



## Prevalence of Gropers Appliance in Pediatric Dentistry

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### ABSTRACT



Space maintainers are used to minimise undesirable drifting of teeth in the dental arch. Using space maintenance after the loss of primary teeth restricts the creation of spaces. Space maintainers also prevent the development of malocclusion due to space. The primary teeth loss can lead to different dental malocclusions like midline shifts, space loss and also crowding of teeth. Gropers appliance is a space maintainer used for children who have lost their primary anterior due to accident or caries. Gropers appliance is a fixed partial denture used for aesthetic purposes. This is used to restore mastication and speech to prevent abnormal oral habit development and also for aesthetics. The aim of the study is to find the prevalence of Gropers appliance in Pediatric Dentistry. This was a retrospective study done under a University setting. All the patients' records were collected from June 2019 to March 2020 and were reviewed. The data included patients who required space maintainers. The data was tabulated and entered in excel and the data were analysed using SPSS package software.  $p < 0.05$  was considered to be the level of statistical significance in the study. The prevalence of Gropers appliance in Pediatric Dentistry was found to be 39.6%. There was a male prevalence of 55.6% in receiving a Gropers appliance. The common age who received it was 3 years old. Within the limitation of current study, the prevalence of Gropers appliance was 39.6% with the common age of children being 3 yrs.

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### INTRODUCTION

There are several appliances which can be used as space maintainers. This depends upon the dental development, which dental arch requires, which

primary teeth are missing and for which teeth it is required (Mcdonald *et al.*, 1987). A proper understanding of the growth and the development of the dental arches of a child is necessary for the proper selection of space maintainer. To determine which space maintainer is to be used there can be several factors. One of the key factors is occlusion (Foster, 1990). The patient's cooperation and tolerance to the removable appliance can also be a major factor in considering a space maintainer.

Premature loss of primary teeth can cause undesirable drifting and can create space in unwanted regions of the arch or can cause loss of space in the arch. But the insertion of space maintainers immediately after the loss of primary teeth can limit the spaces and can prevent the development of malocclusion due to space. To reduce the unavoidable

tooth movement after the loss of the teeth, we use a space maintainer (Potgieter, 2018). Maintenance of space, prevention of over-eruption of antagonist teeth, restoration of function, allowance for maxillary growth, maintenance of hygiene, durability and low costs, are the requirements of a space maintainer.

Premature loss of the primary teeth can lead to various dental malocclusions like midline shifts, space loss and there can also be crowding of the teeth. The factors associated with anterior tooth loss include tipping of adjacent teeth, over-eruption of antagonist's teeth, midline deviation, masticatory impairment, speech problems and lingual dysfunction. To counteract and to restrain these malocclusions effects, we use space maintainers.

Primary teeth acts as a natural space maintainer and it guides the eruption of permanent teeth into their optimal position (Nair et al., 2018; Panchal et al., 2019). In pediatric dentistry, loss of teeth due to necrosis leads to space loss (Jeevanandan, 2017). Early loss of primary molars is a serious issue of concern in pedodontics (Govindaraju et al., 2017a; Jeevanandan and Govindaraju, 2018). Sometimes a decrease in fluoride concentration leads to increased risk of caries (Somasundaram, 2015). Dental plaque accumulation can be another cause for dental caries (Govindaraju, 2017). Pulpectomy can be done to avoid extraction to maintain the integrity of the primary teeth (Govindaraju et al., 2017b). The main goal of root canal therapy is to remove the infected pulp tissue (Govindaraju et al., 2017c).

Deciduous teeth are very inappropriately referred to as "temporary teeth" when in reality, they are responsible for mastication, phonetics, general health, esthetics and self-esteem, psychological comfort, etc. Premature loss of primary teeth affects a child's nutrition, sleep, growth, and self-confidence. Several considerations have to be given regarding the speech problems, masticatory inefficiency, abnormal oral habits, a unesthetic appearance, which follow the loss of anterior teeth at an early age.

