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## Prevalence of gingivitis in patients with open bite

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**Abstract:** Open bite is defined as a developmental or acquired malocclusion whereby no vertical overlap exists between maxillary and mandibular anterior or posterior teeth. It can either be dental or skeletal open bite; anterior or posterior open bite. Open bite can result in mouth breathing causing changes in the muscular force and can lead to increased susceptibility of gingivitis. The study is conducted to find a correlation between open bite and gingivitis. The aim of the study is to evaluate the prevalence of gingivitis in patients with open bite. This study was based on data collected from the digital database of Saveetha Dental College and Hospitals. Over 86000 patient records were reviewed and analysed over a six month period from September 2019 to February 2019. A total of 1000 case sheets of patients were reviewed. Cross verification of data for error was done by presence of additional reviewers and by photographic evaluation. Simple random sampling was done to minimize sampling bias. After reviewing, 1000 case sheets were filtered based on data required. The final sample size was 703 patients with Open Bite. Male patients had high prevalence of open bite [53.5%] and presence of gingivitis in open bite patients was 63.9%. The age group 21-40 years [35.70%] had high frequency of gingivitis. P value was found to be insignificant >0.05. Within the limits of the study it was observed that male patients had more prevalence for open bite malocclusion and presence of gingivitis. The age group 21-40 years at high frequency of gingivitis prevalence in patients with open bite.

**Keywords:** Open Bite; mouth breathing; gingivitis; skeletal; dental

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### INTRODUCTION

The term open bite is defined as a developmental or acquired malocclusion where no vertical overlap exists between maxillary and mandibular anterior or posterior teeth. The definition for open bite was given by Subtelney and Sakuda (Subtelny and Sakuda, 1964). The open white can be classified as anterior open bite and posterior open bite. Anterior open bite exist when there is no contact and vertical overlap between the maxillary and mandibular incisors (Profitt, Fields and Sarver, 2007). Posterior open bite is seen when there is disocclusion in the posterior teeth, when the other teeth are in contact or in occlusion (Nanda, 2005).

According to Sassouni, Open wide can be classified as skeletal open bite and Dental open bite (Sassouni, 1969). The dental alveolar open by occurs as a result of underdevelopment anteriorly of maxillary and mandibular alveolar process. The skeletal open bite occurs as a result of increased downward and backward inclination of the mandible (Edler, 1990). Open bite can result in oral breathing which alters the muscular force exerted by the tongue, cheeks and lips. Results of epidemiological studies have shown that mouth breathing may cause an increase in susceptibility of gingival inflammation (Wagaiyu and Ashley, 1991), (Jacobson, 1973). Although the exact mechanism is unclear, studies suggest that initiation from the surface dehydration and the absence of cleansing effect of saliva have shown to increase the prevalence of gingivitis (Haytac and Öz, 2007).

Tongue spikes either removable or fixed is used to prevent tongue thrusting or thumbsucking. In cases with fixed appliances, the preferred material of choice used for bonding is Transbond XT, a Bis-GMA based composite resin, which has shown better results (Samantha, Sundari and Chandrasekhar, 2017). The major concern with brackets is debonding which in few studies have shown that sandblasting the brackets can lead to a high shear bond strength (Arun, Chandrasekhar and Kumar, 2015).

Habit breaking should be the primary objective in case of Dental open bite. The skeletal open bites are treated with either extra oral appliances which redirect the growth in adolescence or orthognathic surgery is advised in adults. Once the growth spurt is over, the forces required for corrections are heavier which is applied across the sutures and in some cases surgical interventions may be required. Few cases might require the usage of mini

implants. The usage of 1.3x6mm dimension mini-implants are recommended for retraction and intrusion cases (Sivamurthy and Sundari, 2016). It is also used to obtain a true incisor intrusion (Jain, Kumar and Manjula, 2014). The ball headed mini implant has shown to give results in maxillary protraction (Vikram *et al.*, 2017). According to previous studies, the optimum force en masse for maxillary intrusion and retraction is 212 grams per side (Felicita and Sumathi Felicita, 2017b).

