
Prevalence of various removable functional appliances - an institutional set up

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Abstract: Orthodontic treatment is aimed at improving facial and dental appearances as well as enhancing the relationships of the teeth and skeletal bases to each other. The goal of early treatment is to correct existing or developing skeletal, dentoalveolar and muscular imbalances. Class II malocclusion is one of the most common orthodontic problems. There are a number of modalities available for managing Class II malocclusions. Some of the more common options include extraoral traction appliances, arch expansion appliances, extraction procedures, functional jaw orthopaedic appliances and orthognathic surgery. The most commonly used removable functional appliances are activator, frankel and twin block. The Aim of the study is to find out the prevalence of various removable functional appliances used in SDC. A University-based study was conducted among 32 patients with removable functional appliances in the age group of 5 to 40 years from June 2019 to March 2020. Data collection was done by reviewing the patient records and analysing the data of 32 patients, the Variables collected included the age, gender and the type of removable functional appliance used. The data was entered into Excel tabulation was done, statistical analysis was done using SPSS and Pearson chi-square test. Total 32 patients undergoing removable functional therapy were chosen out of which 14 were females and 18 were males. Twin block was found to be the most prevalent appliance with 62.5% followed by activator (15.63%), frankel (9.38%) and other appliances were 12.5%. Within the limits of this Study, it was concluded that the twin block is the most commonly used removable functional appliance.

Keywords: Removable functional appliances; Twin block; Activator; Frankel.

INTRODUCTION

Orthodontic treatment is aimed at improving facial and dental appearances as well as enhancing the relationships of the teeth and skeletal bases to each other. As orthodontic treatment is becoming more accessible, parents and caregivers are requesting attention for their children at an earlier age. The goal of early treatment is to correct existing or developing skeletal, dentoalveolar and muscular imbalances (1).

The mandibular condyles, including their cartilage, have a primary role in the development and growth of the oro-facial complex. In this regard, a deficient growth of the condyles may result in mandibular retrognathia, also referred as skeletal Class II malocclusion (2,3).

Class II malocclusion is one of the most common orthodontic problems and it occurs in about one-third of the population. According to the biological evidence, an orthopaedic approach to treat skeletal Class II malocclusion in growing subjects is based on forward positioning of the mandible (4). For this purpose, several removable or fixed appliances have been developed (5). However, reviews reported very limited partial or relevant effectiveness of such treatment in terms of additional mandibular growth (6), i.e. correction of skeletal Class II malocclusion (7,8). The reason for this apparently inconsistent evidence might reside in the different interventions performed (9,10) in the large variation in individual responsiveness to functional treatment or in the timing, i.e. pre-pubertal or pubertal growth phase (11,12), during which treatment is performed. Indeed, growth does not occur at a constant rate and children of the same chronological age might not have equivalent skeletal maturity or growth potential (13,14).

There are a number of modalities available for managing Class II malocclusions. Some of the more common options include extraoral traction appliances, arch expansion appliances, extraction procedures, functional jaw

orthopaedic appliances and orthognathic surgery. The treatment approach adopted will depend on the growth status of the patient (15). Forces applied at an angle of 5° to 16° to the occlusal plane produces force components within the physiologic limit (16,17). Treatments that have the ability to alter a patient's facial growth exert their effect, either accelerating or limiting, on the skeletal structures of the craniofacial region. These functional appliances were developed to correct the aberrant muscle environment - the jaw-to-jaw relationship - and as a result restore facial balance by improving function (1,18,19).

Functional appliances have been used for the treatment of Class II Division 1 malocclusion for more than a hundred years (20). These appliances are used to correct the abnormal functions responsible for the abnormal growth and development of the underlying hard tissues. Redirecting the neuromuscular activity of the oral cavity to normal limits is the major goal of applying this method of the treatment (21,22). In case of mandibular retrognathism, positioning the mandible forward is believed to enhance its growth. The various removable functional appliances used are twin block, activator, frankel etc. Twin block is one of the most commonly used appliance (23). It can be used for the treatment of sleep apnea as it can improve the facial profile (24).

Our team has rich experience in research and we have collaborated with numerous authors over various topics in the past decade (25-48) The aim of the study was to find out the prevalence of various removable functional appliances used in an institutional set up.

MATERIALS AND METHODS

A University-based study was conducted among 32 patients with removable functional appliances from June 2019 to March 2020 where two people are involved (1 guide and 1 Student). Data retrieval is easier because of similar ethnicity and specific time period. The disadvantage is that it covers only a specific population. Bias was avoided by including all the data available. The Confounding factors were eliminated.

The study was conducted with the approval of the Institutional Ethics Committee [SDC/SIHEC/2020/DIASDATA/0619-0320]. Data collection was done by reviewing the patient records and analysing the data of 32 patients from June 2019 to March 2020, excel tabulation, statistical analysis was done using spss and Pearson chi-square test was performed. The data was exported to SPSS windows version 20 (IBM) for data checking. Data was sorted and then represented in frequencies. Calculating frequencies and sorting. Descriptive results were presented using graphs.

