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A RETROSPECTIVE ANALYSIS ASSESSING THE FREQUENCY OF PATIENTS UNDERGOING GROWTH MODIFICATION WITH FUNCTIONAL APPLIANCES IN A UNIVERSITY SET UP

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Abstract

Functional appliances are used worldwide and are most effective in the treatment of Class II Malocclusion. They are also used to achieve posterior extrusion to correct deep bites. The aim of the study was to assess the number of patients undergoing growth modification with different types of functional appliances and the age group which has the highest frequency of functional appliance usage .The study has been carried during an one-year period (June 2019 to April 2020) on 34 patients who used functional appliances. Data was collected from an electronic dental record consisting of all orthodontic diagnosis case sheets which were reviewed and pre-adolescents and adolescents in the age group between 8-17 years were chosen for the study. All relevant datas obtained from the record system were exported to SPSS software and results were obtained using Chi square test .The findings of our study demonstrated that patients who had undergone Removable functional appliance therapy (69.70 %) were comparatively higher than the ones who had undergone treatment with fixed functional appliances (30.30 %).Majority of male patients had undergone removable functional appliance therapy. 42.42 % of patients were in the age group of 8-12 years (P value >0.05) Statistically not significant. The study concludes that the majority of the patients have undergone removable functional appliance therapy as compared to treatment with fixed functional appliances but the study was not statistically significant.(P value >0.05).

Keywords: *Adolescents ;Functional Appliance ;Fixed;Removable;Malocclusion*

I. Introduction

Functional appliances play an important role in achieving an ideal facial profile.Functional appliances have been used many years back despite its history , there is more controversy relating to the usage, methods of action, and effectiveness [1] .A functional orthodontic appliance enhances the neuromuscular environment, promotes mandibular and maxillary growth, and expands the soft tissue envelope on the affected side that is used among young patients.[2] [3].Class II malocclusion is the most common orthodontic problem which occurs in about 1/3 of the population [4],[5]. It results from many contributing factors, most commonly mandibular retrusion [6].Functional appliance therapy is the primary goal of treatment for Class-II malocclusion [7]

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Functional appliances are classified into removable and fixed. An important factor discriminating between the two types of appliances is the need for patient compliance.[8] These appliances are divided into two categories depending on their mode of action and type of anchorage. [9]

Fixed functional systems have few benefits over removable systems. As the name itself distinguishes them from removable appliances, it is not an easy task for the patient to remove them and the appliance allows greater control as they are fixed on both the arches. [10],[11] They are used full day, which implies continuous incentive for mandibular growth. They are smaller in size allowing better adaptation to perform such functions like swallowing, mastication, speech and inhalation. Since the direction and application of force is directly transferred to the teeth via the supporting system, the main drawback that comes in acknowledgement is dental movement taking place during treatment. While trying to stay away from this undesirable dental movement and as a way of finding an option these are designed to alter the position of mandible, both naturally and sagittally. This will help as a supplementary lengthening of mandible by stimulating unesiased growth at the condylar cartilage [12], [13].

Removable functional appliances are effective in improving Class II malocclusions in the short term. While the skeletal changes are minimal, significant dentoalveolar retroclination of maxillary incisors and proclination of mandibular incisors and soft tissue changes can be corrected using removable functional appliances.[14],[15].All removable appliance increases mandibular length which is useful in correction of skeletal class 2 malocclusion.[16]

To date, there is not much evidence comparing the efficacy of fixed versus removable functional appliances accounting for patient-centred as well as traditional clinician-centred outcomes.[17],[18]. Functional appliances are key to success in early orthodontic treatment.However the choice of functional appliance is decided by the patient and practitioner to avoid discomforts of tha appliance application.The treatment outcome of functional appliance depends on proper case selection, diagnosis and proper appliance selection.

The aim of the study was to assess the number of patients undergoing growth modification with different types of functional appliances and the age group which has the highest frequency of functional appliance patient

II. MATERIALS AND METHODS:

Study Setting:

This was a university-based study, cross-sectional, uni-centred study. The ethical board clearance was obtained from the institutional ethics committee of Saveetha Dental College and hospitals, Chennai. IEC approval number: SDC/SIHEC/2020/DIASDATA/0619-0320. The data was obtained by reviewing 86,000 case sheets of patients who reported to Saveetha Dental College and hospitals. Informed consent was obtained from the patients.

