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ASSOCIATION OF PERIODONTAL HEALTH AND ANGLE'S MALOCCLUSION- AN INSTITUTIONAL BASED STUDY

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ABSTRACT:

Of the several pathologies that affect the oral cavity, malocclusion is the third most important problem in the world population. It not only affects the appearance but also affects the periodontal health. The aim of the study was to assess the association between periodontal health and different angle's malocclusion. This retrospective study was conducted among outpatients reported to Saveetha Dental College and Hospitals, Chennai from June 2019 to March 2020. The study consisted of 300 patients (50 patients in each group). Patients were segregated into six groups based on Angle's classification (Group 1: Class I; Group 2: Class II division 1; Group 3: Class II division 2; Group 4: Class II subdivision; Group 5: Class III; Group 6: Class III subdivision). The type of molar relationship was then correlated with the periodontal status. Out of 300 patients, the prevalence of gingivitis (92%) was higher among Class II subdivision patients and the prevalence of periodontitis (22%) was higher among Class II division patients. Also, the correlation between different types of malocclusion and periodontal health was assessed and found to be statistically not significant (p=0.306).

Keywords: Gingivitis; Malocclusion; Oral health; Periodontitis.

INTRODUCTION:

Malocclusion is a condition in which there is a deviation from the normal relation of the teeth within the same arch or/and to teeth in the opposing arch. It not only affects the appearance of an individual but also has influence in many other ways such as interference with normal growth and development, improper or abnormal muscle function, speech defects, increased caries incidence, predilection to periodontal disease and temporomandibular joint disorder.(Poulton and Aaronson, 1961)

It has been hypothesized that malocclusion predisposes to periodontal disease, primarily because it seems likely that certain morphological traits of malocclusion may impede oral hygiene and self-cleaning and thus lead to increased accumulation of bacterial dental plaque.

Periodontitis is the most common oral disease worldwide. There are two common diseases affecting the periodontium.(Listgarten, 1986) The first is gingivitis, which is defined as inflammation of the gingiva in which the connective tissue attachment to the tooth remains at its original level. The disease is limited to the soft-tissue compartment of the gingival epithelium and connective tissue. The second is periodontitis,

which is an inflammation of the supporting tissues of the teeth with progressive attachment loss and bone destruction.(Flemmig, 1999)

Dental plaque accumulation and inadequate personal oral hygiene are known major risk factors of periodontitis.(MILLER and J, 1961) Even though the disease is modified by various risk factors like smoking, systemic diseases, stress, malnutrition, genetic factors; the primary etiology of periodontal disease is bacteria present in plaque.

Literature search reveals numerous studies assessing the association between malocclusion and periodontal disease.(McCombie and Stothard, 1964; Buckley, 1980) No association studies have been done about the amount of periodontal disease and the degree of malocclusion. However, a few authors have reported such relationships.

In most of these studies, single traits of malocclusion were evaluated for its effect on periodontal status. Previously, our team of researchers have done numerous clinical studies.(Ramesh Kumar *et al.*, 2011; Felicita, Chandrasekar and Shanthasundari, 2012; Dinesh *et al.*, 2013; Jain, Kumar and Manjula, 2014; Kamisetty *et al.*, 2015; Krishnan, Pandian and Kumar S, 2015; Rubika, Felicita and Sivambiga, 2015; Viswanath *et al.*, 2015; Sivamurthy and Sundari, 2016; A. S. Felicita, 2017; A. Sumathi Felicita, 2017; Samantha *et al.*, 2017; Vikram *et al.*, 2017; Felicita, 2018; Pandian, Krishnan and Kumar, 2018) However, studies assessing the effect of all types of malocclusion on periodontal health is minimal.

To address this lacunae, this research project was undertaken to assess the association between periodontal health and angle's malocclusion.

MATERIALS AND METHODS:

The present retrospective study was conducted among outpatients reported to Saveetha Dental College and Hospitals, Chennai from June 2019 to March 2020. The study protocol was approved by the Institutional ethical and review board, Saveetha Dental College and Hospitals, Chennai. The ethical approval number is SDC/SIHEC/2020/ DIASDATA/0619-0320

A total of 300 patients records were selected between the age group of 18-30 years and categorized under six groups based on Angle's classification. Group 1: class I malocclusion; Group 2: Class II division 1; Group 3: Class II division 2; Group 4: Class II subdivision; Group 5: Class III malocclusion; Group 6: Class III subdivision. Each group consisted of 50 patients, with 25 males and 25 females.

Data regarding the periodontal health status were collected for all the samples from patients records. The collected data was then entered in Microsoft Excel spreadsheet and analysed using SPSS software (IBM SPSS Statistics, Version 23). Descriptive statistics and inferential statistics was done for data summarization and presentation. Correlation analysis was done between and periodontal status and different types of malocclusion.

