

## Prevalence of 2/4 Appliances Therapy in 6 to 12 Year Old Children Visiting a University Dental Hospital

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### ABSTRACT

**Introduction:** One of the appliances which can intercept the prevalence of more serious malocclusions in the future is the 2 x 4 appliances. This appliance offers many advantages over alternative techniques as it provides complete control of anterior tooth position, is extremely well tolerated, requires no adjustment by the patient and allows accurate and rapid positioning of the teeth.

**Materials and methods:** A sample of 4,812 of age 6 - 12 years visiting the hospital were taken. We reviewed patient records, analysed data of 4,812 patients between June 2019 to March 2021 and clinical findings are recorded. The data is then tabulated in Microsoft excel. Chi square test is used for comparison of groups. The data is analysed with the help of SPSS software.

**Results and discussion:** In this study we observed that 14% of the total patients showed usage of 2/4 appliances.

**Conclusion:** Thus, Prevalence of 2/4 appliances observed to be 1% low in age groups between 6-12 years children.

**Key words:** Dental hospital, Maxillary incisors, Crossbites, Chi square tests

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### INTRODUCTION

One of the appliances which can intercept the prevalence of more serious malocclusions in the future is the 2 x 4 appliances [1,2]. The 2 x 4 appliance comprises bonds on the maxillary incisors, bands on the first permanent maxillary molars and a continuous archwires [3]. The appliance is used in the early mixed dentition for treatment of both anterior cross bites and alignment of ectopic incisors [4]. This appliance offers many advantages over alternative techniques as it provides complete control of anterior tooth position, is extremely well tolerated, requires no adjustment by the patient and allows accurate and rapid positioning of the teeth [5]. A mixed dentition treatment can efficiently and effectively be provided using a 2 X 4 appliance [6].

The versatility of this appliance permits it to resolve various problems affecting the upper incisors in a simple manner and in a relatively short period (about 6 months)

[7,8]. It can be used for rapid correction of cross bites in the anterior sector; to reduce over jet and to align ectopic incisors [9]. A 2 X 4 sectional fixed appliance offers more effective and efficient tooth positioning as it allows three-dimensional control of the involved teeth during correction of anterior cross bites or aligning ectopic incisors [10]. This appliance not only quickly restores anterior aesthetics but it may also reduce the complexity and duration of any subsequent treatment [11]. It can be used for rapid correction of cross bites in the anterior sector; to reduce over jet and to align ectopic incisors [12-14].

Rotations, diastema and incorrect tooth inclinations and angulations may therefore be treated very quickly using this versatile appliance [15]. A quad helix can be soldered to molar bands or palatal sheaths to provide a simultaneous correction of a posterior cross bite if required [16]. The 2 x 4 can be combined with a rapid palatal expander (RPE) too. Proper oral hygiene is crucial [17]. Early dentitions were treated with 2/4 appliance [18]. The moment of a couple creates inherent equal and opposite Newtonian equilibrium forces not readily sensed clinically [19-21]. Moments at successive brackets, producing rotations in opposite directions, create equilibrium forces also in opposite directions which are subtractive from each other [22-25]. When these equilibrium forces are equal and opposite, they

cancel each other out. If the moments produce rotations in the same direction, the equilibrium forces are also in the same direction and are additive [26–30]. The apparent simplicity of the 2×4 appliance conceals the fact that it is a powerful orthodontic tool that uses engineering mechanics in a way not possible with fully bracketed appliances [31–33]. Clearly the application of engineering mechanics is a distinguishing characteristic of modern orthodontics [11,34–36]. While most general dentists (45.90%) use the 2 x 4 in association with appliances for space management, most orthodontists (46.15%) applied the 2×4 in combination with both appliances for space management [26,37,38].

**MATERIALS AND METHOD**

This retrospective study examined the records of patients from 01 June 2019 to 31st march 2020 who visited a reputed institution, Chennai. Ethical approval was taken from the institutional review board/ SDC/ SIHEC/DIASDATA/0619-0320. The study population included patients with age ranging between 6-12 years. The study sample included both male and female gender, predominantly south Indians. The study population was 4812 pediatric patients who visited university hospitals. Sample size was 14 pediatric patients in which 14 patients in the hospital database were treated with 2/4 appliances.. The necessary data such as age, gender, type of cross bite, molar relation was recorded. Incomplete patient records were excluded. Data was recorded in Microsoft Excel and exported to the statistical package of social science for windows (SPSS) and subjected to statistical analysis. Chi square tests are used for comparison of groups.

