

Presence of occlusal wear facets in patients with a deep bite in patients with skeletal class I malocclusion in different gender

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Background: Deep bite is a malocclusion where the upper tooth excessively overlaps lower front teeth when the posterior are in occlusion. If the patient has a deep bite then tooth to tooth contact increases. This results in attrition which is the surface loss of tooth material due to internal forces mainly due to tooth to tooth contact. In deep bite as the tooth to tooth, contact increases the rate of attrition is comparatively higher than in normal occlusion.

Aim: This study aims at analyzing the presence of occlusal wear in patients with a deep bite.

Materials and Methods: The sample consisted of 101 patients. All the data acquired for the study like the type of malocclusion, presence of deep bite, presence of any occlusal wear facets in any of the teeth in both arch was obtained from the digital archives of Saveetha Dental College. The data was then computed in excel format and it was analyzed statistically with Chi-square analysis using SPSS software.

Results: The occlusal wear was found more in patients with deep bite malocclusion

Conclusion: Within the limits of the study occlusal wear of the teeth was more on patients with deep bite malocclusion.

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Introduction

Tooth wear is defined as loss of dental hard tissue as a result of either a chemical or mechanical process not involving bacteria(Grzegocka *et al.*, 2016)(Dinesh *et al.*, 2013). Clinical experience shows that such tooth wear is relatively common and can be so severe that the vitality of the teeth can be difficult(Hugoson *et al.*, 1988). The pathogenesis of wear facets is considered to be multifactorial with attrition, abrasion, corrosion, and abfraction often acting in a combined manner rather in an isolated sequence. All these come under a group called the non-cariou lesion(Fareed, Johansson and Omar, 1990). Updated and revised nomenclature definitions of tooth surface lesions were proposed by Grippo according to whom attrition is defined as the result of tooth-to-tooth friction without any additional factors(Batra, Pandey and Miglani, 2017). Abrasion is caused by friction between a tooth and an exogenous agent, such as a food bolus, a toothbrush, dentifrice, dental floss, toothpicks, pens, pencils, clasps of partial denture, etc(Cunha-Cruz *et al.*, 2010; Viswanath *et al.*, 2015). The reason for erosion is a chemical or electrochemical action, arising from endogenous or exogenous sources from certain food material. When dentine is exposed to the oral cavity environment, the chipped enamel can accelerate the development of caries by means of the so-called biocorrosion(Sivamurthy and Sundari, 2016) (Antonelli, Hottel and Garcia-Godoy, 2013)

Tooth wear happens in the cervical area or on the occlusal surface(Senna, Del Bel Cury and Rösing, 2012). Attrition, abrasion, and corrosion contribute to the excessive wear of the occlusal and incisal areas, the lesions being flat, round or sharply angulated, polished and shiny, and with dentine exposure(Krishnan, Pandian and Kumar S, 2015)(Cunha-Cruz *et al.*, 2010; Viswanath *et al.*, 2015). The regions most affected include the palatal surface of maxillary incisors, the incisal surfaces of mandibular incisors, and functional cusps of upper and lower premolars and molars(Vikram *et al.*, 2017). Some wear is natural and progresses throughout life(Kamisetty *et al.*, 2015). The most significant risk factors for the progression of occlusal wear facets seems to be age, hard diet or chronic occlusal overload(Felicita, 2017b)

Deep bite is the malocclusion when upper front teeth excessively overlap lower front teeth when the posterior teeth are in contact(Rubika, Sumathi Felicita and Sivambiga, 2015). A deep bite can be due to many reasons including the small lower jaw, prognathic upper anterior where there will be a reduction in the vertical dimension(Jain, Kumar and

Manjula, 2014). This will lead to overloading in the tooth which leads to tooth wear (Ramesh Kumar *et al.*, 2011). A previous study reveals cases demonstrating malocclusion, tensile stresses generated at the cervical areas appeared to be higher compared with the stresses generated in the case of normal occlusion (Felicita, 2017a) (Felicita, Chandrasekar and Shanthasundari, 2012). Our team has extensive knowledge and research experience that has translate into high quality publications (Kumar *et al.*, 2006; Devi and Gnanavel, 2014; Varghese *et al.*, 2015; Sivamurthy and Sundari, 2016; Chen *et al.*, 2019) (Rao and Kumar, no date; Nair, Jeevanandan and Vignesh, 2018; Anbu *et al.*, 2019; Sekar *et al.*, 2019; Johnson *et al.*, 2020). Now the growing trend in this area motivated us to pursue this project. This study aims at analyzing the presence of occlusal wear facets in the patient with skeletal class I malocclusion. This study also aims at establishing any relationship between different type of malocclusion with occlusal wear of teeth.

