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Dental Caries in Children With and Without Cleft Palate: A Case Control Study

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ABSTRACT

The lack of knowledge about oral hygiene maintenance among the general population with oro-facial clefts would lead to a poororal health. The aim was to determine the prevalence of dental caries status in children with cleft palate only. The purpose of the study was to assess the prevalence of dental caries status in children with cleft palate only. A study was carried out by collecting data by reviewing patients' data and analysing the data of 86000 patients between June 2019 and March 2020 at the private dental institute. The sample size that was taken included 19 children with cleft palate and 19 children without cleft palate (control), who came to the private dental institute. Results showed that the mean DMFT score for the children with cleft palate was 1.74 while the mean DMFT score in children without cleft palate was 5.84. The prevalence of dental caries was compared for both case and control group were compared by Mann-Whitney U test, which gave a result of p=0.000. Within the limitations of the present study concluded that, dental caries status in children with cleft palate is significantly less than the dental caries status in children without cleft palate.

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INTRODUCTION

Oro-facial clefts are a major public health problem affecting thousands worldwide (Murray, 2002; Cooper *et al.*, 2000). According to World Health Organization, there is a higher frequency of a child to be affected by oro-facial cleft in India (Agbenorku, 2013). Children affected by oro-facial clefts are commonly suffering from functional and aesthetical problems. Such problems include difficulty in breastfeeding (improper oral seal), swallowing and nasal regurgitation; hearing difficulty(abnormalities in the palatal musculature) and speech distress (due to nasal opening). Such patients suffer under dental neglect, thereby leading to poor oral hygiene measures (Wehby and Murray, 2010). This issue could be managed and a proper oral hygiene practice can be established via the usage of chewable toothbrushes among children (Govindaraju, 2017).

The main types of oro-facial clefts include isolated cleft palate and cleft lip with or without cleft palate. Such clefts can present as part of a syndrome or associated abnormalities. Various factors influencing the occurrence of cleft palate include genetic and environmental (Mossey and Little, 2009). Cleft

lip or palate causes problems in relation to aesthetics, psychological and functional activities like speech (Dixon *et al.*, 2011). Children with cleft lip and palate need an interdisciplinary approach involving plastic surgeons, maxillofacial surgeons, anaesthesiologist, pediatric dentists, orthodontist and a speech therapist (Holt *et al.*, 2001).

Surgical corrections are usually given more importance by the parents of children with clefts causing them to neglect the dental aspects of it, which leads to higher decayed and missing teeth with poor oral health as compared to that of normal children (Chapple and Nunn, 2001; Somasundaram *et al.*, 2015). A child with cleft lip and/or cleft palate are generally at a higher risk of developing dental caries due to dietary and oral hygiene practices. Dental caries is a chronic multifactorial disease affecting the general population due to genetic and environmental factors (Deeley *et al.*, 2008). Previous studies done by Zhu (2010), Chopra *et al.* (2014) and (Kirchberg *et al.*, 2004), reported that patients with and without cleft lip and/or cleft palate showed higher prevalence of dental caries. Studies conducted by Lucas *et al.* (2000), Masitah et al. (Gurunathan and Shanmugaavel, 2016; Tannure, 2012), found that there was no significant difference in the prevalence of dental caries between children with and without cleft abnormalities. Researches conducted by Dahllof *et al.* (1989); Bokhout *et al.* (1996) reported a high prevalence of dental caries in children with cleft lip and palate. Analysis done by Ankola *et al.* (2005) reported a higher susceptibility of dental caries among children with cleft lip than children without cleft palate. Previous studies Holt *et al.* (2001) observed that there was no gender predilection in the prevalence of dental caries among children with cleft, i.e. dental caries was prevalent evenly between the gender of children with cleft. Another study undertaken in Bristol Dental Hospital, England conducted by Rivkin (1999) reported that more than 50% of 5 year olds and of 10 year olds were caries-free in primary dentition, less than 15% were caries free in the permanent dentition and majority of the patients above 20 years old have varied prevalence of dental caries. Dental caries rampant in nature could cause the patients to have a need to undergo pulpectomy procedures due dental caries with pulpal involvement which causes long term problems due to it losing its natural strength and resistance (Jeevanandan, 2017; Govindaraju *et al.*, 2017b,a). The lack of knowledge about oral hygiene maintenance among the general population would lead to cariogenic health leading to pulpal involvements and even extraction (Govindaraju *et al.*, 2017c; Jeevanandan and Govindaraju, 2018). The aim of the present case-control study was to assess the prevalence of dental caries status in children with and without cleft lip and palate.