Sampling:

All the data samples used in this study were obtained by reviewing the case sheets of patients belonging to Saveetha dental college and hospital. The data samples were collected from June 2019 to March 2020. All the case sheets of patients who had undergone orthodontic treatment using functional appliances were taken in this study.

Data Collection:

The data collected included age, gender and type of functional appliance used. A total of 33 patients were chosen. All the data was collected from the Department of Orthodontics.Patient case sheets with incomplete data were excluded if the data required could not be obtained from the intra oral photographs. The data samples obtained were collected and tabulated in excel sheets and were exported for statistical analysis.

Statistical Analysis:

The values and variables were tabulated and analysed using the SPSS software by IBM. Chi-square tests were done to assess associations. Any p-value of less than 0.05 was considered as statistically significant.

III. RESULTS

Descriptive study showed distribution of number of patients who used fixed and removable functional appliances in Figure-1 where 30.30 % patients used fixed functional appliances and 69.70 % patients used removable functional appliances.

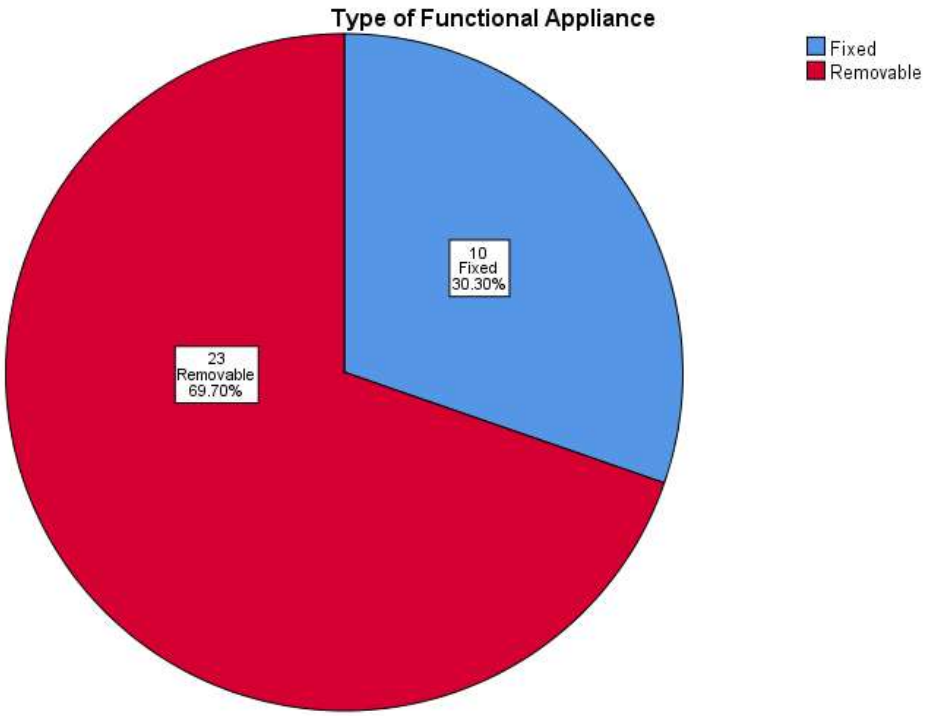

Figure 1: Pie chart representation shows distribution of type of functional appliance used by patients. Blue depicts fixed functional appliances and red depicts removable functional appliances. 30.30 % patients have undergone fixed functional appliance(blue) and 69.70 % patients have undergone removable functional appliance(red) therapy. Majority of the patients have used removable functional appliances compared to fixed functional appliance.