Materials and Methods

This study involves the examination of patients visiting Saveetha Dental College. In this study 101 patients aged 10-40 years of age were examined. This study was conducted in a university setting where a particular group of people was considered in this study. 2100 patients reporting to the orthodontic department between July 2019 to March 2020 were screened. 101 patients with class I malocclusion was identified. The patient details, orthodontic findings were retrieved from the digital archives of the institution. All the relevant data including age, gender, presence of any occlusal wear facets were retrieved and computed in excel format. The processed data was then transferred to SPSS software and statistical analysis was done. Chi-square test was done. P-value was set as 0.05.

Results and Discussion

The study involved an examination of 101 patients. There were 61 males and 40 females. The vertical overlap between the anterior and posterior teeth varied among patients with the presence of open bite, deep bite, crossbite, scissor bite in the selected patients. The wear pattern in maxilla and mandible was almost equal to each other.

This study primarily involves analyzing the malocclusion and correlating it with the occlusal wear of the teeth. Comparing the deep bite based on gender, male patients (60%) had a greater deep bite compared to female patients (40%) [Graph 1, Table 1]. Comparing the presence of deep bite based on age, the deep bite was present more in patients 20-30 years of age followed by 10-19 years of age and least being 30-40 years of age [Graph 2, Table 2]. Comparing tooth wear based on the amount of vertical overlap between the upper and lower anterior teeth in the anterior and posterior region, the incidence of the deep bite was greater (48%) followed by scissor bite (45%) with the least being open bite and crossbite (3%) [Graph 3, Table 3]. Comparing the tooth wear to maxillary and mandibular teeth it was evident that both maxillary and mandibular teeth were equally affected [Graph 4,5 table 4,5]. The incidence of occlusal wear in patients in the deep bite was 36%.

Clinical evidence suggests that dental wear if extreme represents a risk to the dentition on extensive cases. A study by Hugoson *et al.* showed that the age of the patient is the main concern for the wear in occlusal facets of the teeth. The author in his study revealed more occlusal wear facets in increased age persons (Hugoson *et al.*, 1988). A study by Kamal Faeed *et al.* included 20 dental students in the study to find the pattern of tooth wear where he found that the incisors had more tooth wear when compared to the remaining teeth (Fareed, Johansson and Omar, 1990). Kinga Grzegocka examined 250 adolescent students for the presence of occlusal wear and found that 51.6% of the students had mild attrition and 36.4% of them had significantly worn out teeth. They observed that the maxillary and mandibular canine was more affected which was followed by mandibular incisor (Grzegocka *et al.*, 2016).

In the present study, the occlusal wear of the teeth was more in patients with a deep bite. But compared to other studies we included a relatively low sample size. Also, in the current study, only a particular group of people belonging to one geographic area was considered. So it may not coincide with the previous studies. Further studies with a greater sample size including more geographic areas may be considered. 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). We hope this study adds to this rich legacy

Conclusion

Within the limitations of the study, the relationship between tooth wear and malocclusion was obtained. Better diagnosis of malocclusion creating awareness among the people about the ill effects of malocclusion and a well-executed treatment of the malocclusion play an important role in avoiding excessive wear of teeth.

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Author Contribution:

Ajrish George S has contributed to data collection, study design, data analysis, results, tables, and manuscript preparation.

Dr Sumathi Felicita has contributed to the manuscript preparation, proofreading of the manuscript, and reviewing the manuscript.

Dr Nashra Kareem has contributed to reviewing the manuscript.

