OVERJET AND PERIODONTAL HEALTH: A COMPARATIVE STUDY BETWEEN SENIOR AND JUNIOR DENTAL STUDENTS

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بروز الفكين والصحة حول السنية ٠مقارنة بين طلاب طب الأسنان المستجدين والقدامى
د٠ حيدر هاشم – د٠ هدى الكواري

تم دراسة العلاقة بين بروز الفكين والصحة حول السنية من خلال المقارنة بين طـــلاب طب الأسنان المستجدين والقدامى (٤٠ طالباً لكل مجموعة بأعمار ما بين ١٩ – ٢٤ سنة) ٠

تم تقييم الصحة حول السنية باستعمال مشعر اللويحة الجرثومية والمشعر اللثوي وعمق الجيوب ٠

دلت النتائج (باستعمال اختبار كاي المربع وتحليل الاختلاف) على وجود علاقة بيــــن بروز الفكين والصحة حول السنية في الفكين العلوي والسفلي لدي الطلاب القدامى وفقاً لمشـــــعر اللويحة الجرثومية وفي الفك السفلي لدى الطلاب المستجدين وفقاً للمشعر اللثوي ٠

لم يلاحظ وجود أي اختلاف واضح بين الفكين عند أخذ عمق الجيوب بعيـــــن الاعتبـــار وكذلك الفك العلوي بالنسبة للمشعر اللثوي وهذا ينطبق على الطلاب المستجدين والقدامى ٠

The relationship between overjet and periodontal health was studied in 80 male dental students, 40 seniors and 40 juniors with age range from 19 to 24 years. The periodontal status was assessed by the Plaque Index, Gingival Index and probing pocket depth. A comparison of the periodontal health between the senior and the junior students was made. Chi-square test and one way analysis of variance were used for data analysis.The results indicated that there was a relationship between overjet and periodontal health as assessed by Plaque Index (in the upper and lower jaw for the senior students) and by Gingival Index (in the lower jaw for the junior students). However, no significant difference was found for pocket depth in both jaws and for the Gingival index in the upper jaw, for both senior and junior students.

Introduction

It has been postulated that certain morphological traits of malocclusion predispose periodontal disease. However, several studies of the association between malocclusion and periodontal disease report conflicting results. '

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Studies on malocclusion in general give less accurate information than studies on single traits of malocclusion. Several investigators studied the relationship between overjet with plaque accumulation and gingival inflammation. While some reported a relationship, " others did not find an association.

It is known that plaque is the preliminary etiological factor in the development of gingivitis[14] and probably periodontitis. ' These two conditions are

aggravated by malocclusion of teeth. Further, maloccluded teeth may be subjected to excessive occlusal forces which may result in accelerated periodontal breakdown.

The aim of this investigation was to study the relationship between overjet and periodontal health and to compare this relationship between senior and junior dental students.

Materials and Methods

The material consisted of 80 male dental students, 40 seniors (fourth and fifth levels) and 40 juniors (second and third levels). The students were selected according to the following criteria:

1. Male students
2. Age: 19-24 year old
3. The presence of all upper and lower front teeth, without crowns, extensive fillings, prosthetic restorations or extensions.
4. No history of periodontal or orthodontic treatment in the last 6 months.

Overjet (OJ)

The overjet was measured parallel to the occlusal plane from the labial surface of the mandibular central incisors to the labio-incisal edge of the maxillary right central incisor. The measurements were performed to the nearest 0.5 mm for overjet. If the right and left central incisors had different axial inclinations, the most protruded one was measured.

The periodontal parameters used were:

a) The Plaque Index (Silness and Loe 1964)

The Plaque was scored as follows:

Score 0 = No plaque

Score 1 = A film of plaque adhering to the free gingival margin and adjacent area of the tooth. The plaque may be seen in situ only after application of disclosing solution or by using the probe on the tooth surface.

Score 2 = Moderate accumulation of soft deposits within the gingival pocket, or on the tooth and gingival margin, which can be seen with the naked eye.

Score 3 = Abundance of soft matter within the gingival pocket and/or on the tooth and gingival margin.

b) The Gingival Index

Gingival Index was recorded as follows:

Score 0 = Absence of inflammation

Score 1 = Mild inflammation; slight change in colour and little change in texture.

Score 2 = Moderate inflammation; moderate glazing, redness, edema and hypertrophy; bleeding on pressure.