Gropers appliance is a space maintainer used for children who have lost their primary anterior due to accident or caries. Gropers appliance is a fixed partial denture used for aesthetic purposes. This is used to restore mastication and speech to prevent abnormal oral habit development and also for aesthetics. Absence of anterior maxillary teeth, the lingual sides of which are needed by the tongue for certain phonations, may result in improper speech. It usually affects sounds such as 's', 'z' and 'th'. Aes-

thetic rehabilitation of the primary dentition had a psychological impact on the recovery of the child's self esteem. The aim of the present study is to find the prevalence of Gropers appliance among pediatric dentistry.

## MATERIALS AND METHODS

### Study Setting

This present study was conducted as a retrospective cross-sectional study with consecutive non-probability sampling among the patients visiting a private dental institute, Chennai, Tamil Nadu. The study setting was a University setting. The present study was ethically approved by the Institutional Ethical Committee (ethical approval number: SDC/SIHEC/2020/DIASDATA/0619-0320). The patients included in this study had visited the Department of Pediatric and Preventive dentistry and had a requirement of space maintainers. The study was done from June 2019 to March 2020. The study sample included both male and female genders but was mostly south Indian population due to geographic limitations.

### Data Collection

The data collected from the patients were demographic data (Age, Sex, Marital Status, Occupation, Address.). Then clinical examination was done both intraoral and extraoral. The total number of patient's case sheets reviewed in the present study was 5000 case sheets from June 2019 to March 2020. The inclusion criteria for the study were patients who had received space maintainers and also case sheets which were filled. The exclusion criteria for the study were patients who underwent any treatment other than space maintainer and case sheets which were blank. Sampling bias was done to minimize by simple random sampling. The final total sample size of the data was 91 patients. Any gross data which had the possibility of bias and could affect the studies were not included. All the data collected were cross-verified by photographic and radiographic examination.

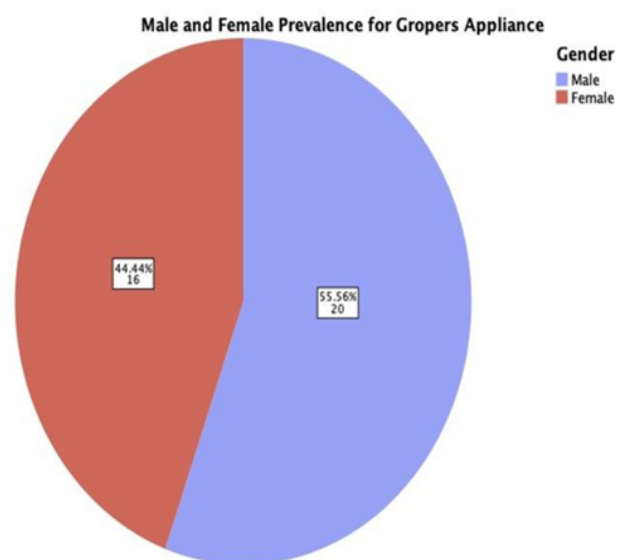
### Data Analytics

Data were entered into a spreadsheet using Excel version 16.37 (Microsoft Corp, Redmond, Wash). The data tabulation in excel was, according to S.no, PID, Age, Gender, Gropers Appliance. The data which was collected was analysed using Statistical Package for Social sciences (SPSS) software, version 1.0.0.1347 64 bit (IBM corp., NY, USA). The data were assessed by being subjected to descriptive analysis with the help of frequencies, percentages, means. The data was represented by means

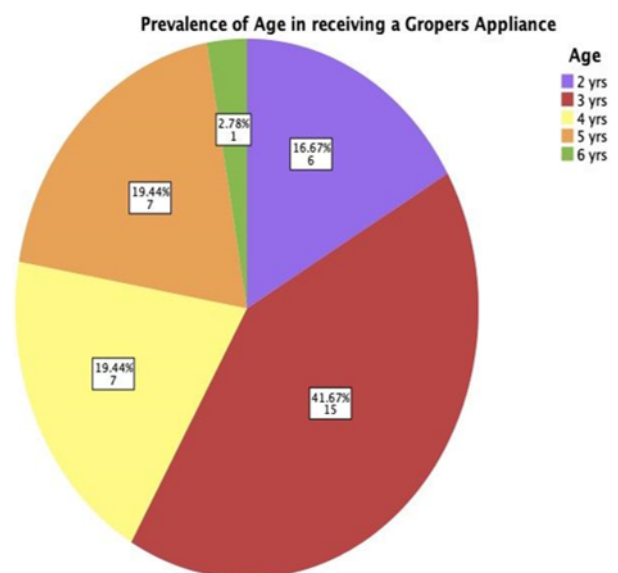
of bar graphs. Non-parametric chi square test was used and results were correlated and associated.