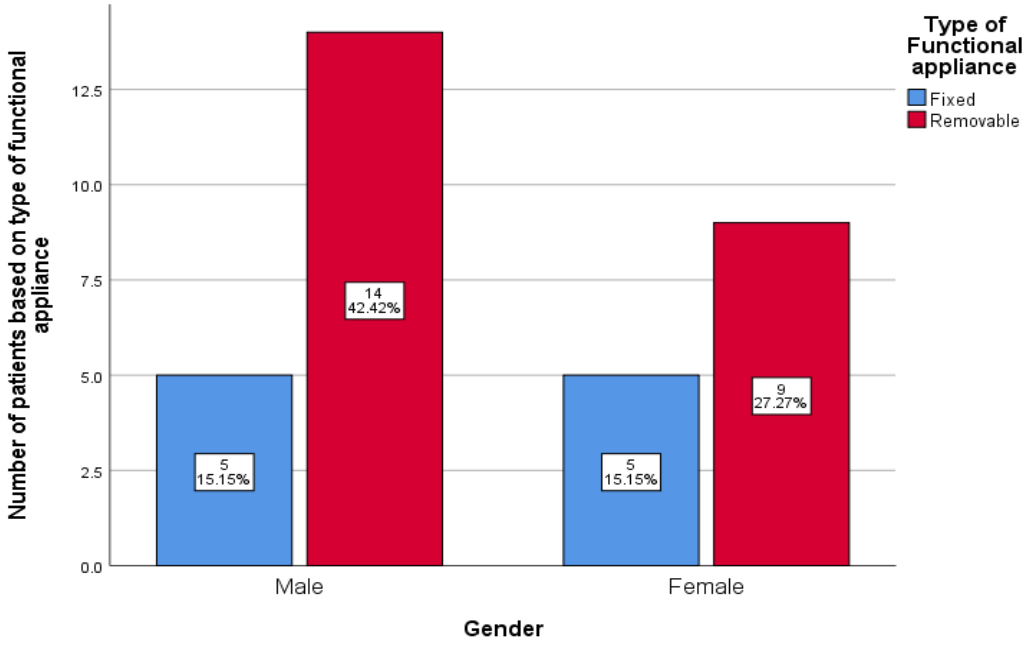

Figure 2: Bar Graph represents the association of gender wise distribution of type of functional appliance used . The x-axis denotes gender and y-axis denotes number of patients based on the type of functional appliance used in each gender.Blue depicts fixed functional appliances and red depicts removable functional appliances. Majority of the male patients have undergone Removable functional appliance (red) therapy as compared to Fixed functional appliance (blue).Chi square test was done. Pearson's chi square -0.337 ; p value-2.535 hence statistically not significant

Association of gender and type of functional appliance is shown in Figure-2 .

Among males, 15.15 % patients used fixed and 42.42 % patients used removable appliances whereas among females 15.15 % patients used fixed and 27.27 % patients used removable appliances.The p value using pearson's chi-square test value was found to be 2.535.

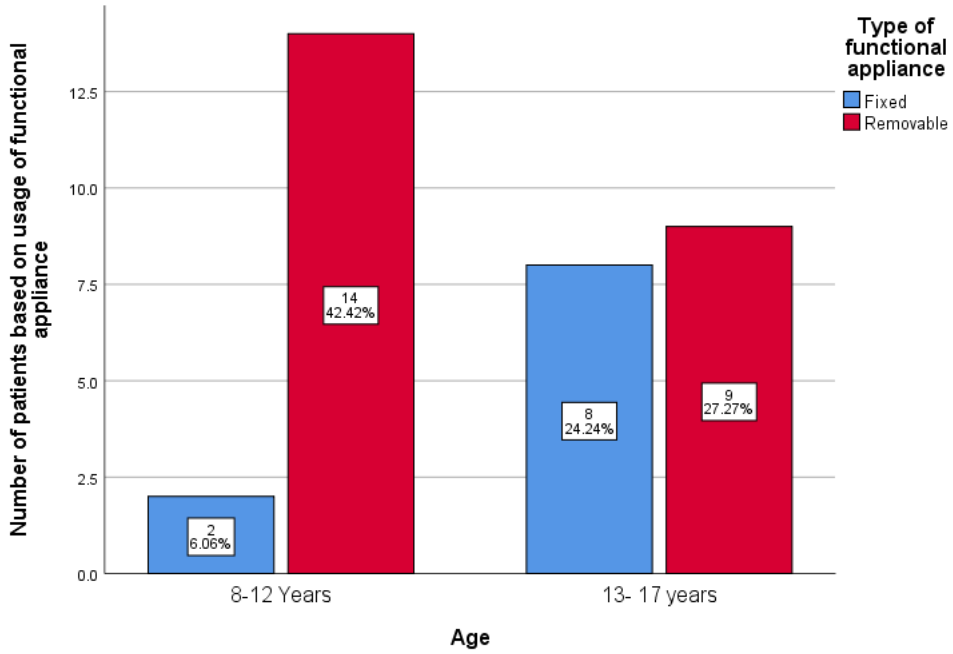

Figure 3: Bar Graph represents the association between age group and the number of patients undergoing

