

Comparison of the Prevalence of Space Maintainers among Different Age Groups and Genders in Children

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Abstract

The space maintainers are mainly the devices that have been specially designed to maintain a space or to create an additional space that was lost due to the premature loss of the primitive teeth. They are mainly available in the various types with different types of indications. The main reasons for the premature loss of the teeth has been indicated for the extraction due to the dental caries or trauma or any type of genetic disorders. The main aim of this study is to estimate the most common type of the space maintainer that has been used among the different age and gender groups. All the patients are being considered in the study with the age group of 3-12 years, they must mainly have clinically missing teeth. The results are obtained and tabulated for the statistical analysis, both descriptive and inferential test which is done by using SPSS version 23. From the above study the results are obtained as, the age distribution of this particular study is mainly about the age groups 1-5 years (48%) and 6-12 years (52%), the gender distribution of this study is males (62%) and females (38%). The most common type of the space maintainer used is the Band and loop space maintainer. Within the limits of this particular study the most common type of the space maintainer indicated is the band and loop space maintainer for the age group of 6-12 years and has the higher gender predilection among the male children.

Keywords : Band and loop space maintainer, Dental caries, Malocclusion, Space management.

Introduction

The term Space maintainer was first coined by JC Brauer in 1941 and it is defined as a device used for maintaining a space in a given arch which has been previously occupied by a tooth or a group of teeth¹. These space maintainers do not play an important role

in the development of new teeth. The major function of the space maintainers is to guide the eruption of the upcoming permanent teeth in its appropriate space in order to prevent from the impaction, crowding or the supraeruption of the teeth². There are many types and the designs that have been developed for the available space maintainer after the loss of the primary dentition³. An ideal space maintainer should maintain the entire space, which is mesiodistally and labio lingually that has been created after the loss of the primitive teeth⁴. They should be simple in the construction of the adequate strength to withstand the functional forces that are developed from the mastication and to restore the function as much as possible. They have been broadly classified into based on their fixation pattern; fixed, semi-fixed or removable; based on their type of the construction with or without the loops, wires and the bands; based on their laterality as the unilateral or bilateral and based on their site as the maxillary or mandibular arches. There are mainly

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various considerations taken for the placement of the space maintainer. In case of the failure of placement of space maintainers in patients mainly lead towards the malocclusion⁵.

The main indication for the use of the space maintainer is in the case of the premature loss of the primary dentition when the concern exists as the regards of the proper development and alignment of the newly growing or erupting dentition. Initially the teeth with dental caries are subjected to endodontic treatment^{6 7 8} and when they have poor prognosis they have been subjected to the extraction of the teeth, which later on lead to the placement of the space maintainer. The various types of the space maintainers used are band and loop, lingual arch, Nance appliance, transpalatal arch, groper's appliance etc. Each type of the space maintainer has the specific indications with various advantages and disadvantages

The main reason for the premature loss of the teeth is mainly due to the indication for the extraction due to the dental caries which occurs mainly due to the consumption of a high level of sweet content diet⁹, improper brushing habits¹⁰, trauma¹¹ and even certain types of genetic disorders like the down syndrome etc. The education of the proper oral hygiene maintenance has to be given to the children this can be done by showing them a proper brushing technique, fluoride application twice in a year¹², regular dental visits¹³. The success rate of any particular treatment mainly depends on the quality of that particular treatment in case on a endodontic treatment the success rate depends over the obturation quality^{14,15} and the patient must not report back with any lesions or secondary caries¹⁶, likewise in case of the space maintainer it must helpful in guiding the eruption of the permanent teeth in the available space. The various complications of the space maintainer include the increased risk of the infections in some cases, plaque accumulation, local pain and the discomfort¹⁷, oral ranula¹⁸, improper frenal attachment¹⁹, interference with normal development and the alignment of the erupting succeeding teeth and the complications associated with appliances like breakage, loss or the displacement. There have been numerous pilot studies done to know about the different types of space maintainers. This research is mainly done to identify the prevalence of the space maintainer and its indication among the young patients,

so it will fulfill the needs for this procedure and the awareness among the patients²⁰. The main aim of this study is to estimate the most common type of the space maintainer that has been used among the different age and gender groups.

Materials and Methods

This retrospective study setting was mainly a university setting and a single centred study. The various advantages they had are large available data and similar ethnicity and the disadvantages of this particular study was mainly the geographical limitations and the isolated populations.