Score 3 = Severe inflammation; marked redness and hypertrophy; tendency towards spontaneous bleeding; ulceration.

Pocket Depth

Pocket depth was determined by using a periodontal probe. The mesial, buccal and distal aspects were measured to the nearest millimeter on the six front teeth in both jaws.

The students were examined in a dental clinic. For each student, the Plaque index[1] and Gingival index were recorded on the buccal surface of the upper and lower anterior teeth (Incisors and Canines). The pocket depth was measured by using William's periodontal probe. The data were recorded by a trained dental assistant.

Reproducibility

The examiner's ability to reproduce reliable scores was assessed. Consistency of scoring was assessed by comparing the readings of 12 registration points in the anterior segment in both upper and lower jaws with a one week interval. It was noticed that the inconsistent scores for Plaque and Gingival indices were not more than one score and one mm for the pocket depth.

The reproducibility in percent was calculated and the results were as follows:

Overjet 100% Plaque Index 85.0%

Gingival Index 86.7%

The students were classified according to the degree of overjet:

Group 1 = overjet 0 - < 2 mm

Group 2 = overjet > 2 to < 4.5. mm

Group 3 = overjet > 4.5 mm

Statistical Analysis

Chi-square test and one way analysis of variance were used for the analysis of the data. When Chi-square was significant, the nature of association was studied by computing the percentage distribution of the row classification within each column.[20] A 5% level of significance was used for the rejection of the null hypothesis.

Results

Overjet and periodontal health for the senior students

i) Sample analysis

The distribution of overjet in the sample revealed that 16 (40%) of the senior students had an overjet of 2 mm or less. Overjet of more than 2 mm but less than 4.5 mm was present in 14 (35%) of the senior students whereas 10 students (25%) had an overjet of 4.5 mm or more.

Table (1) shows that in both upper and lower jaws the association between overjet and plaque index was statistically significant (P < **0.001** in **Upper jaw** and **P < 0.05** in lower jaw).

ii) Overjet versus Plaque Index

Group 3 (OJ > 4.5 mm) showed the highest percentage of score 0 and the lowest percentage of score 2 + 3 in both upper and

Table 1. Overject and periodontal condition for the senior students (n = 40).

Overjet vs.	**Statistical Test**	D.F.	**P**
Upper Jaw			
Plaque Index			
Buccal Surface	CHIS = 22.52	4	***
Ginqival Index			
Buccal Surface	CHIS = 4.01	4	N.S.
Pocket Mean			
Buccal Surface			
Distal	F= 0.76	-	N.S.
Buccal	F = 0.89	-	N.S.
Mesial	F = 0.30	-	N.S.
Lower Jaw			
Plaque Index			
Buccal Surface	CHIS = 11.44	4	*
Ginqival Index			
Buccal Surface	CHIS = 7.70	4	N.S.
Pocket Mean			
Surface			
Distal	F-0.51	-	N.S.
Buccal	F = 0.24	-	N.S.
Mesial	F = 0.64	-	N.S.

P<0.05* PO.001*** N.S. = Not significant
CHIS = Chi-square value D.F. = Degree of freedom
F is based on one-way Analysis of Variance

lower jaws. This indicated that Group 3 had better oral hygiene condition than the other groups. Group 2 (OJ > 2 to < 4.5 mm) showed the highest percentage of score 2 + 3 in upper jaw, whereas group 1 (OJ 0 - < 2 mm) showed the highest percentage of score 2 + 3 in the lower jaw. This indicated that Group 2 had the least favourable oral hygiene condition in the upper jaw while group 1 had the least favourable oral hygiene in the lower jaw (Fig. 1).

iii) Overjet versus Gingival Index

As shown in Table 1 the relationship between overjet and Gingival index was not statistically significant in both upper and lower jaws.

In both jaws

Group 3 demonstrated the highest percentage of score 0 and the lowest percentage of score 2 + 3. Group 2 showed the highest percentages of 2 + 3 scores in the upper jaw and same was observed in group 1 in the lower jaw. Groups 1 and 2 showed similar percentage of scores 1 and 0 in both jaws. Hence, Group 3 had a better gingival condition than Groups 2 and 3 in both jaws (Fig. 2).

iv) Overjet versus pocket depth

Table 2 shows no significant statistical difference in the pocket depth on all buccal surfaces neither between the groups nor within the groups in both jaws.