RESULTS AND DISCUSSION:

The study consisted of six groups representing various forms of angle malocclusion. The overall 300 samples were included in the study (50 in each group) with a mean age of 24.3 years. Among 50 Class I malocclusion patients, 40 (80%) had gingivitis and 10 (20%) had periodontitis. Among 50 Class II division 1 malocclusion patients, 39 (78%) had gingivitis and 11 (22%) had periodontitis. Among 50 Class II division 2 malocclusion patients, 44 (88%) had gingivitis and 6 (12%) had periodontitis. Among 50 Class II subdivision malocclusion patients, 46 (92%) had gingivitis and 4 (8%) had periodontitis. Among 50 Class II malocclusion patients and Class III subdivision malocclusion patients, in both groups, 44

(88%) had gingivitis and 6 (12%) had periodontitis. Also, the correlation between the different types of malocclusion and periodontal health was found to be statistically not significant (p=0.306). (Figure 1)

Also, gender distribution in the occurrence of periodontitis and gingivitis in patients with various malocclusion was assessed. The presence of gingivitis was notably high in Class II subdivision (8.95%) in male and class II division 2 (8.95%) and class II subdivision (8.95%) in females however, the differences were not statistically significant. (Figure 2) The occurrence of periodontitis was noticeably higher in male patients with Class I (14.29%) and Class II division 1(14.29%) malocclusion, however the results obtained were statistically not significant. (Figure 3)

The present study was conducted to assess the association between periodontal health and angle's malocclusion. In the present study, the prevalence of gingivitis (92%) was higher among Class II subdivision patients and the prevalence of periodontitis (22%) was higher among Class II division patients. This finding is in accordance with the previous study by Gusmao ES et al,(Gusmão *et al.*, 2011) where the prevalence of gingivitis and periodontitis was 89% and 11% respectively in patients with Class II malocclusion. The high prevalence of gingivitis may be because of the deficient oral hygiene and consequent accumulation of bacterial plaque which in turn causes gingival inflammation.

Gould MSE et al (GOULD and MSE, 1966) and Geiger AM et al (Geiger, Wasserman and Turgeon, 1973) reported positive association between periodontal disease and increased maxillary overjet or overbite. These findings are in agreement in the present study in which the prevalence of gingivitis was 78% and 88% in Class II division 1 and Class II division 2 malocclusion patients respectively.

However, contrary to this finding, Alexander AG et al (Alexander and Tippis, no date) and Geiger AM et al (Geiger, 1962) reported negative association. These studies highlighted that rather than the type of molar relationship, the position of each tooth contributes to the formation of periodontal pockets.

In the present study, 12% of Class III subdivision malocclusion patients had periodontitis when compared to patients with Class II subdivision malocclusion patients (8%). The prevalence of periodontitis was comparatively high among Class III type of molar relationship. This might be because the amount of vertical bone loss tends to be more in skeletal class III malocclusion.(Park *et al.*, 2018) This finding was also supported by Tian YL et al (Tian *et al.*, 2015) in his study which assessed the alveolar bone thickness around maxillary central incisors in class III malocclusion patients using cone-beam computed tomography.

Even though the prevalence of periodontal diseases including gingivitis and periodontitis was high in patients with different molar relationship; the association between type of malocclusion and periodontal status was found to be not statistically significant (p= 0.306). This might be because of limited sample size and the cross-sectional study design.

Further studies are required with long-term follow up to assess the periodontal disease initiation and progression to confirm these findings.

CONCLUSION:

Within the limitations of the study, it was found that the prevalence of gingivitis was more common in patients with different malocclusion. The presence of gingivitis was notably high in Class II division 2 in male and class II division 2 and subdivision malocclusion in females whereas occurrence of periodontitis was higher in male patients with Class I and Class II division 1 malocclusion.

AUTHORS CONTRIBUTIONS:

Thanish Ahamed S carried out the retrospective study, participated in the sequence alignment, statistical analysis and drafted the manuscript. Nivethigaa B and Mebin George Mathew conceived the study,

participated in its design and coordinated and provided guidance to draft the manuscript. All the authors had equally contributed in developing the manuscript.

CONFLICT OF INTEREST:

There were no conflicts of interest as defined by the authors.

