

Association between Deep Bite and the Periodontal Status of Anterior Teeth

Kirana Suciati¹, Yuniarti Soeroso^{1*}, Hari Sunarto¹

1. Department of Periodontics, Faculty of Dentistry, Universitas Indonesia, Depok, Indonesia.

Abstract

To analyze the relationship between deep bite and periodontal status. A cross-sectional study of 52 normal bite subjects and 52 deep bite subjects using patients' dental records from Teaching hospital Faculty of Dentistry Universitas Indonesia. Statistical analysis was conducted with the Mann-Whitney U test. There were statistically significant differences ($p > 0.05$) in the mean values of pocket depth, gingival recession, loss of attachment, and gingival bleeding between normal bite and deep bite groups. There were associations between deep bite and the increase in pocket depth, gingival recession, loss of attachment, and gingival bleeding. Whilst in deep bite patients, the maxillary palatogingival and the mandibular lingual gingival tissues showed the highest levels of damage.

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Introduction

Incidence and prevalence data issued by the World Health Organization (WHO) show that malocclusion is one of the most commonly occurring dental and oral problems in people all over the world, after caries and periodontal disease.¹ Malocclusion is defined as a dental or skeletal relationship that is not ideal. Malocclusion can cause many dental health problems and disrupt oral and dental functions such as mastication, swallowing, and speech, as well as causing psychosocial problems due to its aesthetic effect.²

Malocclusion makes plaque control difficult. Some studies show there is a positive correlation between crowded teeth and periodontal diseases.³ Plaque and calculus increase the incidence of gingivitis. Changes in periodontal tissues can lead to edema of the gingival tissue, bleeding upon provocation, gingival swelling, discoloration, ulceration, and pocket formation.⁴

Malocclusion is also one of the predisposing factors of dental trauma.⁵

Periodontal tissues can adapt to occlusal force. An increase of occlusal force on periodontal tissues can lead to an increase in periodontal ligament width. Changes in direction of occlusal force can cause reorientation of force and tensile stress on periodontal tissues, which can lead to trauma of the periodontal tissues. It is true that malocclusion does not always lead to occlusal trauma,⁶ but excessive force borne by periodontal tissues over the long term is frequently caused by malocclusion.^{7,8}

Deep bite, one form of malocclusion, is one of the predisposing local factors of periodontal and skeletal problems.⁹ It can be caused by the arrangement of teeth and can lead to food impaction.¹⁰ Poor plaque control on the palatal aspect of the maxillary incisor can cause palatogingival inflammation and swelling. Deep bite also causes soft tissue trauma due to contact from antagonist teeth.¹¹ In adults and children, deep bite is the most commonly occurring type of malocclusion. In 10% of children and 13% of adults, the overbite is more than five millimeters.¹²

Several studies have analyzed the association between malocclusion and periodontal status, but few have analyzed the periodontal status of subjects with deep bite. The results of this study were expected to increase public awareness of the need to treat malocclusion so it does not lead to periodontal diseases.

*Corresponding author:

Yuniarti Soeroso
Department of Periodontics, Faculty of Dentistry
Universitas Indonesia, Depok, Indonesia.
Jl. Salemba Raya No. 4
Jakarta Pusat
E-mail: yuniarti_22@yahoo.co.id

Materials and methods

This study was a cross-sectional study. The study's population data were mined from medical records at teaching hospital Faculty of dentistry Universitas Indonesia. The inclusion criterion was an anterior deep bite. The exclusion criteria were medical records with incomplete examination details, and patients who smoked, had systemic diseases, took medications, or were pregnant.

The variable of this study was deep bite and periodontal status consisting of gingival bleeding, pocket depth, gingival recession, and loss of attachment. Data were analyzed by IBM SPSS software.

Variable	Frequency (N)	Percentage
Distribution by Gender		
<i>Normal Bite</i>		
Male	13	25%
Female	39	75%
<i>Deep Bite</i>		
Male	26	50%
Female	26	50%
Distribution by Age		
<i>Normal Bite</i>		
Early Juvenile	0	0%
Late Juvenile	18	34.6%
Young Adult	9	17.3%
Adult	8	15.4%
Early Elderly	10	19.2%
Late Elderly	5	9.6%
Older than Elderly	2	3.8%
<i>Deep Bite</i>		
Early Juvenile	1	1.9%
Late Juvenile	16	30.8%
Young Adult	3	5.8%
Adult	14	26.9%
Early Elderly	12	23.1%
Late Elderly	5	9.6%
Older than Elderly	1	1.9%
Distribution by OHIS		
<i>Normal Bite</i>		
Good	12	23.1%
Fair	22	42.3%
Poor	18	34.6%
<i>Deep Bite</i>		
Good	7	13.5%
Fair	9	17.3%
Poor	36	69.2%

Table 1. Subject Distribution by Gender, Age, Oral Hygiene Index Simplified (OHIS) Category

The highest mean of maxillary periodontal status in normal bite subjects was buccal loss of attachment. The highest mean of maxillary periodontal status in deep bite subjects was palatal pocket depth. The highest mean of mandibular periodontal status in normal bite subjects was buccal loss of attachment. The highest mean of mandibular periodontal status in deep bite subjects was lingual loss of attachment. The mean of PBI in normal bite subjects was 0.71. The mean of PBI in deep bite subjects was 1.34.