MATERIALS AND METHODS

This retrospective study was conducted under a hospital based university setting. Ethical approval for this study was obtained from the institutional ethical committee (ethical approval number: SDC/SIHEC/2020/DIASDATA/0619-0320). Consent to use treatment records for research purposes were obtained from patient/ guardian at the time of patient entry into the university for dental needs. The retrospective data were collected by obtaining and analysing the 89000 dental case records of the university from June 2019 to March 2020. The inclusion criteria for the current study were children with cleft palate only, children between the age of 3-17 years age, complete photographic and written records regarding the complete intra-oral examination of the patient. Age and gender matched controls, i.e. children without cleft palate, were taken according to the relevant cases obtained from the inclusion criteria. The exclusion criteria were incomplete and censored dental records and children below the age of 3 were excluded. The total case acquired for the study was 38, with 19 patients from the case group and 19 patients from the control group.

The selected case and control group were examined by three people; one reviewer, one guide and one researcher. The patients' case sheets were reviewed thoroughly. Cross checking of data including digital entry and intra oral photographs was done by an additional reviewer and as a measure to minimise sampling bias, samples for the group were picked by simple random sampling. Digital entry of the clinical examinations and the intra oral photographs of selected subjects were assessed. This included the assessment of tooth decay as mentioned before by the examiner based on intraoral photographs and clinical examination data for each tooth. The examiner was trained to add data of dental caries as present or absent for both case and control group by tabulation using excel software.

Data analysis was done using SPSS PC Version 23.0 (IBM;2016) software for statistics. The prevalence of dental caries was compared for both case and control group by Mann-Whitney U Test which gave a result of $p<0.05$.

RESULTS AND DISCUSSION

The study population was made up of 38 patients, made up of cleft palate and non-cleft palate group, case and control respectively. Out of the 38 cases reviewed, 19 (50%) of the patients had presence of cleft palates in the case group and there were 19 (50%) patients without cleft palate with the same age and gender as the case group taken as the control group. (X-axis: Presence or absence of cleft palate; Y-axis: number of cases) Notice the equal distribution of cases for both the groups. [Figure 1].

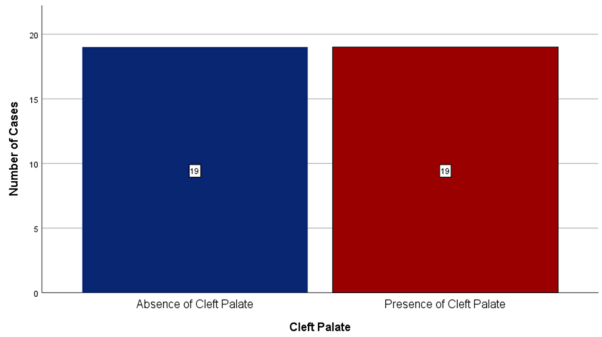

Figure 1: The graph bar shows case distribution in case group (children with cleft palate) and control group (children without cleft palate).

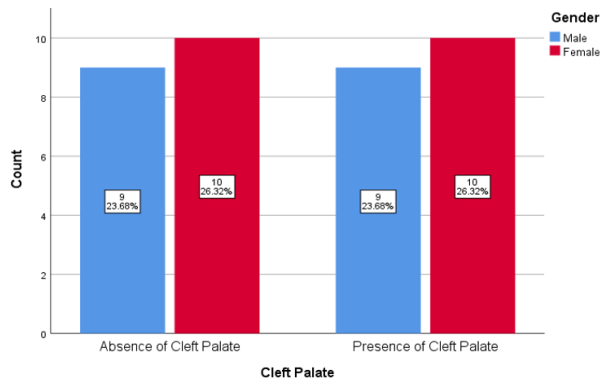

Figure 2: The graph bar shows gender distribution of cases in case group (children with cleft palate) and control group (children without cleft palate).

In the case group, all 19 of the patients' case sheets were reviewed from the database. Out of the 19 patients, 9 (47%) were male and 10 (53%) were female patients. In the control group, out of the 19 patients, 9 (47%) were also male and 10 (53%) female patients as can be seen in the graph. (X-axis: Presence or absence of cleft palate; Y-axis: number of cases) Notice the equal distribution of gender for both the groups [Figure 2].

