

Occlusal criteria in two Iraqi rural communities

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ABSTRACT

This study was carried out to assess the occlusal features in two Iraqi rural populations, to evaluate the prevalence of these criteria, to explore the difference in these features between the two communities and to provide data base for the malocclusion add to the available informations mainly in rural areas. A sample of (268) males with age range (12-18) years (139 persons from Al-Sharkhan and 129 from Al-Shamsiat rural areas). The statistical analysis revealed that the normal occlusion form (38%) for the two areas while the Class I malocclusion appeared in (54.1%) of the total sample, but Class II division 1 and 2 occurred in (8.2%), (2.2%) respectively, and lastly the Class III malocclusion noticed at (6.3%). The most commonly occurring feature was the generalized dental spacing (40.31%) followed by the generalized crowding (23.25%), and deep bite of which the total overlapping of the lower anterior teeth was occur in (7.08%). Nevertheless, open bite noticed at (1.49%) of the total sample. In this research, there was only a significant difference between the samples of two rural areas at the generalized dental crowding, spacing and in the slight and extreme increase in over jet. Also the unilateral cross bite, buccally erupted canines were more common than the bilateral one.

Key Words: Prevalence, malocclusion, rural area.

الخلاصة

تهدف هذه دراسة إلى فحص الصفات الاطباقية للسكان في منطقتين ريفيتين هما قرية الشريخان والشمسيات وذلك لتحديد أي اختلاف في هذه الصفات بين المنطقتين مع توفير قاعدة معلومات حول هذه الصفات في تلك المناطق للاستفادة منها مستقبلاً. تم جمع عينة مكونة من (268) شخص ذكر بين سن (11-18) سنة، تم وضع صفات معينة لهذه العينة وقد تم جمع (139) شخص من قرية الشريخان و(129) شخص من قرية الشمسيات. لقد أظهرت النتائج الإحصائية أن نسبة الإطباق السليم (38%) لكلا المنطقتين، أما حالة سوء الإطباق فقد توزعت كما يلي: للصف الأول كانت نسبة (45,1%)، الصف الثاني القسم الأول كانت (8,2%)، القسم الثاني (2,2%)، أما الصف الثالث فقد شكّل (6,3%). لقد كانت نسبة حالة الفراغات بين الأسنان هي الأعلى (40,31%) أما نسبة تزامم الأسنان فقد كانت (54,1%). لقد ظهر أن العضة العميقة التي يتم فيها تغطية الأسنان السفلى بالعلية تماماً هي الأكثر شيوعاً (7,08%) من بقية أنواع العضات، وكذلك ظهر أن هناك اختلاف معنوي بين العينة في الشريخان والشمسيات لكل من سوء الإطباق من النوع الأول، تزامم الأسنان الكلي، الفراغ الكلي بين الأسنان، وحالات بروز الفك العلوي إلى الأمام. كذلك وجد أن حالة العضة المتصالبة والناب الخدي النمو ذات الجبهة الواحدة هي الأكثر شيوعاً من ذات الجبهتين.

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INTRODUCTION

Malocclusion today is a public health problem, as each individual has the right to achieve maximum usefulness of his dentition ⁽¹⁾. Many efforts were done to incorporate the orthodontic treatment in mass dental health programs, this was done beside the expansion on the post-graduated studies that need an adequate trained professional persons; all of these necessitated the establishment of clearly defined epidemiological data base in relation to malocclusion features.

The investigation of malocclusion prevalence among adolescent was carried out by many authors, Ngang *et al.* ⁽²⁾, registered the occlusal criteria in a group of Kenyan adolescents and reported that the prevalence of malocclusion was (72%) indicating that crowding was the mostly prevalent feature (19%), followed by posterior cross bite (10%), deep bite (10%) and the frontal open bite was (8%); while Tang ⁽³⁾ tried to evaluate the malocclusion prevalence of Hong Kong males dental students and found that the commonly occurring feature was crowding (38.9%), also reported that Class II malocclusion formed (21.3%) followed by Class III (14.8%).