Conflict Of Interest: There is no conflict of interest

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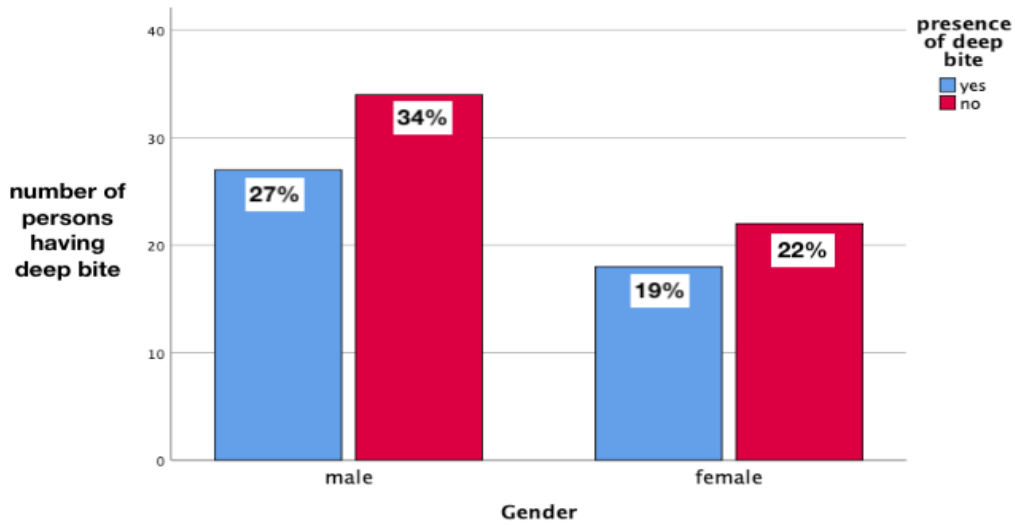
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Graphs And Tables

Table 1 showing the association of gender to the presence of a deep bite

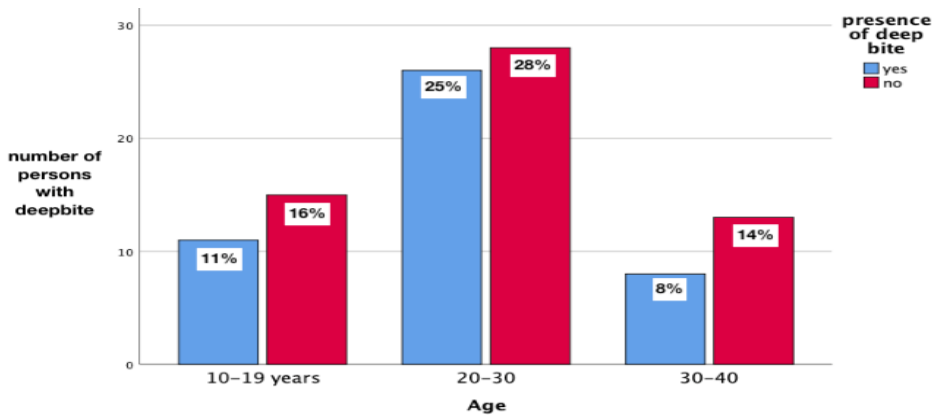
	Gender		Total	Significance
	male	female		
Presence of occlusal wear				
yes	17	16	33	0.02
no	45	22	67	
Total	62	38	100	



Graph 1 bar chart showing association of gender to the presence of deep bite. The X-axis shows the gender of the patient and Y-axis shows the number of persons having a deep bite. The blue bars denote the presence of deep bite and red bars denote the absence of deep bite

Table 2 showing the association of the presence of deep bite to age

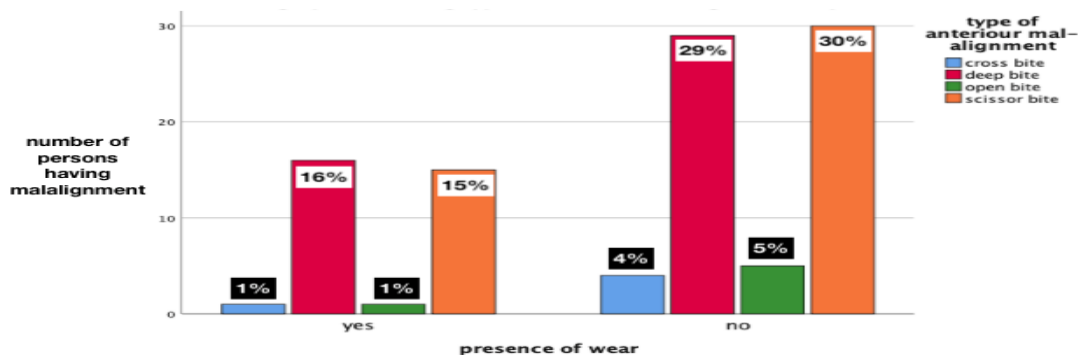
	Age			Total	Significance
	10-19 years	20-29 years	30-39 years		
Presence of occlusal wear					
yes	11	24	8	43	0.04
no	16	27	14	57	
Total	27	51	22	100	



Graph 2 bar chart showing the association of the presence of deep bite to age. The X-axis shows the age groups and the Y-axis shows the number of persons having a deep bite. The blue bars shows the presence of deep bite and red bar shows the absence of deep bite