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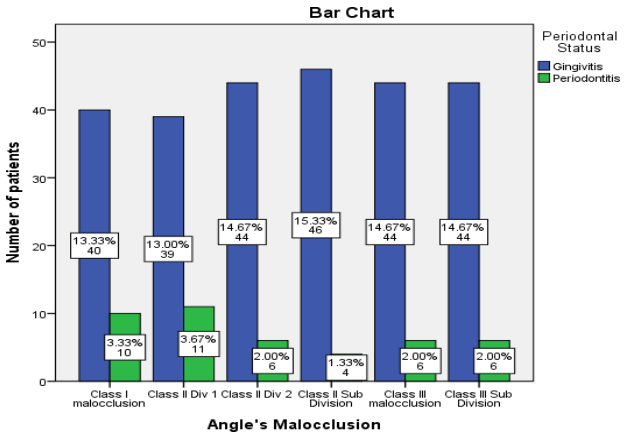

Figure 1: Bar chart showing association between various Angle's malocclusion and periodontal status of the patients. X-axis represents Angle's malocclusion and the Y-axis represents the number of patients. Gingivitis(blue) was most prevalent when compared to periodontitis(Green), however the difference was statistically not significant. (Chi square test;p value=0.306(>0.05, which is statistically not significant)).

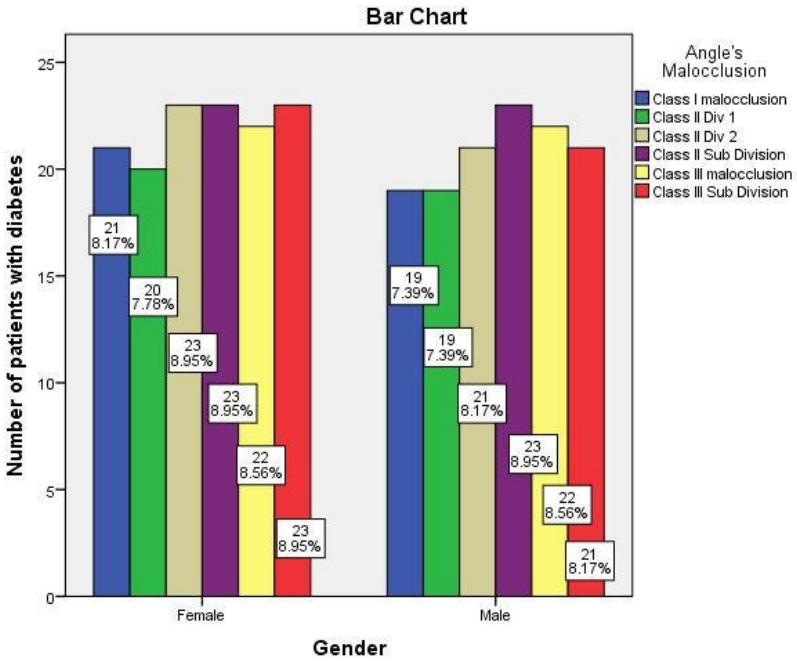

Figure 2: Bar chart depicts gender distribution in the occurrence of gingivitis in patients with various malocclusion. X-axis represents the gender and Y-axis represents the number of patients with gingivitis under each malocclusion. (Chi square test p value- 0.127, (>0.05, which is statistically not significant)). Not much difference was noted in the presence of gingivitis among both the genders. The presence of gingivitis was notably high in Class II division 1 and 2 in female and class II division division 2 and class II subdivision in females however, the differences were not statistically significant.

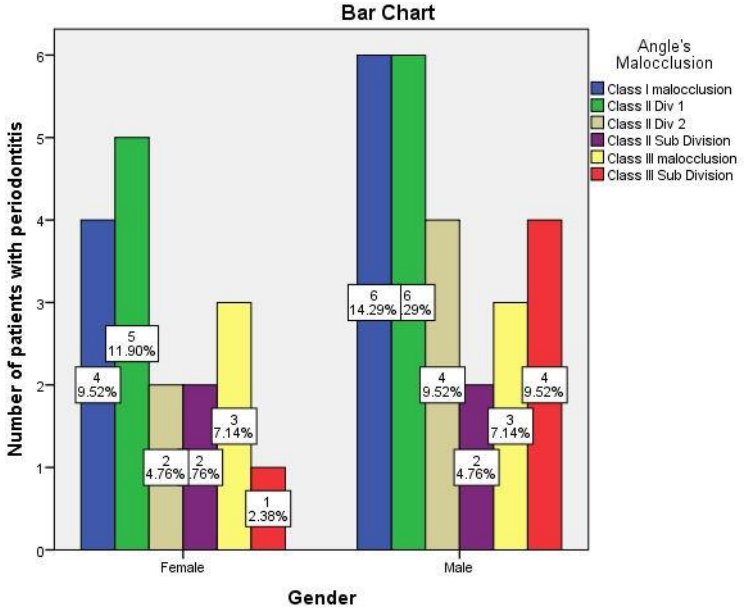

Figure 3: Bar chart depicts gender distribution in the occurrence of periodontitis in patients with various malocclusion. X-axis represents the gender and Y-axis represents the number of patients with periodontitis under each malocclusion. (Chi square test p value- 0.127, (>0.05, which is statistically not significant)). The occurrence of periodontitis was noticeably higher in patients with male patients with Class I(blue) and Class II division 1(green) malocclusion, however the results obtained were statistically not significant.