The mean DMFT score was higher in the control group (5.84) than the case group (1.74). Lower

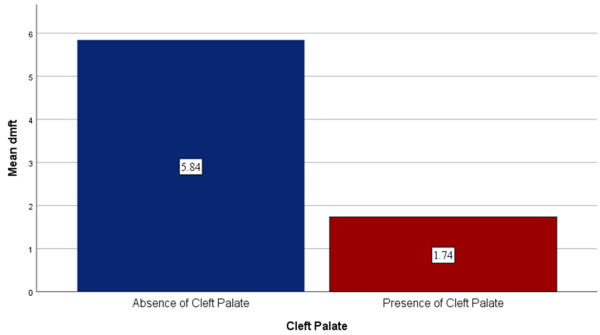

Figure 3: The graph bar depicts the DMFT index score distribution for case (with cleft palate) and for control (without cleft palate) groups.

DMFT score noted in patients with cleft palate when compared to patients without cleft palate. (Mann-Whitney test; p = 0.00 - highly significant) [Figure 3]. On comparison by Mann-Whitney U Test, this difference was highly statistically significant. (p-value=0.000)

The World Health Organization stated that dental caries is a pandemic disease affecting all the population irrespective of age, gender and socioeconomic status. Dental caries is more alarming in developing countries due to poor knowledge about caries prevalence and its preemptive measures (Al-Wahadni *et al.*, 2005). Early childhood caries is a socio-behavioural health issue with a more significant dental problem that affects infants and toddlers and their prevalence varies from population (Stec *et al.*, 2007; Gregg *et al.*, 1999). Early childhood caries not only affects the overall oral health, but also interferes with self-esteem, speech, normal nutrition, intake results in underweight in children and also causes abnormal cognitive development in the children (Tinanoff *et al.*, 2002; Christabel, 2015). In addition, the lipid peroxidation in early childhood caries causes a higher prevalence in dental caries. Previous studies conducted by Lauterstein and Mendelsohn (1964); Subramanyam (2018) found that there was no significant differences in caries prevalence between children with and without cleft. Previous study conducted by Zhu (2010); Chopra *et al.* (2014); Packiri (2017); Kirchberg *et al.* (2004) reported that children without cleft palate have higher prevalence of dental caries than children with cleft palate. Ahluwalia *et al.* (2004); Parapanisiou *et al.* (2009); Ramakrishnan and Bhurki (2018) suggested that individuals with oral clefts are at an increased risk for dental caries incidence.

Fitzgerald and Keyes (1960) and göran emilson and krasse (1985) reported that dental caries were initiated by mutans streptococci. A study conducted by Bokhout revealed that mutans streptococci could

be isolated from saliva and plaque of children with cleft lip and cleft palate (Bokhout *et al.*, 1996; Lakshmanan *et al.*, 2020). Lucan found that there was no significance in difference in the isolation of streptococcus mutans in children with cleft lip and palate and their matched controls based on age (Lucas *et al.*, 2000). Lactobacillus can be found in deep pulpal lesions and could be detected in only 1/4th of cleft lip and palate group (göran emilson and krasse, 1985).

The amount of fluoride in the water consumption on a daily basis in children aged 3 to 4 years, 0.05 to 0.31 mg with an average of 0.18 mg, in addition to fluoride toothpaste which has between 0.17-1.21mg per day. We could notice a decrease of dental caries prevalence in children with proper oral health as stated by Somasundram et al in his study conducted in 2015 (Ramakrishnan and Bhurki, 2018). Besides, traumatic injuries to the tooth structure and needing root canal treatments to be done can lead to secondary caries which leads to early extraction of the tooth (Ravikumar *et al.*, 2017; Panchal *et al.*, 2019).

The advantages of the study were that this was a case- control study with age and gender matched control to provide better results and high internal validity. The limitations found in the study are geographic restrictions as the patients are from around the same region. Besides, there was only a single ethnicity as the group of people are from the same ethnicity group. Unicentric study, smaller sample sizes and indirect clinical observation are also some other limitations faced while conducting our study. The future scope of this study could involve studies with a larger case group with presence of subdivisions involving snacking habits taken into account in children with oral without delft palate. A wide range comparative study involving children with cleft lip and/or palate as well as alveolar cleft children can be done.

CONCLUSION

Within the limitations of the present study, dental caries experience in children with cleft palate was less compared to children without cleft palate. Although these results show that children with cleft palate has lower caries incidence, proper oral hygiene measures should be emphasized among the parentsdespite the presence or absence of oro-facial clefts.

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Conflict of interest

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

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