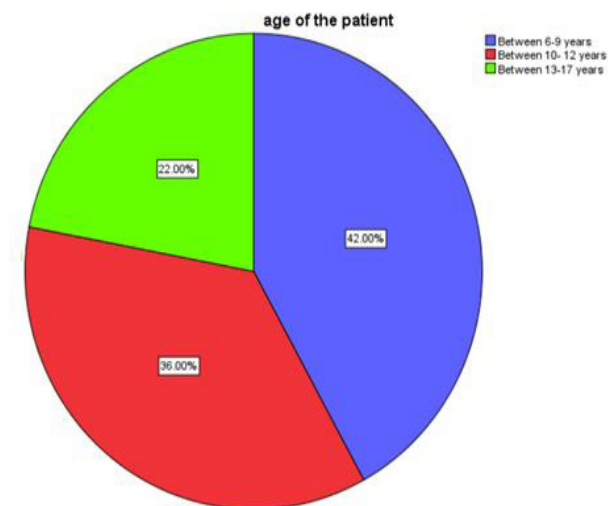


Figure 1: Pie chart showing Age distribution among the children. There were about 4812, pedo patients between the age group of 6 to 12 years. These pedo patients were grouped into three different Categories based on their age. Between 6-9 years, between 11–12 years and between 30 to 17 years are the different age groups. From figure 1, we can see that 42% of them were between 6-9 years of age, 36% of them were between 10-12 years of age and 22% of them were between the age group of 13-17 years.

**RESULTS**

Results are represented in Figures (Figures 1 to Figure 6).

**DISCUSSION**

Related article by Sharmin et al. [39] said that sectional 2/4 fixed appliances offer an effective and efficient tooth positioning. As it allows three dimensional controls of the involved teeth during correction of misaligned anterior teeth which can be treated very quickly using such a versatile technique. In the study by Hagg et al. [40] and Reyes, et al. [41] 27 patients with pseudo-Class III were treated with the 2 x 4. After 5 years, 25 patients were examined, 20 of them did not need a second phase of treatment.

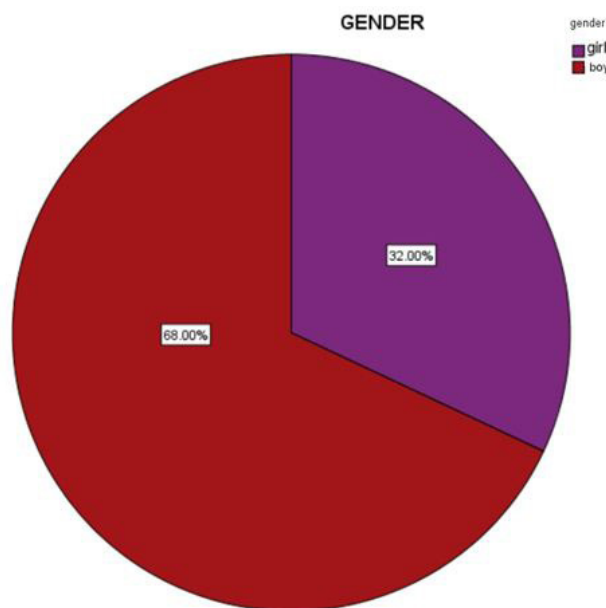


Figure 2: Pie chart showing the gender wise distribution among children. Red colour indicates boy and purple colour denotes girl. 68% of them were boys and 32% of them were girls.

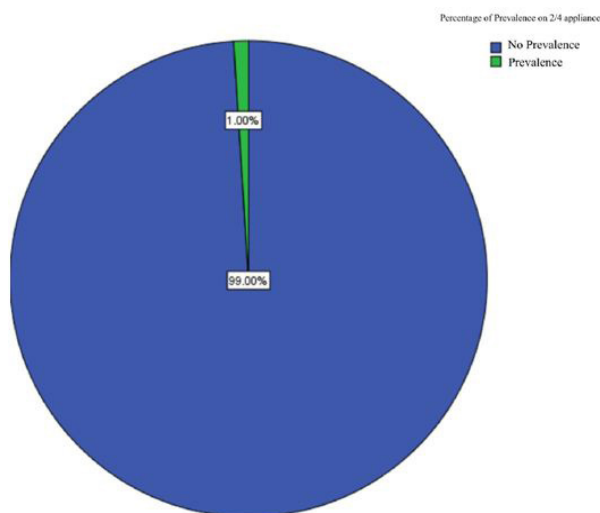


Figure 3: It represents the percentage of prevalence on 2/4 appliances among children of 6 to 12 years. Blue colour indicates no prevalence and Green colour indicates prevalence. Among 4812, of the total population, shows only 1% (14 children) prevalence on 2/4 appliances.

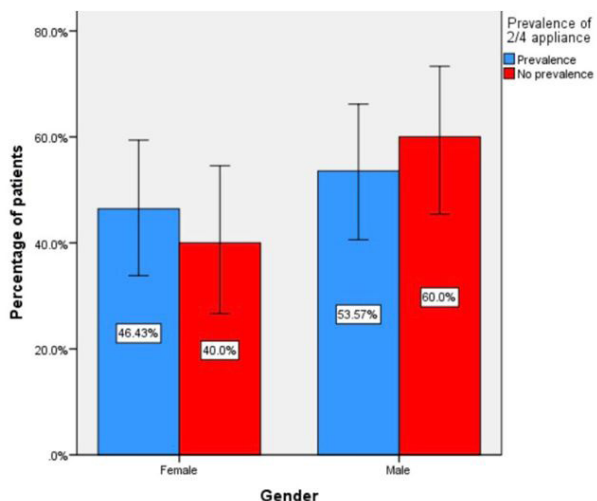


Figure 4: Bar graph depicts the percentage of gender wise distribution of pedo patients who underwent 2/4 appliance. Here the X axis represents the gender and the Y axis represents the percentage of patients. The Red colour bar indicates the pedo patients who are with prevalence. Blue colour bar represents the Pedo patients who were not with prevalence. Out of 4,812 children who visited university dental hospital, girl patients with prevalence 2/4 appliance. Were about 15.84% and without prevalence on 2/4 appliances. was about 27.72%. Among, male population with prevalence were about 15.84% and without prevalence was about 40.59%.