The data collection has been done from 89000 cases sheets that were reviewed and analyzed individually. The non-probability convenience sampling method has been used. The sample data were collected from June 2019 – March 2020. Ethical approval was obtained from institutional ethical committee (Ethical approval number: SDC/SIHEC/2020DIASDATA/0619-0320) The inclusion criteria for the study were mainly the patients undergoing extraction due to caries, patients between the age group of 3-12 years with no other lesions, medical history and systemic complications, children who received any type of space maintainer and complete available data were considered. The exclusion criteria for this study were patients above the age group of 12 and patients with medical complications, incomplete and censored data. The case sheet verification was done using the photographic method. To minimize sampling bias simple random sampling was done.

The collected data were subjected to statistical analysis using the SPSS software by IBM of version 23 in which both the descriptive and the inferential test has been done which was the Chi-square test.

Results & Discussion

From the above done study, the results were obtained and tabulated, among which the age distribution of children for the space maintainer treatment was 2-5 years (48%) and 6-12 years (52%) [Figure 1], the gender distribution of this study shows that from the involved children are males (62%) and the females (38%) [Figure 2] and the most used space maintainer for the children was mainly the band and loop space maintainer [Figure 3] which has been used for about 50% of the patients.

The correlation between the age group and the type of the space maintainer mainly shows that the age group of 6-12 years were more prevalent for the space maintainer placement with band and loop space maintainer as the most commonly used type. This was mainly statistically significant [$p < 0.05$][Figure 4]. The correlation between the gender and the type of the space maintainer shows that the males were more prevalent for the placement of space maintainers with band and loop as the most commonly used type. They were statistically non-significant [$p > 0.05$][Figure 5].

Early losses of the deciduous teeth have often been studied because of their relevance and association with the occlusal abnormality²¹, this mainly occurs due to the improper oral hygiene among the children, so that in the mixed phase space maintainers are used to maintain the space corresponding to the permanent successor teeth. The loss of the arch length resulting from this process can lead to the development of the severe malocclusions in the permanent dentition.

The age and gender distribution of the study of which age were mainly been grouped into two groups like 1-5 years and 6-12 years as they were the stages of the primary dentition and the mixed dentition respectively, so by which the study shows that the patients of the age group 6-12 years were more prevalent for the space maintainer placement this was similar to the findings seen in the previous studies²². The gender predilection shows that the males were more prevalent than the females for the space maintainer placement this was mainly due to the habit of frequent snacking which

increases the risk of the increased dental caries among the male children and so they are highly indicated for the extraction which was a type of premature loss of the teeth and this was similar to the results of the previous literature²³.

The most commonly used type of the space maintainer was the band and loop space maintainer this was similar to the previous literature²⁴ in which band and loop space maintainer was the most commonly indicated for the premature loss of the teeth, and this was mainly due to the various reasons like patients have mainly unilateral loss of the teeth²⁵ which has been more common and it mainly has the advantage of easy fabrication²⁶.

The correlation between the age and the type of the space maintainer shows that patients of the age group 6-12 years were more prevalent for the space maintainer placement with a positive correlation and this finding was mainly similar to various studies^{27,28}. The correlation between the gender and the type of the space maintainer shows that the males had the higher prevalence for the space maintainer placement and this finding was not statistically significant.

The possible limitations of this study was mainly a lesser sample size. The future scope is that they can be subjected to a multicentric study and mainly can be involved for the study of longevity of the space maintainer and to determine the proper indication for the space maintainer placement and if they are provided with a higher sample size and the various other ethnicities can provide a better results.

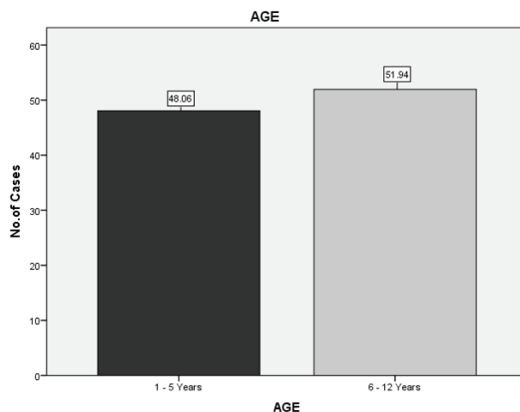


Figure 1 : Bar graph showing the age wise distribution of the children with the space maintainer treatment, in which 52% belongs to the 6-12 years age group and 48% belong to the 1-5 years age group.

