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Association Of Periodontal Health Status with Crowding Of Dental Arches in Adults - A Retrospective Study

Research Article

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Abstract

Malocclusion refers to the mal-relationship of the dental arches. Periodontitis is defined as an inflammatory disease of the supporting tissues of the teeth. Dental plaque is recognised as an essential precursor for periodontitis. Therefore any factor which is presumed to promote plaque retention or make its removal difficult can contribute to the risk of periodontal disease. The crowding of teeth creates areas hardly accessible for tooth brushing and makes oral hygiene measures very difficult.The aim of the study was to evaluate the association between periodontal health status with crowding of arches in adults. A retrospective study was carried out using digital records of patients who reported to a Dental hospital from June 2019 to March 2020. A total of 200 patients with moderate and severe crowding were included for the study evaluation. The age, gender, Gingival index scores, Plaque index scores, community periodontal index of treatment needs (CPITN) scores were observed from the digital records and tabulated on a spreadsheet. The collected data was analysed by computer software SPSS version 20. Chi square test was performed with the level of significance set at 5%. Significant association between severity of malocclusion and periodontal health ($p<0.05$) was noted. No significant association was found between gender and severity of crowding ($p>0.05$). Within limits of the study significant association was found between severity of crowding and periodontal health.

Keywords: Crowding; Gingivitis; Malocclusion; Periodontitis.

Introduction

Malocclusion refers to the mal-relationship of the dental arches along with the anomalies in teeth positioning [1]. The etiology of malocclusion [2-4] can be classified as either Genetic, Environmental or Local [5]. Periodontitis is defined as an inflammatory disease of the supporting tissues of the teeth [6] caused by specific organisms or groups of specific organisms resulting in progressive destruction of the periodontal ligament and alveolar bone with periodontal pocket formation, gingival recession or both [7].

As the above statement claims the etiology and pathogenesis of periodontal disease is multifactorial but dental plaque is recognised as an essential precursor [8, 9]. Therefore any factor [10] which is presumed to promote plaque retention or make its removal difficult can contribute to the risk of periodontal disease. The crowding of teeth creates areas hardly accessible for tooth brushing and makes oral hygiene [11] measures very difficult [12].

Previous literature states that various types of malocclusions have also been correlated to increased plaque indices [13, 14]. In a study by Ainamo et al,it was found that the extent of periodontal disease was worse around malaligned teeth [15] than around aligned teeth [16]. Gusmao et al., found in their study that all tooth malpositions [17] lead to occlusal trauma [18, 19] which further lead to periodontal disease progression [20]. On the other hand, many other studies failed to demonstrate any significant correlation between tooth irregularity [21] and periodontal health [22, 23]. The aim of this study was to evaluate the association of periodontal

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health with the crowding of arches.

Materials and Methods

Study Design

In this retrospective study, data from 86000 patients reporting to a Dental Hospital were collected. To fulfil the inclusion criteria, patients above 18 years of age with presence of crowding were included in the study. 200 patients were selected for the study by random sampling, who fulfilled the inclusion criteria. Patients who were outside this age group or those with other systemic complications were excluded from 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.After data extraction, all information was anonymized and tabulated onto a spreadsheet.

Subjects and Procedures

It was a retrospective study. Data was collected from July 2019 to March 2020.

The following data were retrieved from the dental records: patient age, gender, Gingival index score, Plaque index score,community periodontal index of treatment needs (CPITN) scores and periodontal status. The records were examined for errors by photographic evaluation. Incomplete or censored data was excluded from the study.

Statistical Analysis

The statistical analysis was done using Statistical Package for Social Sciences for Windows, version 20.0 (SPSS Inc., Chicago, IL, USA). Independent variables included age, gender. Dependent variables included crowding, periodontal status. Chi-square test was used to compare the malocclusion and periodontal status of the patients. The significance level was set at 5% for the present study.

Results and Discussion

A total of 200 participants were included in the study of which 52% were female and 48% were males. 26.5% of the females in the study had severe crowding while 23.5% of the males had severe crowding (Figure 1). No significant association was found between severity of crowding and gender (Figure 1). Significant association was found between severity of crowding and periodontal status, $p<0.05$, Chi square test.(Figure 2) 14% of the patients with severe crowding presented with periodontitis. 1.5% of the patients with moderate crowding had periodontitis.(Figure 2)

The association between gender and periodontal status was found to be significant, $p<0.05$, Chi square test (Figure 3).

It was observed in the present study that there was significant association between the severity of crowding of the arches and the periodontal health status. The association between gender and periodontal health was found to be significant. The association between gender and the severity of crowding was not found to

Figure 1. Bar graph representing association of Gender and Severity of crowding, where X axis denotes both Genders (Male and Female) and Y axis denotes the number of patients with severity of crowding as; Moderate(blue), severe (Red). Chi square association was done and found to be statistically not significant. Pearson Chi-Square value=0.080a,df=1, P value=.77,P >0.05, not significant. Proving that gender does not influence the severity of crowding.

