
Band and Loop Space Maintainer Among Children Between the Age Group Of 6-10 Years - A Retrospective Study

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Abstract: Premature loss of teeth in children leads to space loss and affects arch integrity. Space maintainer and space maintenance is an important part of paediatric dentistry as well as a part of interceptive orthodontics. This study aims to determine the prevalence of band and loop space maintainers among children who are 6-10 years old. Data collection was done from going through 86,000 patient records from June 2019 to April 2020. Total sample size was 44 children who were inserted with a band and loop space maintainer. Chi-square test is done to analyse the significance of the study. The analysis showed that the band and loop space maintainer are more prevalent in 6 year old children and mostly done in female children. The reason for tooth loss was due to extensive caries. However, the study showed positive correlation but there was no significance since $p=0.276$. Use of space maintainers is an important step in interceptive orthodontics and the study concluded that it is more prevalent in 6 year old children.

Keywords: Space maintainer; Space maintenance; Band and Loop space maintainer; Extensive caries

INTRODUCTION

Premature loss of teeth in children leads to space loss and affects arch integrity (Beumer *et al.*, 1973; Govindaraju and Gurunathan, 2017; Subramanyam *et al.*, 2018). Space maintainer and space maintenance is an important part of paediatric dentistry as well as a part of interceptive orthodontics (Christabel and Gurunathan, 2015; Jitesh and Mathew, 2019). Interceptive Orthodontics is any procedure that eliminates or reduces the severity of malocclusion in the developing dentition (Mahendran *et al.*, 2017). A space maintainer is an appliance that is custom-made by a dentist or orthodontist in acrylic or metal material. It can be either removable or cemented in a child's mouth. Its purpose is to keep the space open to allow the permanent tooth to erupt and come into place (Satyaprasad *et al.*, no date; Packiri, Gurunathan and Selvarasu, 2017). Space maintenance can be defined as the provision of an appliance (active or passive) which is concerned only with the control of space loss without taking into consideration measures to supervise the development of dentition (Laing *et al.*, 2009; Gurunathan and Shanmugaavel, 2016).

Space maintainers are of different types according to the missing teeth, age of the child and indications for each particular case. Some of the Space maintainers used in paediatric dentistry are

Band and loop, crown and loop, nance palatal arch, trans-palatal arch, distal shoe and lingual arch space maintainer (Beldiman *et al.*, 2015; Ramakrishnan, Dhanalakshmi and Subramanian, 2019). In this study we are mainly going to see specifically about band and loop space maintainers.

The band and loop space maintainer is indicated for the premature loss of single, unilateral or bilateral maxillary or mandibular primary molars. Band and loop space maintainer adjusts easily to accommodate changing dentition (Shulman, 2011; Bahesh *et al.*, 2020). However, it does not aid in mastication and will not prevent the continued eruption of the opposing teeth (Sasa, Hasan and Qudeimat, 2009).

No literature is found in the prevalence of band and loop space maintainer in the age group under study. Whereas, any studies on fabrication, modifications and case reports were noticed (Somasundaram *et al.*, 2015; Mahesh and Masitah, 2018). There are many recent advances in the field of pediatric dentistry (Jeevanandan, 2017).

This study is indicated to assess the prevalence of band and loop space maintainer as a treatment modality among children in the given age group of 6- 10 years. The study will fulfill any shortcomings or deficiency in the assessment and understanding of band and loop space maintainer as a choice of treatment in children with interceptive orthodontic treatments. The aim of the study is to analyse the prevalence of band and loop space maintainer among children between the age group of 6-10 years. Our team has rich experience in research and we have collaborated with numerous authors over various topics in the past decade (Deogade, Gupta and Ariga, 2018; Ezhilarasan, 2018; Ezhilarasan, Sokal and Najimi, 2018; Jeevanandan and Govindaraju, 2018; J et al., 2018; Menon et al., 2018; Prabakar et al., 2018; Rajeshkumar et al., 2018, 2019; Vishnu Prasad et al., 2018; Wahab et al., 2018; Dua et al., 2019; Duraisamy et al., 2019; Ezhilarasan, Apoorva and Ashok Vardhan, 2019; Gheena and Ezhilarasan, 2019; Malli Sureshbabu et al., 2019; Mehta et al., 2019; Panchal, Jeevanandan and Subramanian, 2019; Rajendran et al., 2019; Ramakrishnan, Dhanalakshmi and Subramanian, 2019; Sharma et al., 2019; Varghese, Ramesh and Veeraiyan, 2019; Gomathi et al., 2020; Samuel, Acharya and Rao, 2020)