Previously our team had conducted numerous clinical trials [(Felicita and Sumathi Felicita, 2017a),(Krishnan and Saravana Pandian, 2015),(Kumar *et al.*, 2011),(Felicita and Chandrasekar, 2012),(Felicita and Sumathi Felicita, 2018),(Viswanath *et al.*, 2015)] and few in vitro studies [(Rubika, Felicita and Sivambiga, 2015),(Krishnan, Pandian and Kumar, 2018),(Dinesh and Saravana Dinesh, 2013)] over the past 5 years. Now we are focussing on epidemiological studies. The idea for the study was derived from the current interest in our community. 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)

The purpose of this study is to compare the prevalence of gingivitis among different age groups and gender in patients with open bite. The aim of this study is to evaluate the prevalence of gingivitis in patients with open bite.

## MATERIALS AND METHODS

**Study Setting:** This study was based on data collected from the patient records of Saveetha Dental College and Hospitals. Over 86000 patient records were reviewed and analysed over a six month period from September 2019 to February 2020, 1000 records of patients reporting with Orthodontic complaints was retrieved. Approval was obtained from the institutional Scientific Review Board. Two examiners were included in the study.

### Sampling

Data was collected retrospectively over a six month period spanning from September 2019 to February 2020. A total of 1000 case sheets of patients were reviewed. Cross verification of data for error was done by presence of additional reviewers and by photographic evaluation. Simple random sampling was done to minimize sampling bias. After reviewing, 1000 case sheets were filtered based on data required. The final sample size was 703 patients with Open Bite.

### Data collection

The data was entered in the system in a methodical manner. For the present study, Clinical examination, periodontics examination, orthodontic diagnosis and photographs of these patients were evaluated to find the presence of open bite and gingivitis. The data was entered in excel manually and imported to SPSS for analysis. Incomplete or censored data was excluded from the study.

### Analytics

IBM SPSS Software version 23 was used for data analysis. Descriptive statistics which included frequency of distribution was used for analysis.

## RESULTS AND DISCUSSION

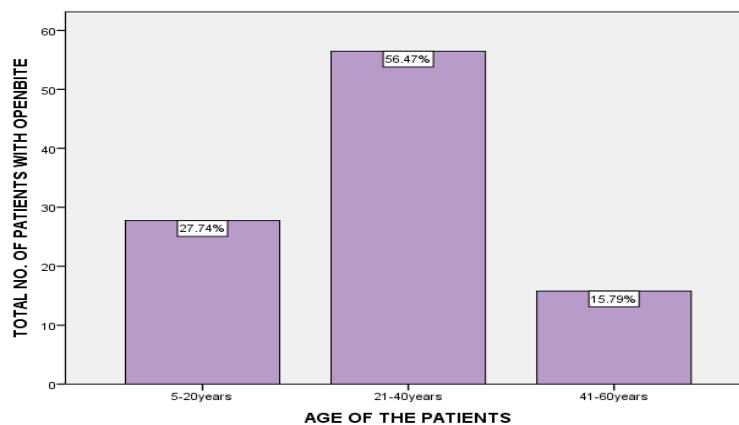
Collected data was imported to SPSS software and the results were obtained using chi-square test. The individual frequencies observed for each age group were; 5-20 years-27.74%, 21-40 years-56.47% and 41-60 years-15.79% (Figure 1). The frequency distribution of gingivitis in patients with open bite malocclusion showed that 63.87% of the open bite patients had gingivitis and 36.13% did not have gingivitis (Figure 2). When gender was compared with interarch relationship, it was observed that open bite malocclusion was more common in males [53.46%], whereas in females, it was 46.51% (Figure 3). Association between open bite malocclusion and gingivitis was assessed, it was observed that 63.87% of the study population had gingivitis and the rest 36.13% did not have gingivitis (Figure 4). Association between age of the patients with open bite and gingivitis showed that the gingivitis was more common in the age group 21-40 years (35.70%) for which the P value was 0.326 which is >0.05. (Pearson Chi square value-2.242, df-2, p value-0.326) (Figure 5). Association between gender of the patients with open bite malocclusion and gingivitis showed that gingivitis was more commonly seen in male patients (34.17%) for which the P value was found to be 0.544 which is >0.05. (Pearson Chi square value-0.368, df-1, p value-0.544) (Figure 6).