Table 3 showing association of type of tooth malalignment to the presence of tooth wear

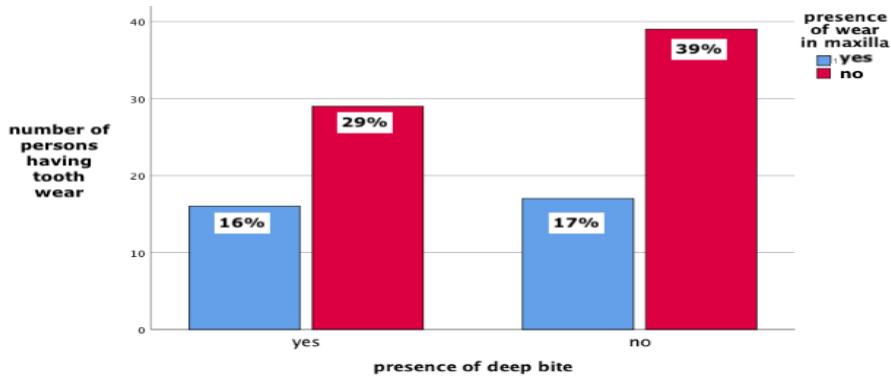
Presence of occlusal wear	Type of mal-alignment				Total	Significance
	Cross bite	Deep bite	Open bite	Scissor bite		
yes	1	16	1	14	32	0.05
no	4	29	5	30	68	
Total	5	45	6	44	100	



Graph 3 bar chart showing association of type of tooth malalignment to the presence of tooth wear. The X-axis shows the tooth wear and the Y-axis number of persons having each specific malalignment. The blue bars denote the number of persons having crossbite, the red bars denote the number of persons having deep bite, green bars denote the number of persons having an open bite and orange bars denotes the number of persons having scissor bite

Table 4 showing the association of the presence of deep bite and presence of tooth wear in the maxilla

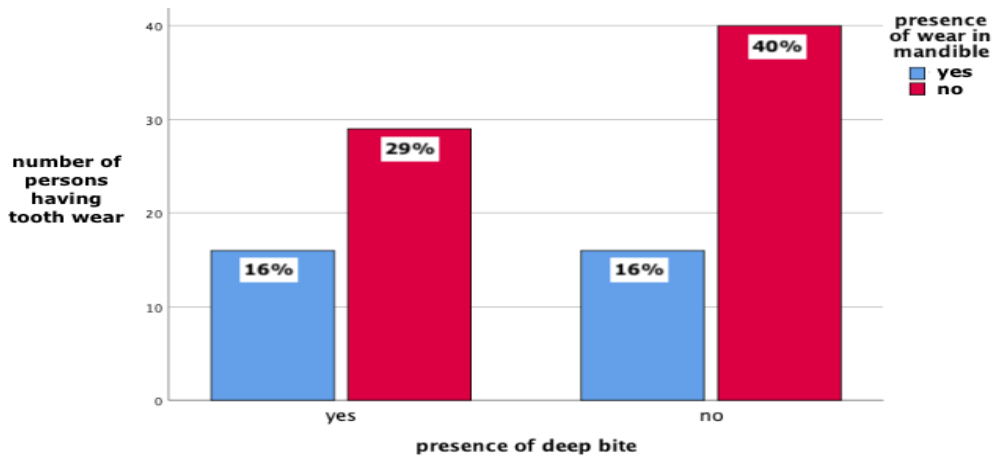
Presence of deep bite	Presence of tooth wear in the maxilla		Total	Significance
	Yes	No		
yes	5	13	18	0.03
no	9	18	27	
Total	14	31	45	



Graph 4 bar chart showing association of the presence of deep bite and presence of tooth wear in the maxilla. The X-axis shows the presence of deep bite and the Y-axis shows the number of persons with the presence of tooth wear in the maxilla. The blue bars show the presence of tooth wear and the red bars show the absence of tooth wear.

Table 5 showing association of the presence of deep bite to the presence of wear in the mandible

	Presence of tooth wear in the mandible		Total	Significance
	Yes	No		
Presence of deep bite				
yes	7	13	20	0.13
no	7	18	25	
Total	14	31	45	



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Graph 5 bar chart showing association of the presence of deep bite to the presence of wear in mandible. The X-axis shows the presence of deep bite and the Y-axis shows the number of persons having tooth wear in mandible. The blue bars shows the presence of wear and the red bars shows the absence of wear