MATERIALS AND METHODS

The study was a retro-spective study and was done under a university setting. The similar characteristics of the study is that it is done with the available data and under similar ethnicity of the population. The disadvantage of the study can be that the geographic location is similar. One principal investigator and 2 co-investigators were involved in the study. The study was commenced after approval from the scientific review board, and the ethical clearance was obtained from the ethical committee of the University with the following ethical approval number-SDC/SIHEC/2020/DIASDATA/0619-0320.

The samples were taken from patients who had checked in the clinic from June 2019 to April 2020. Total number of sample size includes 44 children who were under the age group of 6-10 years old, systematically healthy. The case sheets were verified with the help of photographs. To minimise the sampling bias, we included all the data available and there was no sorting of data done. Internal validity of the study included all children from the age group 6-10 years who had been inserted with band and loop space maintainer. The external validity of the study is to find the prevalence pattern.

Data collection was done from going through 86,000 patient records from June 2019 to April 2020. The data was obtained from the category of space maintainer, band and loop space maintainer and the data was tabulated. If the space maintainer was not inserted, those samples were excluded for the study. Data was verified by one external reviewer. The data was imported to SPSS (SPSS version 21.0, SPSS, Chicago II, USA) and the variables were verified.

Chi-square test was done on the data obtained using SPSS software by IBM. Gender and ethnicity were considered as independent variables. Age groups and children who have inserted band and loop space maintainers were considered as dependent variables. Type of analysis which was done was correlation and association.

RESULTS

The data collected from the patient management software were tabulated in SPSS and the descriptive statistics were obtained. Out of total 44 children, 17 children were 6 years old, 13 children were 7 years old, 7 children were 8 years old, 4 children were 9 years old and 3 children were 10 years old. The mean was estimated to be 7.16, median was 7.00, standard deviations was 1.238. The frequencies calculated for gender distribution and the age groups are depicted in Figure 1 and Figure 2 respectively. Chi-square test was done between gender and age. Results showed positive correlation but the results were not significant because $p= 0.305$. Most of the space maintainers were inserted in 6 year olds which was dominating in female children (Figure 3).

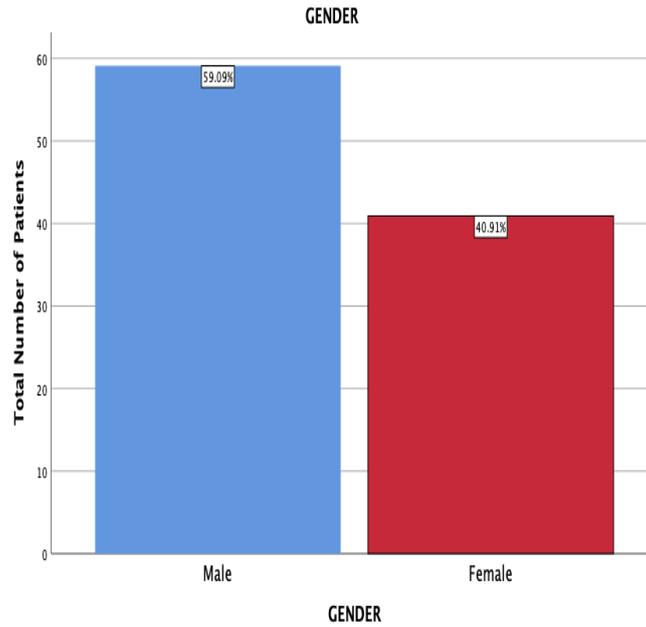


Fig.1: This bar graph represents the percentage of gender distribution in the study. X axis depicts the gender and Y axis depicts total number of patients in percentage. This graph shows us that the male population(59.09%) is more than the female population(40.91%).