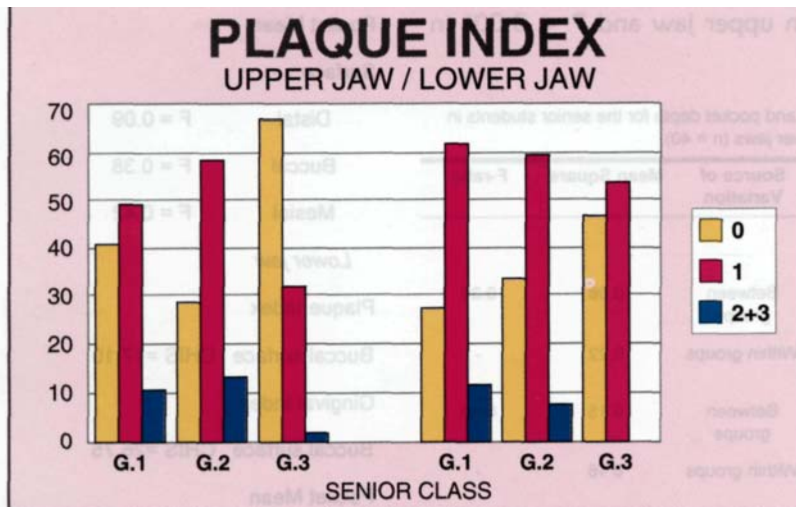

Fig. 1. Frequency distribution of plaque index scores in percentage for the overjet groups (senior students).

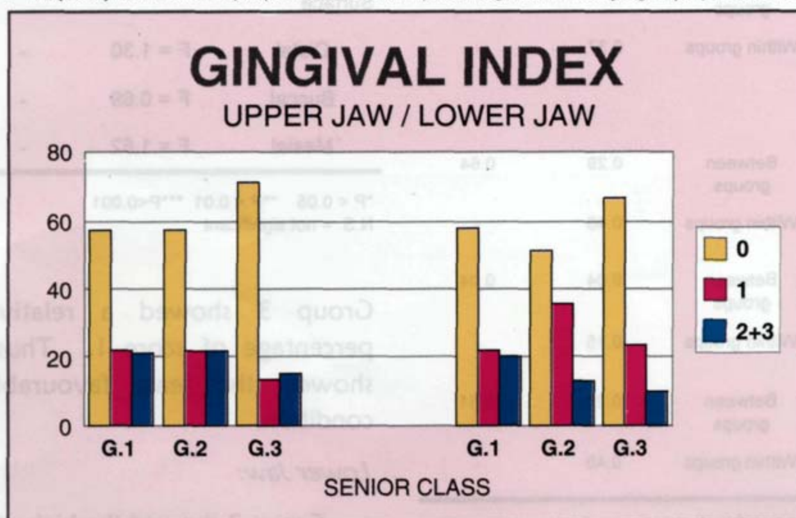

Fig. 2. Frequency distribution of gingival index scores in percentage for the overjet groups (senior students).

Overjet and periodontal health for the junior students

i) Sample analysis

The distribution of overjet in the sample revealed that 17 (42.5%) of the junior students had an overjet of 2 mm and less. Overjet of more than 2 mm and less than 4.5 mm was present in 16 (40%) of the junior students and 7 students (17.5%) had an overjet of 4.5 mm or more.

ii) Overjet versus Plaque Index

Table 3 shows that in both upper and lower jaws, the association between overjet and plaque index was statistically significant (P < 0.05 in upper jaw and P < 0.001 in lower jaw).

Table 2. Overjet and pocket depth for the senior students in the upper and lower jaws (n = 40).

Overjet vs.	Source of Variation	Mean Square	F-ratio
Upper jaw			
Mesial	Between groups Within groups	0.08	0.30
		0.22	
Buccal	Between groups	0 15	0.89
	Within groups	0.16	-
Distal	Between groups	0.28	0.76
	Within groups	**0.37**	-
Lower jaw			
Mesial	Between groups	**0.29**	064
	Within groups	**0.46**	-
Buccal	Between groups	**0.04**	024
	Within groups	**0.15**	-
Distal	Between groups	0.20	0.51
	Within groups	**0.40**	-

All F ratios are not significant

Upper Jaw

Group 2 in the upper jaw showed the lowest percentage of score 0 and the highest percentage of score 2 + 3. Group 2 and

Table 3. Overjet and periodontal condition among junior students (n= 40).