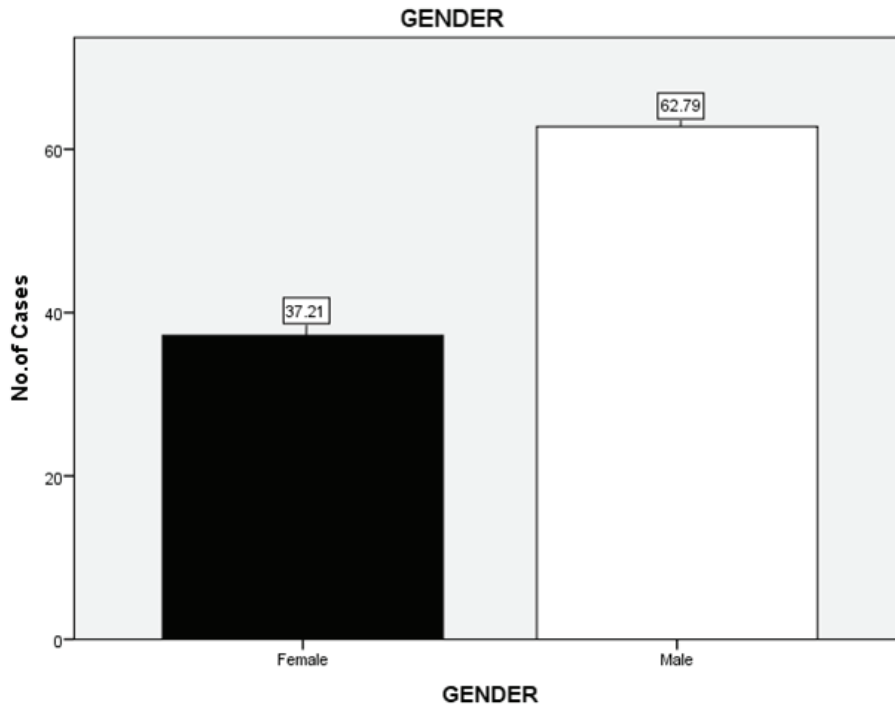


Figure 2 : Bar graph showing the gender distribution of children with space maintainers, 62% belongs to males and 38% were females.

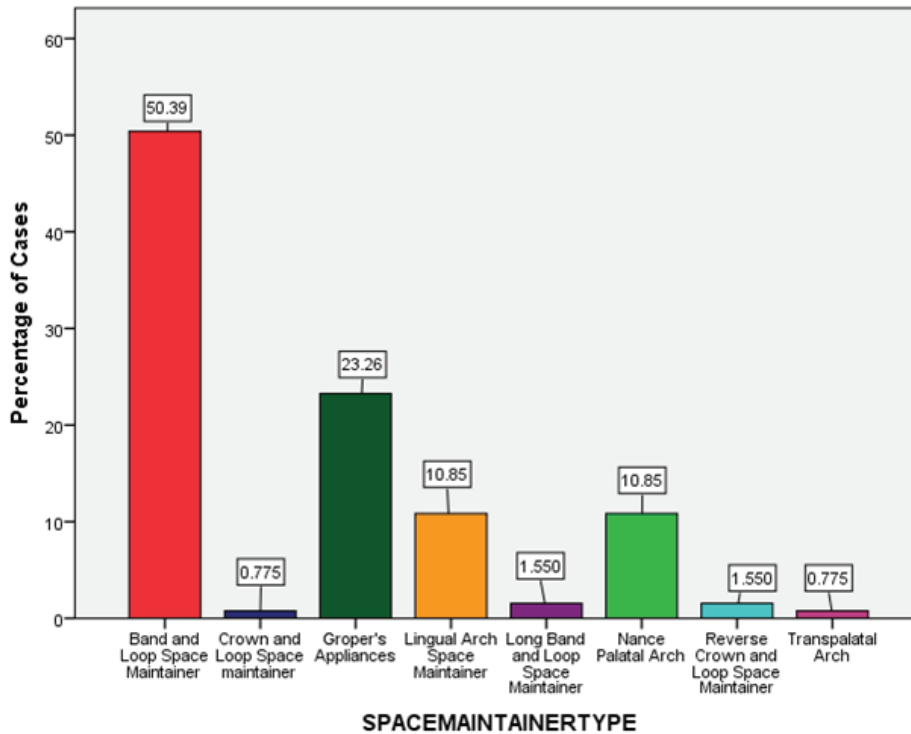


Figure 3: Bar graph showing the frequency distribution of different types of the space maintainers delivered to the children. Red colour represents band and loop space maintainer, Dark blue denotes crown and loop space maintainer, Dark green denotes Groper's appliance, yellow denotes the lingual arch, purple denotes the long band and loop, light green denotes the nance palatal arch, light blue denotes reverse crown and loop space maintainer, pink colour denotes transpalatal arch. Band and loop space maintainer was most commonly used among children(50.39%).