In this present study, the significance level was pre-determined at the probability value of 5% or less.  $p < 0.05$  was considered to be as the level of statistical significance.

**RESULTS AND DISCUSSION**



**Figure 1: Pie chart showing the gender distribution among the patients**



**Figure 2: Pie chart showing the age distribution among the patients**

The study evaluated the patients who had undergone space maintainer treatment. The total number of patients included in the study were 91 patients. All the patients had visited the department of pediatric and preventive dentistry. The patients required the placement of space maintainers due to

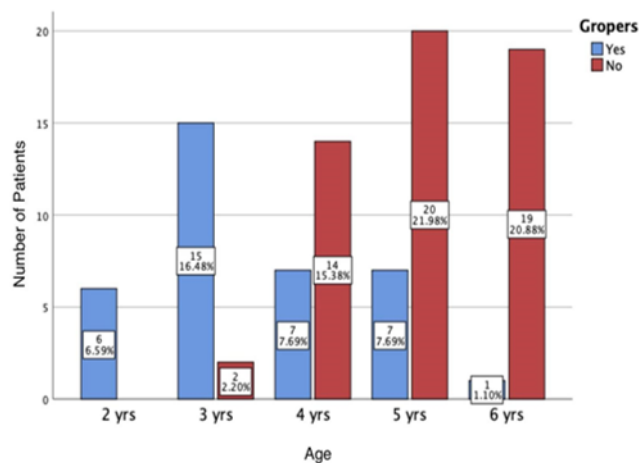
loss of primary teeth. Among the study sample, the number of male children patients were 56 patients out of the total 91 and female children patients were 35 out of 91 patients. The age distribution was 6 patients of 2 years, 17 patients of the age 3 years, 21 patients of the age 4, 27 patients of 5 years and 20 patients of 6 years. The age range of the study was 2 years to 6 years old.

In this study, there was a male prevalence among children of 55.6% while female children had gropers appliances of 44.4%,  $p < 0.05$  (Figure 1). Pie chart showing the gender distribution among the patients who received Gropers appliance across the scale of the patient count. There is a significant higher incidence of male patients requiring Gropers appliance (Chi square test,  $p = 0.028$ ).

The prevalence of gropers appliance in 2 years old was 16.7%, 3 years old was 41.7%, 4 years old was 19.4%, 5 years old was 19.4% and 6 years old was 2.8%,  $p < 0.05$  (Figure 2). Pie chart showing the age distribution among the patients who received Gropers appliance across the scale of the patient count. There is a significant higher incidence of 3 years old patients requiring Gropers appliance (Chi square test,  $p = 0.011$ ).

Prevalence of gropers appliance among all the space maintainers given was 39.6%,  $p < 0.05$  (Figure 3). Bar graph showing the age distribution of Gropers appliance delivered among other space maintainers used. There is a significant higher incidence of Gropers appliance used in 3 years old patients (Chi square test,  $p = 0.046$ ).

Early childhood caries (ECC) is a relatively new term that encompasses all dental caries occurring in the primary dentition of young children from birth to 71 months of age. Early childhood caries is defined by American Academy of Pediatric Dentistry as the presence of one or more decayed, missing teeth due to caries, or any filled tooth surface in the primary tooth of a child 71 months of age or less (Subramanyam et al., 2018). It is one of the rising prevalent chronic diseases that can affect different aspects of life (Ramakrishnan and Shukri, 2018). Early childhood caries, known previously as baby bottle caries, nursing bottle caries, baby bottle tooth decay, or nursing decay, is a relatively new term that describes rampant dental caries in infants and toddlers (Tinanoff and Sullivan, 1997). In case of severe loss of coronal tooth structure as seen in severe early childhood caries or an early loss of primary teeth Gropers appliance was used to restore the aesthetics (Gurunathan and Shanmugaavel, 2016). The original Gropers appliance introduced by Jasmin and Groper in 1984 consists of