Variable	Mean ± SD		Min-Max	
	Buccal	Palatal	Buccal	Palatal
Maxillary				
<i>Normal Bite</i>				
Pocket Depth	0.09±0.37	0.14±0.54	0.00-2.00	0.00-3.00
Gingival				
Recession	0.30±0.76	0.04±0.23	0.00-3.00	0.00-1.33
Loss of Attachment	0.32±0.90	0.30±1.04	0.00-5.00	0.00-5.50
<i>Deep Bite</i>				
Pocket Depth	0.82±1.39	1.79±2.55	0.00-5.00	0.00-12.00
Gingival				
Recession	0.60±1.02	0.54±0.97	0.00-3.50	0.00-3.50
Loss of Attachment	1.23±1.76	1.76±2.59	0.00-6.50	0.00-12.00
Mandibular				
<i>Normal Bite</i>				
Pocket Depth	0.11±0.39	0.13±0.42	0.00-2.00	0.00-2.00
Gingival				
Recession	0.68±1.28	0.51±0.96	0.00-6.00	0.00-3.17
Loss of Attachment	0.70±1.30	0.47±1.04	0.00-4.25	0.00-4.00
<i>Deep Bite</i>				
Pocket Depth	1.56±1.68	1.15±1.73	0.00-6.00	0.00-8.00
Gingival				
Recession	0.95±1.18	1.14±1.33	0.00-4.50	0.00-5.00
Loss of Attachment	1.79±1.84	1.80±2.08	0.00-5.75	0.00-7.50
PBI				
<i>Normal Bite</i>				
PBI	0.71±0.56	0.00-2.00		
<i>Deep Bite</i>				
PBI	1.34±0.73	0.00-3.09		

Table 2. Mean, Maximum, and Minimum Scores of Pocket Depth, Gingival Recession, and Loss of Attachment in Maxillary, Mandibular, and Papila Bleeding index (PBI) in Normal Bite and Deep Bite Subjects.

Normality tests were conducted with the Kolmogorov-Smirnov test. Based on the Kolmogorov-Smirnov test, the distribution of data was not normal. Thus, the differences between the periodontal statuses were analyzed by the Mann-Whitney test. The Mann-Whitney test

showed there were differences between the means of pocket depth, gingival recession, loss of attachment, and PBI in normal bite subjects and deep bite subjects.

	Mean±Deviation Standard		p-values
	Normal Bite	Deep Bite	
Pocket Depth	0.14±0.38	1.33±1.24	0.000
Gingival Recession	0.47±0.75	0.80±0.92	0.027
Loss of Attachment	0.58±0.93	1.63±1.64	0.000
PBI	0.71±0.56	1.35±0.73	0.000

Table 3. Mann-Whitney U Test Results of Pocket Depth, Gingival Recession, Loss of Attachment, and PBI in Normal Bite and Deep Bite Subjects. Note: Mann-Whitney test, mean of data significantly different if p-values <0.05

Discussion

Frequently, gingival health can be improved with orthodontic treatments.⁴ Most adult orthodontic patients choose aesthetics as the reason to get orthodontic treatments, followed by functional and restoration demand, tooth loss, and periodontal tissue damage.^{13,14} Deep bite is an asymptomatic abnormality and aesthetically accepted.¹¹ It can caused discomfort, difficulty in speaking, aesthetics patient's facial structure and appearance.¹⁸ The focus of this study was the comparison between pocket depth, gingival recession, loss of attachment, and PBI of normal bite subjects and deep bite subjects. Each group had 52 subjects. Data collected from each group indicated that both groups had different subject compositions based on sex, age, and OHIS category. The majority of normal bite subjects were female (75%), while the deep bite group had the same proportion of males and females (50%). The normal bite group consisted of 13 male subjects and 39 female subjects, while the deep bite group consisted of 26 male subjects and 26 female subjects. The age group with the highest frequency of normal and deep bite subjects was late juvenile. Based on OHIS category, the majority of normal bite subjects had a fair OHIS score (42.3%) and the majority of deep bite subjects had a poor OHIS score (69.2%).

The highest means of maxillary periodontal

status and mandibular periodontal status of deep bite subjects were loss of attachment on the maxillary palatal and the mandibular lingual. These results differed from the Ackerly theory that said deep bite traumatic manifestation is trauma of gingivolabial of the maxillary incisive and gingivolabial of the mandibular incisive,¹⁰ and that it depends on individual oral health status.¹⁵ Data, which were collected from medical records, were then given a normality test and analyzed with the Mann-Whitney test. The results of this study showed there were significant differences ($p < 0.05$) between the gingival recession of normal bite subjects and deep bite subjects. The results were in accordance with Ackerly's study, which showed that deep bite subjects had occlusal trauma with gingival inflammation and recession on marginal gingiva.^{10,11}

The results of this study showed there were significant differences between the means of pocket depth and loss of attachment in normal bite and deep bite subjects. The results were in accordance with previous study, which showed that deep bite subjects had trauma caused by deep bite and had loss of gingival attachment with no appearance of periodontitis, which led to alveolar defects.^{16,17} This study also showed there were significant differences between the mean of PBI in normal bite and deep bite subjects. The results were in accordance with the Ackerly theory, which showed that deep bite caused trauma of periodontal tissues and gingival sulcus inflammation.^{10,11} The limitation of this study is sampling of medical records is not as optimal of a data collection method as direct sampling. The data in the medical records were not always complete. Additionally, sampling of medical records meant that controlling for other predisposing factors of periodontal diseases could not be done. Thus, further studies should control for the other predisposing factors of periodontal diseases indicated in the results of this study.

Conclusions

There were associations between deep bite and the increase in pocket depth, gingival recession, loss of attachment, and gingival bleeding, and in deep bite patients, the maxillary palatogingival and the mandibular lingual gingival tissues showed the highest levels of damage.

Declaration of Interest

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