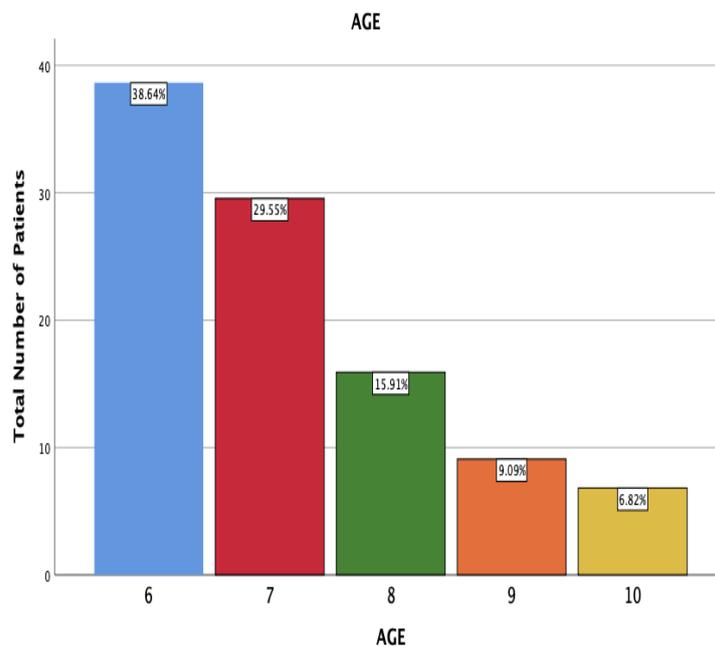


Fig.2: This graph represents the percentage of the children with different age groups involved in the study where X axis depicts the various age groups involved in the study and Y axis denotes the total number of patients in percentage. The graph shows that there were more children at the age of 6 years (Blue) compared to other age groups.

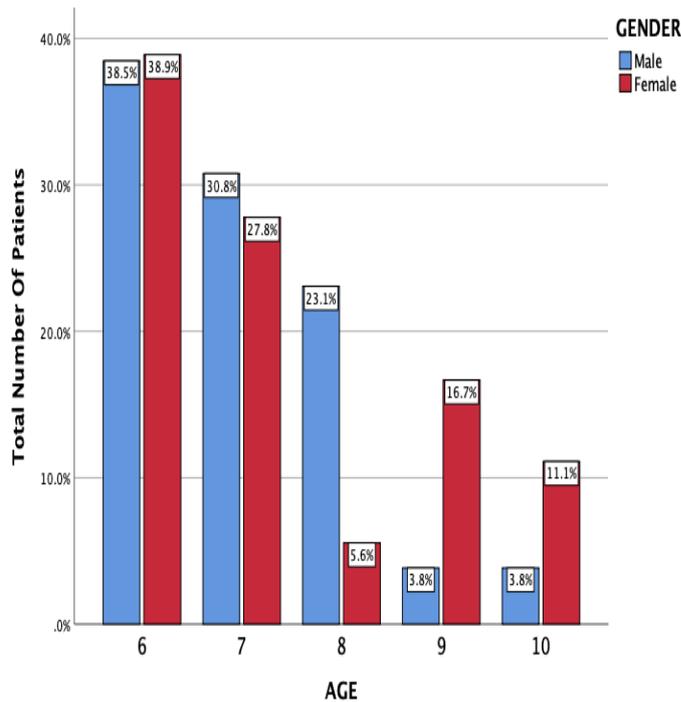


Fig.3: This bar graph represents the association between age and gender distribution in children with band and loop space maintainers. X axis depicts the various age groups in the population and the Y axis depicts the total number of patients in percentage. This graph shows that there were more number of space maintainers inserted at the age 6 years compared to other age groups. At the age of 6, 9 and 10 years female (Red) children received more band and loop space maintainer compared to male (Blue) children. However, the difference was statistically not significant. Chi square test value- 4.832- p- value- 0.305 ($p > 0.05$, hence statistically not significant).