Overjet vs.	**Statistical Test**	**D.F.**	P
Upper jaw			
Plaque Index			
Buccal surface	**CHIS** =12.93		*
Gingival Index			
Buccal surface	CHIS= 6.87		N.S.
Pocket Mean Surface			
Distal	F = 0.09		N.S.
Buccal	F = 0.38		N.S.
Mesial	F = 0.42		N.S.
Lower jaw			
Plaque Index			
Buccal surface	CHIS =17.10		**
Gingival Index			
Buccal surface	CHIS =26.75		***
Pocket Mean Surface			
Distal	F = 1.30		N.S.
Buccal	F = 0.69		N.S.
Mesial	F = 1.62		N.S.

*P < 0.05 **P < 0.01 ***P<0.001
N.S. = not significant

Group 3 showed a relatively similar percentage of score 1. Thus, Group 2 showed the least favourable gingival condition.

Lower Jaw:

Group 3 showed the highest percentage

of score 0 and the lowest percentage of score 2 + 3. This indicated that Group 3 had a better oral hygiene condition than the other groups. Group 2 showed the highest percentage of score 2 + 3 in both jaws suggesting that it had the least favourable oral hygiene condition. (Fig. 3).

iii) Overjet versus Gingival Index

As shown in Table 3 the relationship between overjet and gingival index was statistically significant only in the lower jaw (P < 0.001).

Upper Jaw:

Group 3 demonstrated the lowest percentage of score 0 and the highest percentage of score 2 + 3. Accordingly, Group 3 showed the least favourable gingival condition with Group 2 as being second in rank. Group 1 exhibited the lowest percentage of score 2 + 3 and the highest percentage of score 0. Hence, Group 1 had a better gingival condition.

Lower Jaw

Group 1 showed the highest percentage

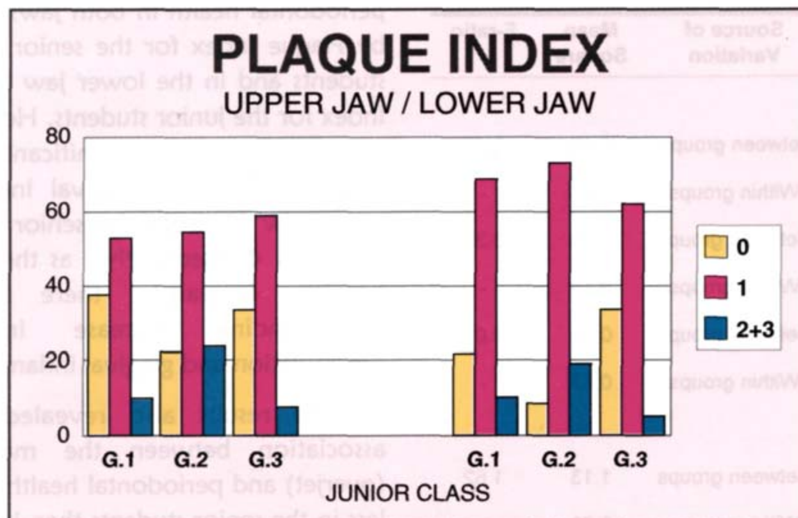

Fig. 3. Frequency distribution of plaque index scores in percentage for the overjet groups (Junior students).

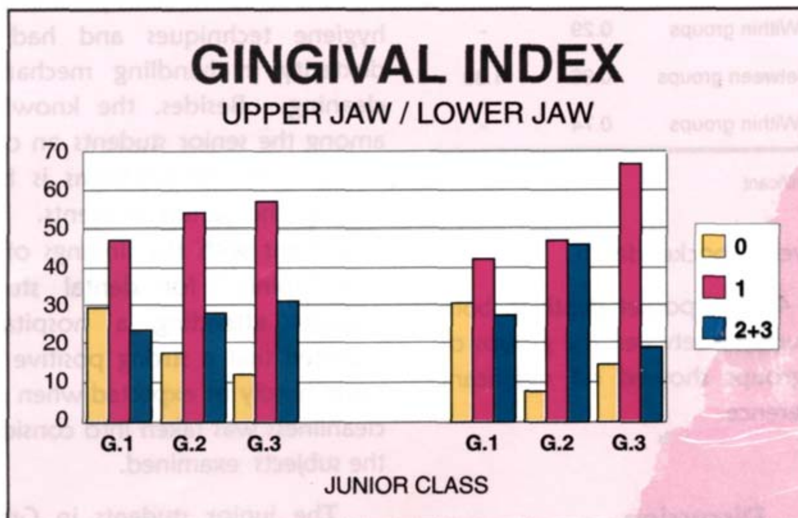

Fig. 4. Frequency distribution of gingival index scores in percentage for the overjet groups (Junior students).

of score 0 and the the lowest percentage of score 1. On the other hand. Group 2 exhibited the highest percentage of score 2 + 3 and the lowest percentage of score 0.