Inclusion criteria includes patients Class II malocclusion of any age or gender, Intervention - Orthodontic treatment with removable functional appliances.

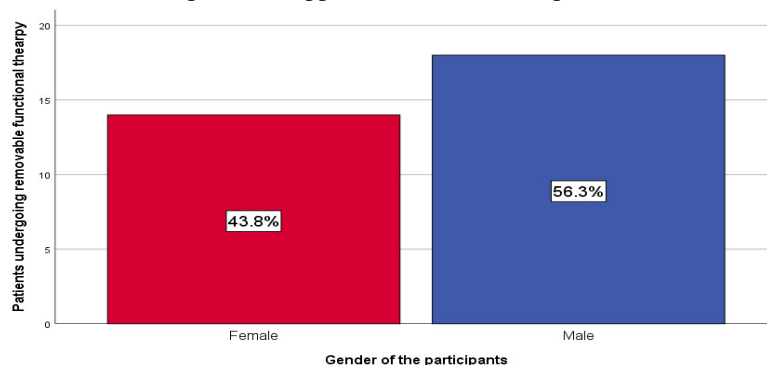
Exclusion criteria includes Patients with craniofacial syndromes and/or cleft lip palate, Patients with temporomandibular joint disorders .

RESULTS AND DISCUSSION

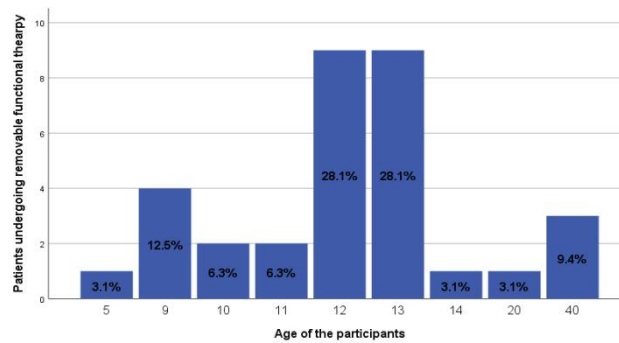
Total 32 patients undergoing removable functional therapy were chosen out of which 14 (43.8%) females and 18 (56.3%) males as seen in Graph 1

The mean age of the patients is 14 years. Patients were in the age group of 5 to 40 years. Most number of patients with removable functional appliances were seen in the age group of 13 and 14 as seen in Graph 2. Association of age of the participants and various removable functional appliances. Twin block appliance was most commonly used in the age group 12 and 13 as seen in the Graph 3.

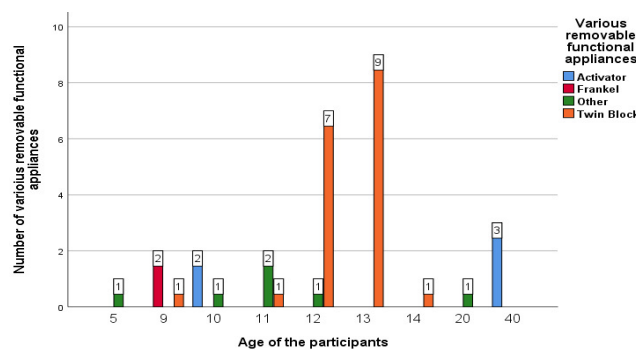
The association of various removable functional appliances and patients undergoing functional therapy is as follows Activator 15.63%, Frankel appliance 9.38%, Twin block was 62.5% and others appliances were 12.5%. Twin block was found to be the most prevalent appliance as seen in Graph 4.



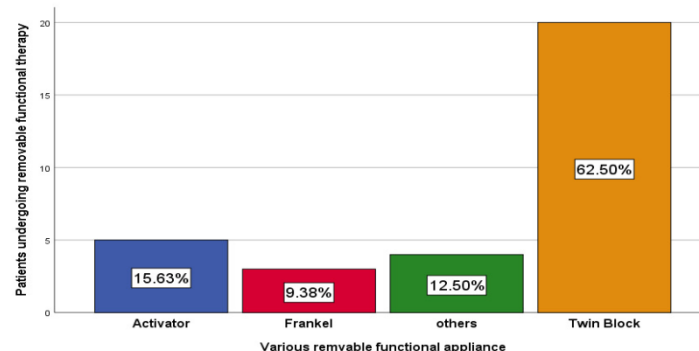
Graph 1: Bar graph shows the distribution of gender and patients undergoing removable functional therapy. The X axis represents the gender of the participants and the Y axis represents the patients undergoing removable functional therapy. Highest frequency was seen in male participants (56.3%).



Graph 2: Bar graph showing the distribution of age of the participants and patients undergoing removable functional therapy. The X axis represents the age of the participants and the Y axis represents the patients undergoing removable functional therapy. Highest frequency was seen in the age group of 12 and 13 years (28.1%).