In (1998), Proffit *et al.* ⁽⁴⁾ provided a clear picture about malocclusion in United States population. They reported a noticeable irregularity occurs in the majority all racial ethnic groups with only (35%) of adults have well-aligned mandibular incisors. The irregularity was severe in (15%) of population, and about (20%) have deviation from the ideal bite relationship as in (2%) of these cases they are severe enough to be out of the limit of orthodontic correction. In Mexican-Americans that compared to the rest of study population, the incisor irregularity and both severe Class II and III malocclusion were more prevalent, but deep bite and open bite were less common. Also they indicated that over (30%) of White youths, (11%) of Mexican-Americans, and (8%) of Blacks reported as a person who receiving orthodontic therapy.

Other investigators ⁽⁵⁾ reported that malocclusion are generally less common among African and Arab children than Europeans. However, Angle Class III malocclusion is more common among African and Arab children, whereas the opposite is found for Angle Class II malocclusion. They recorded also that the space conditions are better in African Arab children than European populations.

El-Mongoury and Mostafa ⁽⁶⁾ investigated the occlusal variation among Egyptian adults. They recorded that (34.4%) showed normal occlusion, while the Angle's malocclusion classes were (33.3%), (21%), (10.6%) and (0.8%) for Class I, II, III and IV respectively. Afify and Hafez ⁽¹⁾ carried out an epidemiological study on persons who living in one of the rural Egyptian areas and recorded the malocclusion features in a sample of (14-15) years of age and found that normal occlusion is presented in (42%) of the total sample. Also found that crowding was seen in (10.4%) of the cases while spacing in (8.2%) and they recorded that the cross bite is present in (20%) of total adolescent cases.

In Iraq, many epidemiological works were done ⁽⁷⁻¹¹⁾, mostly in urban region. Salman ⁽⁹⁾ reported that Class I malocclusion was the predominant dental arch relationship (79.4%) and the crowding was more common feature (41.5%), followed by cross bite (5.6%). In accompany to that, Jasim ⁽¹⁰⁾ concluded that the normal occlusion were (24.4%) while Class I malocclusion was (54.9%), Class II and Class III were (18.7%) and (2%) and recorded that dental crowding was reported in (42.6%) of the population, over bite was represented in (50.3%) and the over jet from (0-5) mm were found in (92%) of the study sample which have an age range between (12-14) years old.

Beside these researches, Al-Sayagh⁽¹¹⁾ assessed the occlusal variation in Al-Sharkhan rural area and indicated the most of the subjects has Class I molar and canine occlusion, with approximately $\frac{3}{4}$ of the sample had normal over jet and correct midline relation with the crowding of lower anterior teeth was the most common feature.

In accompany to these researches, the purpose of this study was to evaluate the occlusal features in a group of males living in two separated rural areas, and to compare each of these occlusal criteria for those two rural populations so as to provide additional epidemiological data base for the malocclusion that may be used as basis for preventive and interceptive orthodontics.

MATERIALS AND METHODS

The sample of this study consists of (268) males (129 from Al-Sharkhan and 136 from Al-Shamsiat rural communities). They were chosen throughout dental survey that was done in these villages. The age range was between (11-18) years. There are specific criteria that have been considered:-

- 1- No previous orthodontic treatment.
- 2- No history of any disease that could disturb the craniofacial growth.
- 3- No extracted permanent teeth or big cavitation or restoration.

The materials used were: 1) Dental probes, 2) Mirrors, 3) Kidney dishes, 4) Sterilizing solution (Septicin 4%), 5) Cotton, and 6) Modified sliding caliper gauge.

Every subject was submitted to the oral examination using the natural light by setting him on a chair in an upright position. The assessment was carried out by one examiner and the informations were recorded by a dental student.