Group 3 demonstrated the lowest percentage of score 2 + 3 and the highest percentage of score 1. Consequently, Group 2 had the least favourable gingival condition than Group 1 and Group 3 (Fig. 4).

Table 4. Overjet and pocket depth among junior students in the upper and lower jaws (n = 40).

Overjet vs.	Source of Variation	Mean Square	F-ratio
Upper jaw			
Mesial	Between groups	**0.19**	0.42
	Within groups	**0.46**	-
Buccal	Between groups	0.06	0.38
	Within groups	0.15	-
Distal	Between groups	0.06	0.09
	Within groups	0.63	-
Lower jaw			
Mesial	Between groups	1.13	1.62
	Within groups	0.70	-
Buccal	Between groups	0.20	0.69
	Within groups	0.29	-
Distal	Between groups	0.96	1.30
	Within groups	0.74	.

All F ratios not significant

iv) Overjet versus pocket depth

In Table 4, the pocket depth in both jaws on all surfaces between the groups or within the groups showed no significant statistical difference.

Discussion

Correction of increased overjet is undertaken to improve esthetics, reduce the susceptibility to trauma, avoid tooth migration, gingival inflammation and improve functional ability.

The degree of overjet considered excessive varies between the different investigators. In this study, a few students had an overjet of more than 6 mm. This is related to the bimaxillary tendency which is more frequent among Arabs and American Negroes.[21,22]

The results of the present study show an association between overjet and periodontal health in both jaws as assessed by Plaque Index for the senior and junior students and in the lower jaw by Gingival Index for the junior students. However, the results showed no significant statistical difference for the Gingival Index in the upper jaw for both the senior and junior students. Consequently, as the degree of overjet increases, there was no corresponding increase in plaque accumulation and gingival inflammation.

The results also revealed that the association between the malocclusion, (overjet) and periodontal health was found less in the senior students than in the junior students. This can be explained by the fact that the senior students practiced better oral hygiene techniques and had advanced dexterity in handling mechanical tooth cleaning. Besides, the knowledge level among the senior students on oral hygiene and periodontal problems is higher than among the junior students. This is in agreement with the findings of Alexander and Tipinis[23] for dental students and patients attending a hospital. They reported that a strong positive correlation could hardly be expected when perfect oral cleanliness was taken into consideration for the subjects examined.

The junior students in Group 1 and Group 2 exhibited poorer gingival

conditions in the upper anterior segment when compared to the lower anterior segment. This may be related to a lack of lip seal in the majority of the students and to increase in gingivitis. '

The results of this study showed an inconsistency with the increase of the degree of overjet. This inconsistency may be attributed to the fact that the majority of the students in group 2 and group 3 brush their teeth regularly and adequately.

The results of this study are in agreement with previous studies. However, the results of the present study are in disagreement with other investigators[11,32,33]

The age range chosen is quite important. In this study, the age range (19-24 years) was selected to avoid certain ages, e.g. 12 years, as there is a strong inclination towards gingivitis, and 50 years due to periodontitis.

No significant statistical difference was observed when the degree of overjet was related to pocket depth around the anterior teeth. The same observation was reported by Tipinis. Slatter and Alexander.

The diversity of these results are at least partially due to the fact that different methods were used in recording malocclusion and periodontal disease and usually cross-sectional samples were examined. Hence, meaningful comparisons are not always possible and firm conclusions are difficult to draw. Thus, there is a need for more studies using large uniform samples and sound methods of assessing periodontitis and specific features of malocclusion.

When evaluating the results of the present study, it must be taken into consideration that other local factors are involved in determining dental health. It is also noteworthy to remember that this association may be confined to 19-24 year old dental students with an oral hygiene level comparable to what is reported in this investigation.

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