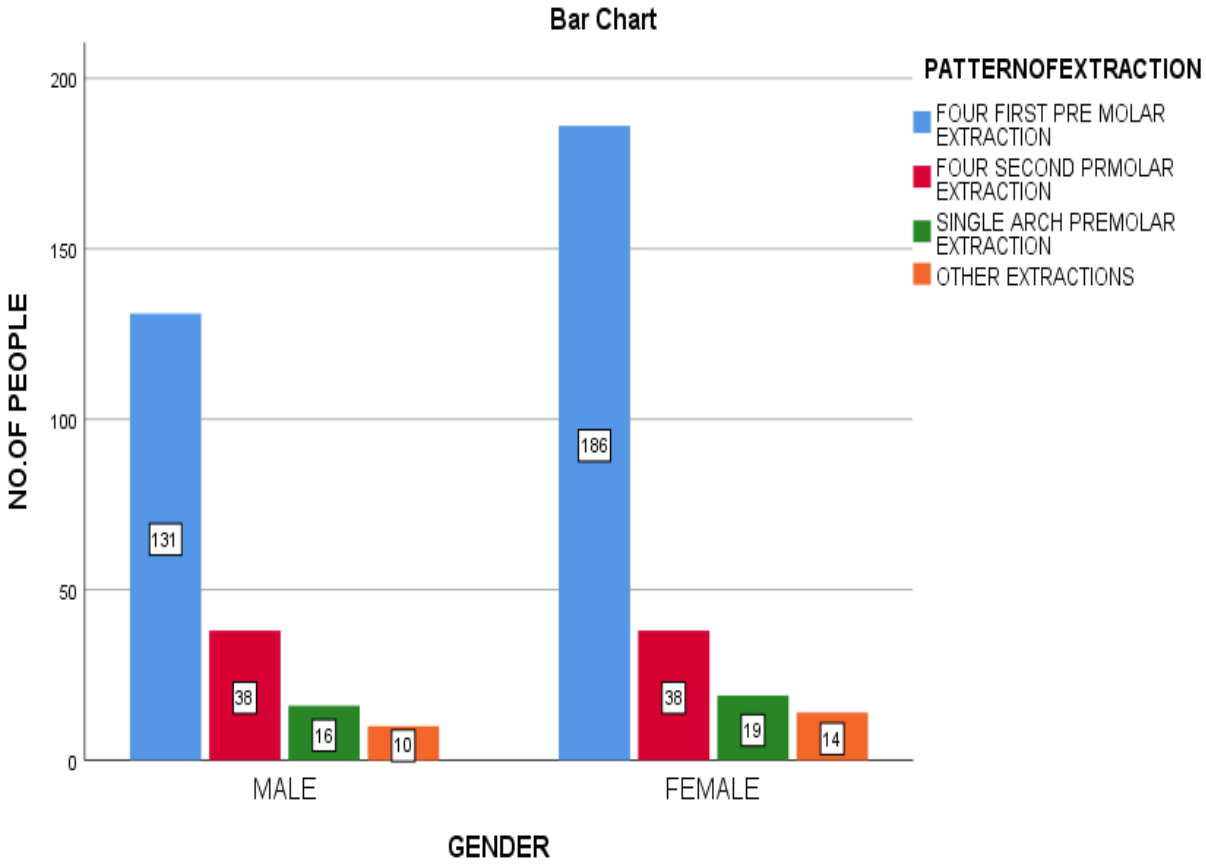

Figure-3: Bar graph representing the association of different patterns of extraction undergone by patients with respect to gender. X-axis represents gender distribution and Y-axis represents the number of people who underwent extraction for orthodontic treatment. Females underwent extraction more frequently for orthodontic treatments (56.9%) than males (43.1%) among first four premolar extraction patients(blue). There was a clinical significance but no statistical significant differences seen in patients undergoing extraction for orthodontic treatment with respect to gender (chi square value-1.70, p value >0.05).

IV. DISCUSSION:

In our study, most common pattern of extraction for orthodontic treatment was found to be all four first premolar extraction (70.1%) followed by all four second premolar extraction (16.6%), single arch premolar extraction (7.7%) and other extractions (5.1%). The participants were ranged in the age group of 11-20 years, 21-30 years and 31-45 years. Patients in the age group of 11-20 years reported with maximum number of extractions (58.4%) and patients in the age group of 31-45 years reported with the least number of extractions (2.2%). 56.9% of the participants who underwent extractions were females and 43.1% were males.All four first premolars were the most frequently extracted teeth for orthodontic treatment. The choice of these teeth is justified because of their proximity to anterior and posterior teeth and because they occupy an intermediate position in the arch, which facilitates correction of crowding, dentoalveolar protrusion and midline deviations. This finding is in line with studies conducted by Salzmann JA et al, Brandt S et al, Weintraub JA et al, Gaya C et al [22–25] who proposed that the increase in first premolar extraction occurred primarily in search of stability which is contradictory to Riedel 1957 [25] study of evaluation of seattle seafair princesses which showed decline in extraction of first premolar due to impact of extraction on esthetics, data to suggest that extraction does not guarantee stability, concern about the temporomandibular dysfunction and changes in technique all seem to play role.

Extraction of all four second premolar showed a much reduced frequency than all four first premolar, which is in accordance with a study conducted by Guilherme Janson et al because it is usually used when anchorage can

be lost, producing smaller impact on the soft tissues or in cases with moderate crowding. Single arch extraction with only two maxillary premolar extraction showed a relatively stable frequency around 10% in the study by Guilherme Janson et al similar to our study. This treatment approach has a greater occlusal treatment success rate compared to four premolar extractions and presents a shorter treatment time to complete Class II malocclusions. Other extractions like molar extractions due to decayed tooth, third molar extraction, retained deciduous tooth, incisor and canines were the least frequent teeth to be extracted which is in line with the study by Guilherme Janson et al.[26] The reason behind it is because it can be a valuable therapeutic approach which could lead to more stable results, smaller impact on facial profile, and present a smaller percentage of extraction spaces re opening. This study shows, higher frequency of extractions among female patients (59.6%) which is in accordance with the study conducted by Peck S, Peck H et al study observed a higher frequency of extractions in female patients (44%), while only 39% of male patients were treated with extraction and is not in line with the Camila de S et al study shows a higher frequency of extractions in male patients (48%), while in female patients extractions were performed in 44% of cases. This finding is most likely been justified by the growing concern with esthetics among females.

The long-term results of extraction for orthodontic treatments have not been studied in controlled fashion. Even in the short term, there are some risks and potential side effects associated with surgical extraction of time, costs, pain, and discomfort. The probabilities associated with the risks and benefits should be considered in the process of deciding whether or not to extract a tooth. Further investigation of how orthodontic treatment decisions are made and their long-term implications is needed.[6]

V. CONCLUSION:

The teeth most often extracted for orthodontic correction were four first premolars, followed by the option of extracting second premolars, single arch extraction and extractions of other teeth, which presents a shorter treatment time to complete Class II malocclusions. This reinforces the suggestion that orthodontic treatment planning is derived from weak levels of scientific evidence and there is a need to increase the level of orthodontic scientific investigation. The orthodontist may need to evaluate the different alternatives of treatment by constructing as many setups as needed, which will help him in making decisions, in recognizing the possibilities and limits of the treatment and in determining the anchorage and mechanics to be used.

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CONFLICT OF INTEREST: There are no conflicts of interest.

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