From the present study it is observed that, about 63.9% of the study population has gingivitis and the open bite was more commonly seen in the males [53.5%]. The age in which gingivitis was commonly seen was- 21-40 years [35.70%]. The mean age group was found to be 28.03 years.

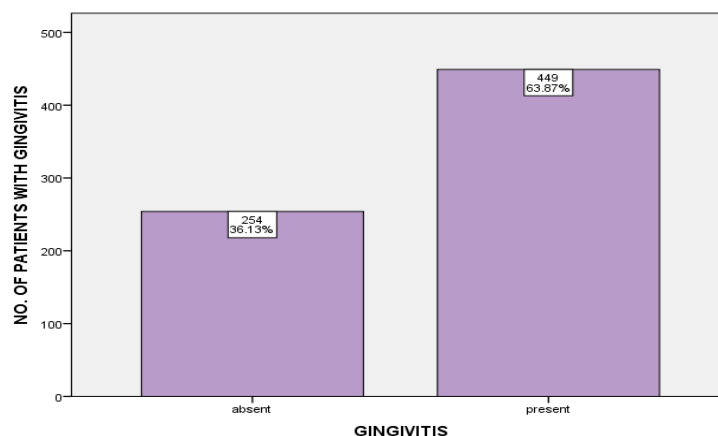
Rajinder K et al, in their study has observed that the prevalence was more in male population and the mean age was 24.6 years and mouth breathing Patients had higher scores of gingival inflammation (Sharma *et al.*, 2016), this is in accordance with our study. According to Abdul B et al Reply the plaque deposition in patients with malocclusion was more prevalent in the female population [58%], the study in contrast to the present study where the prevalence was seen in male patients (Memon *et al.*, 2015).

Fatemeh J et al, in the study observed that the presence of gingivitis is more in girls [53.7%] and prevalence of mouth breathing was found to be 19.7% (Jahanimoghadam and Shamsaddin, 2016). According to. Lene K et al, about 64.5% of the study population were females and the oral hygiene status in 16 to 18 years old was found to be better than the 12 to 15 years age group. The prevalence at 16 to 18 years was 46.7% (Kudirkaite *et al.*, 2016), the study is in contrast to the current study. Gulati MS et al, in the study has observed that the gingival index was higher in patients with mouth breathing habits (Gulati, Grewal and Kaur, 1998), this study is in accordance with the present study.

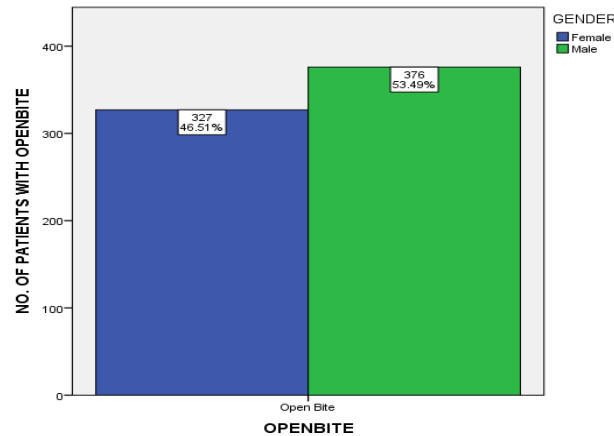
Comparing the previous literature it was observed that the current study is not in accordance with it this may be due to geographical variations in the population and limited availability of articles on open bite and gingivitis correlation. Our institution is passionate about high quality evidence based 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)



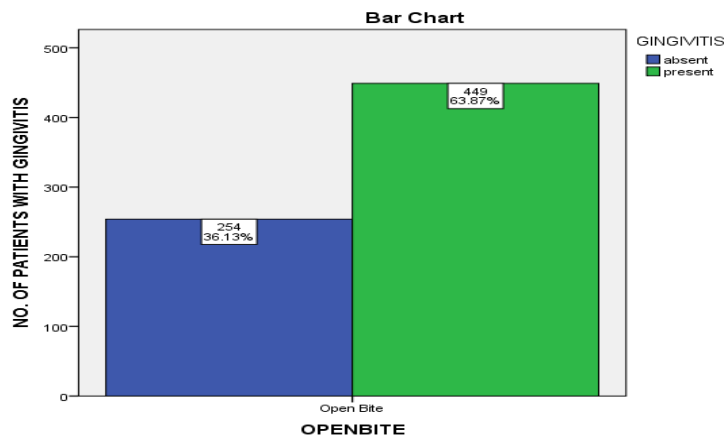
**Fig.1: Bar graph showing frequency of age wise distribution of open bite patients. It is observed that patients in the age group 21-40years (56.47%) had more incidence of open bite malocclusion.**