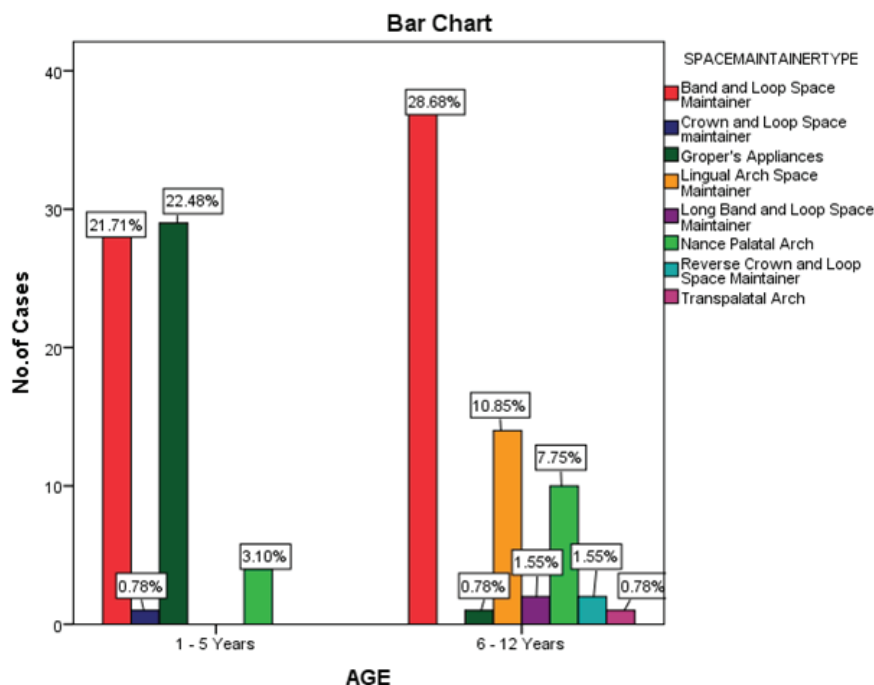


Figure 4 : Bar Graph depicts the association between the age of the child and the type of space maintainer placement. X axis represents the different age group of the children and Y axis represents the number of cases. Red colour represents band and loop space maintainer, Dark blue denotes crown and loop space maintainer, Dark green denotes Groper’s appliance, yellow denotes the lingual arch, purple denotes the long band and loop, light green denotes the nance palatal arch, light blue denotes reverse crown and loop space maintainer, pink colour denotes transpalatal arch. Band and loop space maintainer was the most commonly used space maintainer in both the age groups, However groper’s appliance was more commonly used in the 1-5 years age group the other space maintainers were more pertained to mixed dentition. This difference was statistically significant (Chi-Square test; p-value = 0.000 -significant)

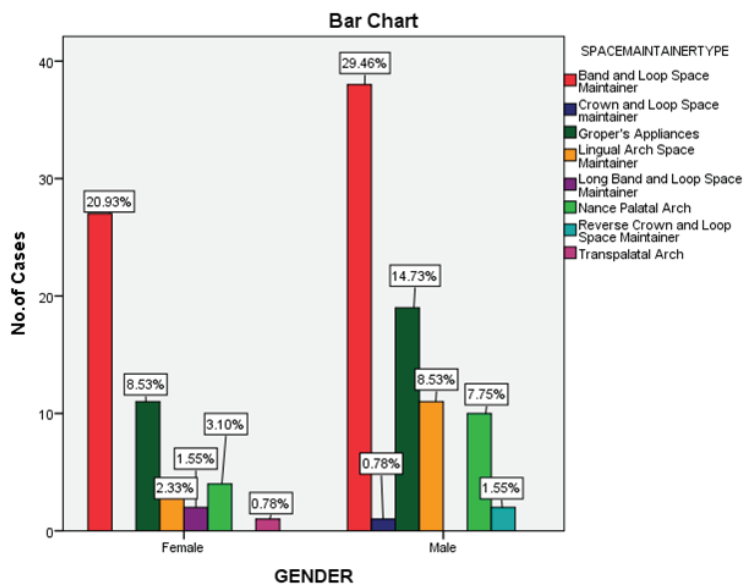


Figure 5 : Bar Graph depicts the association between the gender and the type of space maintainer placement. X axis represents the patients of different genders and Y axis represents the number of patients with space maintainers.

Red colour represents band and loop space maintainer, Dark blue denotes crown and loop space maintainer, Dark green denotes Groper's appliance, yellow denotes the lingual arch, purple denotes the long band and loop, light green denotes the nance palatal arch, light blue denotes reverse crown and loop space maintainer, pink colour denotes transpalatal arch. Children who were male had higher chances of receiving space maintainers when compared to females which was not statistically significant, among which band and loop space maintainer were as most commonly used in males. (Chi-Square test; p-value=0.125-not significant)

Conclusion

Within the limits of the present retrospective study, the most commonly indicated space maintainer was the band and loop space maintainer among the patients of age group of 6-12 years with a higher gender predilection among the male children.

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