**Figure 3: Bar graph showing the age distribution of Gropers appliance delivered among other space maintainers used.**

acrylic teeth attached to metal clefts which were soldered onto the palatal wire. Due to the strenuous laboratory procedures, the appliance was modified, incorporating preformed acrylic teeth and buccal acrylic flange (Khare et al., 2013). The limitations of this appliance include larger tooth size, gingival inflammation associated with the buccal acrylic flange, occlusal disturbances and secondary caries due to cement loss in the primary molars.

Groper's appliance is used 36 out of 91 times. Prevalence of Groper's appliance among all the space maintainers delivered was 39.6%. The common age group for the Groper Appliance was 3 years. The mean age for receiving space maintainers was  $4.42 \pm 1.21$  years. The average age for receiving a Groper's appliance was found to be  $3.5 \pm 1.08$  years. The prevalence of Groper's appliance in 2 years old was 16.7%, 3 years old was 41.7%, 4 years old was 19.4%, 5 years old was 19.4% and 6 years old was 2.8%. The age range of the study was 2 years to 6 years. The reason for this could be due to the first dental visit, which is most often due to pain. Sometimes dental neglect due to parents persistent failure to take precautions can also be the cause (Gurunathan and Shanmugaavel, 2016).

There was a slight male predilection to the Groper's appliance (20 out of 36) that is 55.6%, and female prevalence was 44.4%. This could be due to increased cariogenic diet. Also, one of the reasons could be reduced oral hygiene maintenance among them. This can lead to frequent extraction. There is an increased tendency for dental trauma among males in society. Traumatic injuries are common in preschoolers since this is the age when the child indulges in various physical activities.

Moreover, there is a lack of motor coordination at his

age. Trauma in primary dentition is common in 2 to 4 years of age (Ravikumar et al., 2017). Esthetics can be a concern among many parents and children in the current scenario.

In children going to preschool, early childhood caries can be one of the reasons for the destruction of the teeth. It can have significant social and economic consequences beyond the immediate family as well. In childhood caries, it has an effect on the child's quality of life and in school. One of the pediatric dentist's greatest restorative challenges is the esthetic rehabilitation of a young toddler who has suffered multiple tooth loss subsequent to rampant early childhood caries (EEC) or extensive dental trauma. Parental desire is the main motivation for the placement of anterior appliances in the case of children. As the parental desire towards aesthetics is gaining more importance, there is a need for an anterior aesthetic appliance which may be used to replace these lost teeth. The labial frenum is a structure which is varying in size, shape and position (Christabel, 2015). Ranula develops due to trauma or obstruction to the salivary gland duct (Packiri et al., 2017).

The reason for Groper's appliance is due to aesthetics (Shanmugaavel, 2016), could be for speech difficulties as stated by Riekman. Some evidence states that space maintainers are not required for the loss of upper anterior teeth after the eruption of the canine. But Kapur et al. reported that aesthetic rehabilitation of primary dentition had a psychological impact on the recovery of the child's self esteem.

This study will have a huge impact on the public by raising awareness by knowing the prevalence of Groper's appliances among all the age groups and different genders. This study helps in giving valu-

able information to oral health planners for proposing strategies to help in the development of dental health management. It will assist the clinician to prevent space and any malocclusion by using space maintainers like Gropers appliance and knowing how to treat them. The study was limited by a few factors. There were geographic limitations to the study which had more South Indian population and this study was a cross sectional and uncentered study. The sample size and duration of the study can be expanded for better results. For the further scope of the study, larger sample size and inclusion of different ethnicity will give better results.

## CONCLUSION

Within the limitation of current study, the prevalence of Gropers Appliance was found to be 39.6% with the common age of Gropers appliance being used for 3 years old. There was a male predilection among the prevalence of Gropers appliances.

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## Conflict of Interest

The authors declare that they have no conflict of interest for this study.

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