DISCUSSION

Very few studies were present related to the age prevalence in band and loop space maintainer as surveys and about their survival rates in literature. A study conducted by Eshghi et al (Eshghi, Tayaran and Mosleh, 2018), concluded that the children involved in their study were mostly 5 year old children. This was in contradiction with the study, since the present study concluded that the band and loop space maintainer was more prevalent in 6 year old children. The reason for this difference may be due to ethnicity as well as the large sample size. Lira et al, (Lira *et al.*, 2019) reported that most of the children involved in their study were male children which was in agreement with the study. The reason for the similarity may be because of the younger age samples and the reason for tooth loss in these children were due to extensive caries. Early losses of deciduous teeth have often been studied because of their relevance and association with occlusion abnormality, so that in the mixed phase, space maintainers are used to maintain the space corresponding to the permanent successor teeth (Govindaraju, Jeevanandan and E. Subramanian, 2017). The loss of arch length resulting from this process can lead to the development of several malocclusions in the permanent dentition (Govindaraju, Jeevanandan and E. M. G. Subramanian, 2017a; Ravikumar, Jeevanandan and Subramanian, 2017; Jeevanandan and Govindaraju, 2018). The loss of a deciduous tooth is considered to be early or premature when it occurs at least one year before its normal exfoliation or after radiographic evidence that the permanent successor is still short of nolar stage 6, that is, with coronary formation and root formation not yet started (Govindaraju, Jeevanandan and E. M. G. Subramanian, 2017b; Panchal *et al.*, 2019). Several studies have been published regarding the premature loss of deciduous teeth (Satyaprasad *et al.*, no date; Nair *et al.*, 2018). However, according to Owen (Owen, 1971), there is a great diversity of opinions about the clinical consequences of premature loss of deciduous teeth, especially regarding the need to use space maintainers.

The molar loss was expected to be higher due to the population presenting a caries experience and second or primary molar hypomineralization. However the prevalence of early molar loss in this study was lower than that observed in other studies (Tagliaferro and Guirado, 2002). In the study by Cardoso et al (Cardoso *et al.*, 2005), the prevalence was 54.62%, being 49.15% in the male gender and 50.84% in the female. more affected than the second corroborating this study.

It was verified that the etiological factor of the early loss of deciduous molars was dental caries, corroborating the findings of de Souza et al (de Souza *et al.*, 2016), when affirming that in Brazil, it plays a predominant role,

due to socioeconomic problems and lack of knowledge of those responsible for paper of primary teeth, since treatment is often neglected. Although the possibility of dental loss should be considered due to the hypomineralization of the deciduous molars, since this pathology does not affect only the incisors and molars, but also the primary molars, which may evolve to the development of carious lesion and consequently the loss according to the literature (Christensen and Fields, 2013). Our institution is passionate about high quality evidence based research and has excelled in various fields ((Pc, Marimuthu and Devadoss, 2018; Ramesh *et al.*, 2018; Ezhilarasan, Apoorva and Ashok Vardhan, 2019; Ramadurai *et al.*, 2019; Sridharan *et al.*, 2019; Vijayashree Priyadharsini, 2019; Mathew *et al.*, 2020)

CONCLUSION

Within the limits of the study, it is seen that the frequency of band and loop space maintainers is more in children at the age of 6 years. Female children received more band and loop space maintainer than male children. However, the association of band and loop space maintainers with age and gender is not significant.

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