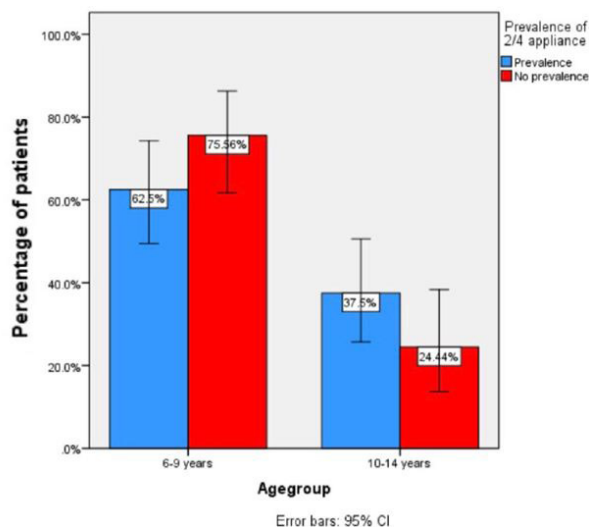


Figure 5: Bar graph depicts the age wise distribution of the total population. The X axis represents the age group distribution and Y axis represents the percentage of patients in each age group. The Red colour bar indicates the pedo patients who are with prevalence about 2/4 appliance. Blue colour bar represents the Pedo patients who were not with prevalence on 2/4 appliances. So, from the bar chart it's seen that, between the age group 6-9 years, there were about 20.79% of the children who underwent 2/4 appliances, and between 10-12 years of age group it was 10.89%.

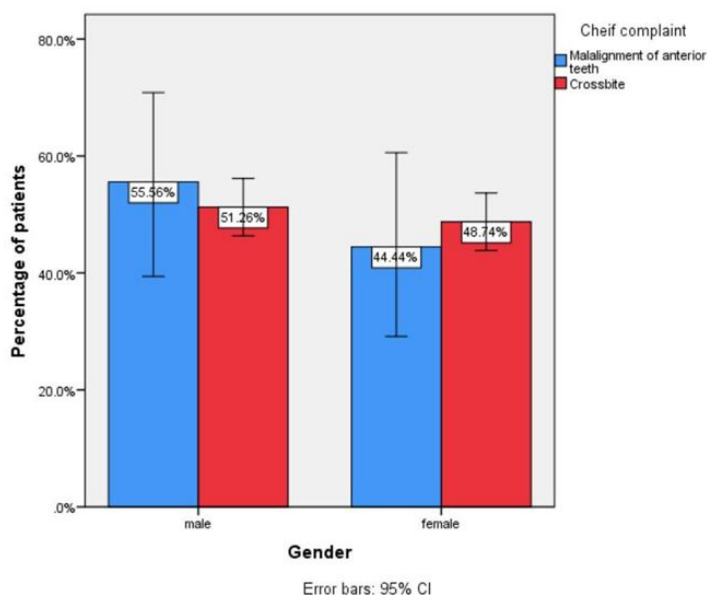


Figure 6: Bar graph depicts the gender wise distribution of pedo patients with different chief complaints. X axis represents the gender wise distribution of pedo patients who underwent 2/4 appliance and Y axis represents the percentage of patients with different chief complaints. Here, the Blue colour bar indicates the Malalignment of anterior teeth as chief complaint and the Green colour bar indicates the Cross bite as the chief complaint. From the graph it shows that Male population was 43.75% with chief complaints of Malalignment of anterior teeth and Least 6.25% with cross bite as chief complaint. Female population was highest at 37.50% with cross bite as the chief complaint and at least 12.50% with Malalignment of anterior teeth as chief complaint.

In another study by Gu et al. [42]. 17 consecutive patients (mean age 9.7 years) with pseudo-Class III malocclusion were treated with a simple fixed appliance, whereas 20 patients [mean age, 8.5 years] with skeletal Class III and anterior crossbite were treated with reverse headgear. Lateral Cephalometric radiographs taken at the beginning of treatment, end of the treatment, and 1 year after the active treatment, were analysed by modified

Pancherz analysis. After active treatment the over jet correction was achieved using the 2 X 4 and reverse headgear. The over jet correction provided by the 2 x 4 appliance was due to dental changes only. These related studies prove that 2/4 appliances are very effective.

**CONCLUSION**

Within the limits of the study, it is concluded that there

is low (1%) prevalence of 2/4 appliance among pediatric patients between age group 6- 12 years of age. The study shows that among 4,812 total populations only 14 of them underwent 2/4 appliances. This study is statistically significant.

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