functional appliance treatment. x-axis denotes age group and y-axis denotes number of patients based on the type of functional appliance used .Blue depicts fixed functional appliances and red depicts removable functional appliances. Majority of the patients have undergone Removable functional appliance (red) therapy in the age group of 8-12 years followed by 13-17 years. Chi square test was done .Pearson's chi square test -4.661 ; P value -0.16(>0.05) hence statistically not significant.

Association of age group and type of functional appliance is shown in Figure-3. Number of patients who used fixed appliance was 6.06 % patients in the age group 8 -12 years and 24.24 % in the age-group 13-17 years.Patients who used removable appliances where 42.42 % in the age group 8-12 years and 27.27 % in the age group 13-17 years .Using pearson 's chi-square test p value was found to be 0.16.

IV. DISCUSSION

An increasing number of orthodontists and general dentists have used fixed and removable functional appliances to treat young patients. [19].Higher rates were in Europe and South America where 20 % of orthodontists worldwide used functional appliances [20] .Treatment of Class II malocclusions should focus first on improving the skeletal discrepancy using functional appliances while the individual is still growing. [21] There are many treatment options available for the correction of Class II malocclusion , depending on what part of the craniofacial skeleton is affected .Treatment approaches include the use of functional or removable appliances, extraoral traction by means of headgears, and fixed appliances combined with Class II elastics.[22]

Successful orthodontic treatment using these modalities often relies heavily on the patient's willingness to wear the suggested appliance. For example, regarding the wearing of headgear, apart from the discomfort and the extraoral appearance of the patient (factors that can reduce their cooperation), there is also a risk of the headgear causing eye and facial tissue damage.

Moyad et al study showed inclusion of participants from under the age of 16 who used fixed and removable functional appliances.[23] The total sample size used in our study was 34 patients, 30.30 % who used fixed functional appliances and 69.70 % who used removable functional appliances. [Figure-1].

In a study done by Madhur et al showed 34 young female patients who participated used fixed functional appliances. In the present study 5 out of 10 female patients used fixed functional appliances.[Figure-2] [24]

In a study conducted by E.Cirgie et at (II) 21 adolescents (12 girls and 9 boys) were used in the study. In the present study 16 pre-adolescents and 17 adolescents participated. [Figure-3]. [20]

Therefore, this study does not emphasize and elaborate on other types of functional appliances used and on individual preferences.[25],[26] .The main objective in usage of functional appliances is to explore the experience of using both fixed and removable appliances. Hence, A prospective study needs to be done on a longer duration with equal number of gender distribution samples. However in this study based on statistical analysis pre-adolescents use functional appliances more than adolescents.Few other studies also showed the appliances used on adults.

Functional appliance can improve facial aesthetics which is one of the main reasons for seeking orthodontic treatment and it is associated with a high level of patient and parent satisfaction.[27]

Functional appliances used were more common among males than females. Number of pre-adolescents who used functional appliance were higher than adolescents mostly because they encounter problems with malocclusion and correction needs to be done at younger age.Removable appliances have a major role in retaining the results achieved with other appliance systems and their usage is high because of its ease of application

V. CONCLUSION

Within the limitations of this study, the majority of the patients underwent removable functional appliance therapy as compared to fixed functional appliance treatment were males and in the age group of 8-12 years(late mixed dentition). Fixed functional appliances are commonly advocated for subjects in the 13-17 yr age range. However none of the above associations were statistically significant. Further studies with a larger sample size are required to give more significant results.

AUTHORS CONTRIBUTIONS

First author [Monisha.K.] performed the analysis, and interpretation and wrote the manuscript.

Second author [Dr.Remmiya Mary Varghese] contributed to conception,study design, data design, analysis, interpretation and critically revised the manuscript.

Third author [Dr.Aravind Kumar S] participated in the study and revised the manuscript.

All the three authors have discussed the results and contributed to the final manuscript.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interests.

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