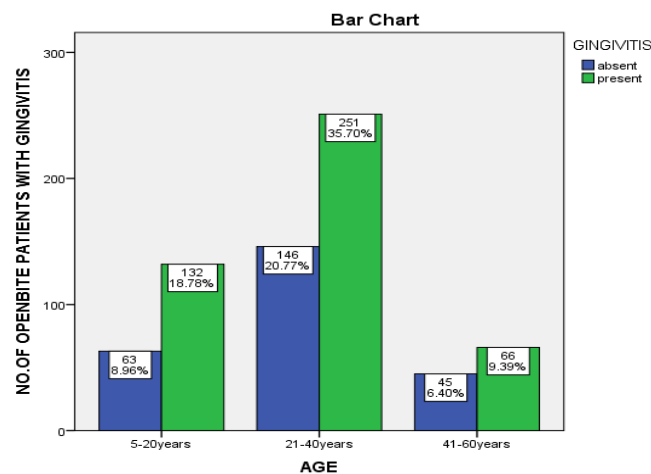
**Fig.2: Bar graph showing frequency distribution of gingivitis in patients with open bite malocclusion. It is observed that 63.87% open bite patients have presence of gingivitis.**



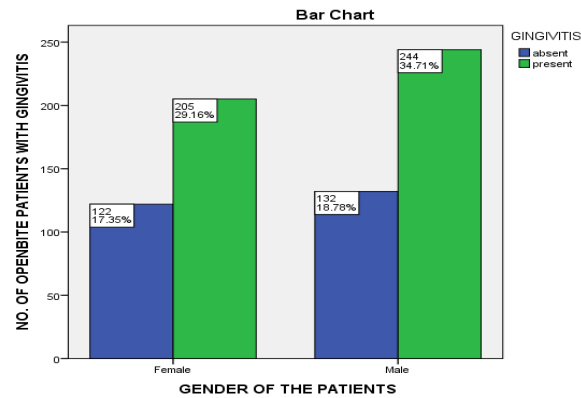
**Fig.3: Bar graph showing association between gender and patients with open bite malocclusion. The X axis shows open bite malocclusion and Y axis number of patients with open bite malocclusion. It is observed that male patients (green) have a higher prevalence (53.49%) for open bite malocclusion.**



**Fig.4: Bar graph association between gingivitis and patients with open bite malocclusion. The X axis shows open bite and Y axis number of patients with gingivitis. It is observed that patients with open bite have higher prevalence for gingivitis (63.87%) (green).**



**Fig.5: Association between age of the patients with open bite and gingivitis. The X axis denotes age of the patients and Y axis number of patients with gingivitis. It is observed that the gingivitis was more common in the age group 21-40 years (green) for which the P value was 0.326 which is >0.05. (Pearson Chi square value-2.242, df-2, p value-0.326).**



**Fig.6: Bar graph shows association between gender of the patients with open bite malocclusion and gingivitis. The X axis denotes gender of the patients and Y axis number of patients with gingivitis. It is observed that gingivitis was more commonly seen in male patients (34.17%) (green) for which the P value was found to be 0.544 which is >0.05. (Pearson Chi square value-0.368, df-1, p value-0.544).**

### CONCLUSION

Within the limits of the study, it was observed that male patients had more prevalence for open bite malocclusion and gingivitis. The age group which had high frequency of gingivitis was 21-40years.

### AUTHOR CONTRIBUTION

Preetha Parthasarathy carried out the retrospective study, planning the study design, collection and analysis of data and drafted the manuscript. Dr. Harish Babu and Dr. Sree Devi aided in conception of the topic, supervision and appraisal of the manuscript.

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### Conflict of interest

Authors have no conflict of interest.

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