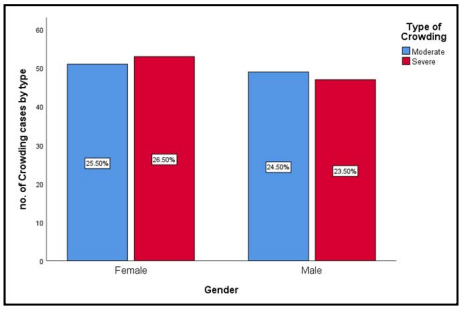

Figure 2. Bar graph representing association between periodontal status and the Severity of crowding, where X axis denotes the type and severity of crowding (moderate and severe) and Y axis denotes the number of patients with different periodontal status. Chi square test was done and association was found to be statistically significant. Pearson Chi-Square value=23.860a,df=1, P value=0.00,P<0.05, significant. Proving moderate crowding was associated with gingivitis and severe crowding was associated with periodontitis.

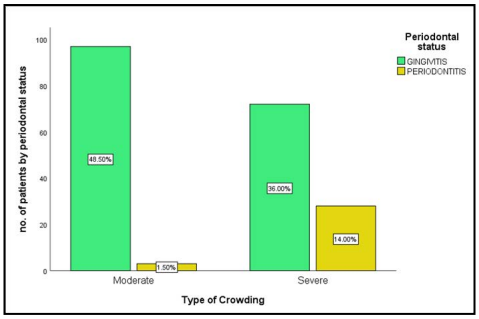

Figure 3. Bar graph depicting association between gender and periodontal status,where X axis denotes both Genders (Male and Female) and Y axis denotes the number of patients with different periodontal status: periodontitis (Yellow) and gingivitis (green). Chi-square test was done and the association was found to be statistically significant. Pearson Chi-Square value=4.009a,df=1, P value=0.04, P<0.05, significant. Proving that gender is associated with periodontal status and periodontitis was more common in males compared to females.

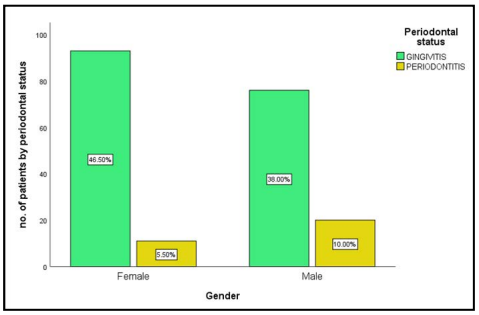

Table 1. Table depicting the Gender wise distribution (Male and Female) of severity of crowding (severe and moderate) Females (53) appear to have more prevalence of severe crowding than males (47).

Gender wise distribution of Crowding				
		Type of Crowding		Total
		Moderate	Severe	
Gender	Female	51	53	104
	Male	49	47	96
Total		100	100	200

Table 2. Table depicting the periodontal status(periodontitis and gingivitis) distribution by Severity of crowding(severe and moderate). Higher prevalence of periodontitis was observed in severe crowding cases(28) than moderate crowding(3).

Periodontal status by Type of Crowding				
		Periodontal status		Total
		GINGIVITIS	PERIODONTITIS	
Type of Crowding	Moderate	97	3	100
	Severe	72	28	100
Total		169	31	200

Table 3. Table depicting the Gender wise distribution (Male and Female) of periodontal status(periodontitis and gingivitis). Males(20) appear to have more prevalence of periodontitis than Females (11).

Gender wise distribution of Periodontal status				
		Periodontal status		Total
		GINGIVITIS	PERIODONTITIS	
Gender	Female	93	11	104
	Male	76	20	96
Total		169	31	200

be significant.

Significant association was found between the severity of crowding of the arches and the periodontal health. However while some previous studies have discussed that improper occlusal forces [18, 24-26] due to malalignment can progress to pocket formation [27, 28], other studies have found evidence of association weak and inconsistent [29]. The reported relationships between crowding and periodontal status have ranged from no relationship [30, 31], to a weak relationship [32]. The associations between crowding and oral hygiene performance along with chronic periodontitis have also been reported as weak [33]. Significant association was found between gender and periodontal health. These findings are consistent with the findings of Helm et al, which states that men are at greater risk for periodontal disease than women [34]. No significant association was found between gender and the severity of crowding. This finding is consistent with findings of Rahbar et al,2010 and Decusara et al,2019, which state that even though males have higher interarch and intra arch dimensions than females, there was no significant difference in the severity of crowding [35, 36].

The limitations of the study include that it has a limited sample size as it is a single centre study. The future scope of the study can involve expanding it to a multicentre study and taking the classification of dental crowding into consideration.

Conclusion

Within the limits of the current study significant associations were found between the crowding of the dental arches and periodontal health status. Severe crowding of the dental arches was associated with more periodontal breakdown. A larger number of male subjects had severe crowding and periodontitis than females, whereas more females presented with moderate crowding than males hence gingivitis was more common among females.

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Authors Contribution

Kadambari Sriram contributed to the acquisition of data, analysis,literature collection, and in drafting the article and revising it critically for important intellectual content. Ravindra kumar Jain contributed in conception, study design, interpretation of data, formatting, manuscript preparation, supervision and guidance. Santhosh Kumar contributed to the editing, supervision and final approval of the submitted version of the manuscript.

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