Graph 3: This graph shows association between the Number of various removable functional appliances and age of the participants. The X axis represents the age of the participants and the Y axis represents the number of various removable functional appliances. Twin block appliance was most prevalent in the age group 13 (9) and 12 (7) when compared with other age groups. Pearson chi-square was done $P = 0.000$ for age and the various removable functional appliances (<0.05 - indicating statistically significant).



Graph 4: This graph shows association between the Various removable functional appliances and patients undergoing removable functional therapy. The X axis represents the various removable functional appliances used and the Y axis represents the patients undergoing removable functional therapy. Twin block appliance was the most prevalent removable functional appliance with 62.50%. Pearson chi-square test was done $P = 0.023$ for various removable appliances and patients undergoing removable functional therapy (<0.05 - indicating statistically significant).

Treatment with functional appliances has several well-established advantages. Functional appliance treatment reduces the overjet, improvement in patient’s profile, and taking care of jaw discrepancies. The main reason for using functional removable appliances is to establish muscular balance, eliminate oral dysfunction, and allow a proper length of both the maxilla and the mandible (49).

Our institution is passionate about high quality evidence based research and has excelled in various fields ((30,50–55)The success of retention with removable appliances mainly depends on patient compliance (56). The

selection of functional appliances is dependent upon several factors which can be categorized into the patient factors, for example, age and compliance, and clinical factors. According descriptive analysis Twin block is the most commonly used removable functional appliance.

The most commonly used removable functional appliances in orthodontics are Twin block, activator, frankel and modifications of the frankel appliances.

Twin block has separate upper and lower appliances with occlusal bite blocks, so the appliance gives greater freedom of movement in anterior and lateral excursions and causes less interference in normal function. The patient can eat comfortably with the appliances in mouth, and the patient can learn to speak normally with twin blocks. Twin blocks can be designed with no visible anterior wires without losing its efficiency in correction of arch relationships. They may be fixed to teeth temporarily or permanently to guarantee patient compliance. Adjustment and activation is simple and chairside time is reduced in achieving major correction. Therefore, the twin-block appliances due to its acceptability, adaptability, versatility, efficiency, and ease of incremental mandibular advancement without changing the appliance, it has become one of the most widely used functional appliances in correction of class II malocclusion (57,58).

Activator is an appliance used to position the mandible forward in severe mandibular retrognathism. It induces musculoskeletal adaptation by introducing a new pattern of mandibular closure (59,60). It also inhibits the horizontal growth of the maxilla (61) and results in increased growth of the mandible therefore it helps in positioning the mandible forward. Overjet reduction occurs mainly due to dentoalveolar changes that are retroclination of maxillary incisors and proclination of mandibular incisors (62,63).

Among contemporary functional appliances, one of the most popular and well characterized is the FR II of Frankel The main concept of this appliance is positioning the mandible forward plus the oral screen. By reducing the size of the oral screen, Frankel designed the appliance to be worn full time. It differs from other functional appliances by protruding the mandible, ideally without contacting any mandibular teeth, and by causing an increase in both apical bases and maxillary and mandibular arch widths. Frankel stimulates the mandibular growth by acting as bite guides to cause some of the muscles of mastication to move the mandible into a protrusive position (64).

In this study there was no significant difference between the gender of the participants and the use of removable functional appliances, these results were in accordance with the study conducted by Rizell, Sara, et al (65).

In this study we found that twin block is the most commonly used appliance, Similar findings were seen in Sergl, Hans Georg, and Andrej Zentner et al. where the twin block was the most commonly used removable functional appliance (66).

The most common age group in which the removable functional appliances were given are in the age group of 8 - 13 years ,similar findings were observed in the study conducted by O'Brian et al. where he found that the average age of the patients was 12 years and the age group included 8 -14 years (67,68).

Removable functional appliances are mostly used during the early and late mixed dentition period at the ages of 8–13 years depending on the child's development as seen in this study. However, the use of 'functional' appliances have recently been used for older patients. Activator can be used successfully in aged patients (nongrowing individuals) if the functional or manual guided position of mandible is comfortable or tolerable for the patients (69).Therefore, the possible effects of the relatively wide age range were ignored in order to make a realistic comparison. Overall Consensus – Agree as the Twin block is the most commonly used appliance when compared to other appliances.

Another study concluded that functional appliances may be considered only in specified cases as an adjunct in treatment of patients having craniofacial anomalies which are risk factors for apnea (67,68)(70).

The Limitations of this study are Less number of cases,Specific population was covered ,Time period is not known for all the cases

Future scope

Larger population should be covered and other functional appliances can be used

CONCLUSION

Within the limits of this study, it is concluded that the twin block is the most commonly used removable functional appliance as it gives freedom of movement and causes less interference in normal function.

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