1: Examination of Occlusion

The relationship of the occlusion antero-posteriorly was recorded according to Angle's basic classification of malocclusion⁽¹²⁾:

Class I. The mesiobuccal cusp of upper first permanent molar is occluded with the buccal groove of the lower first permanent molar.

Class II. The mesiobuccal cusp tip of upper first permanent molar is occluded $\frac{1}{2}$ cusp width in relation to lower antagonist.

Division 1. There is an increase in overjet, with procline upper central incisors.

Division 2. Retrocline upper central incisors, with increased overbite.

Class III. The upper first permanent molar occluded $\frac{1}{2}$ cusp width posterior to the buccal groove of the lower first permanent molar.

Overjet: - is represented by the anterior distance from the anterior incisal edge of the lower central incisor to the most anterior part of the incisal surface of the opposing incisor⁽¹³⁾. An overjet (1-3) mm is normal, (3.1-7) mm slight increase in overjet and (>7) mm is extreme one. The reverse is recorded in minus value.

Overbite: - This relationship was recorded according to Kerosuo *et al.*⁽¹⁴⁾, as the define as overlap of the central incisors: -

- 1= No overlap (anterior open bite).
- 2= Overlap of half of the crown height of the antagonistic mandibular incisor or less.
- 3= Overlap of more than half but less than total crown height of the mandibular incisor.
- 4= Total overlapping, with contact of mandibular incisors with palatal mucosa (deep bite).

Anterior Crossbite: - also assess according to Kerosuo *et al.* ⁽¹⁴⁾:

0= No.

1= One or more of maxillary incisors deviate bucco-lingually in palatal direction.

Posterior Crossbite: - This was recorded either unilateral or bilateral when the upper premolars or molars deviated bucco-lingually greater than half of cusp, so that the cusps had passed one another ⁽¹⁵⁾.

2: Examination of Dentition

Dental Crowding: - It was estimated separately for anterior and for the posterior and anterior (generalized) ⁽¹⁴⁾, in the upper and lower arches.

0= No crowding.

1= Lack of space for less than half, or half, or more than half of the mesio-distal width of tooth in segment, or even lack of space for one tooth or more.

Dental Spacing: - defined as teeth separation that exposes to view the interdental papillae on the alveolar crest. These are evaluated either at midline (midline diastema) or anteriorly and posteriorly (generalized spacing) in the upper and lower arches ⁽¹⁶⁾.

Buccally Erupted Canine: - The canine is positioned in such a manner to be out of the dental arch, with the loss of contact or disturb in interproximal relationship between the canine on one hand and the lateral incisor or first premolar on the other hand. This relation was recorded in the upper and lower arches ⁽¹⁷⁾.

The data of the present study was statistically analysed to determine the percentage and distribution and distribution of the measured occlusal features. Also chi square test was carried out between the sample of each rural community.

RESULTS

From the analysis of the data of the present study, we can notice that the malocclusion showed higher percentages than the normal occlusion in the two rural communities. The Class I malocclusion was the highly percentage one, especially at Al-Shamsiat sample as it was formed (55.8%) from the total sample of that population; while the lowest percentage was found in Class II Division 2 at Al-Shamsiat sample also. These results were shown in table (1).

Table (1): The sample distribution percentage according to Angle's classification of malocclusion

Variables	Al-Sharkhan n= 129	Al-Shamsiat n= 139	Total n= 268	p Value
Normal Occlusion	48.2	27.23	38.1	N.S
Class I Malocclusion	35.2	55.81	45.1	S
Class II Division 1 Malocclusion	7	9.3	8.2	N.S
Class II Division 2 Malocclusion	3.5	0.7	2.2	N.S
Class III Malocclusion	5.75	6.97	6.3	N.S
Total Malocclusion	51.8	72.8	61.9	N.S

$p < 0.05$

In table (2), which describe the percentage distribution of the occlusal features of the total sample, we found that the generalized dental spacing formed about (23%), (40.31%) of the Al-Sharkhan and Al-Shamsiat population respectively unlike the dental crowding, mainly the anterior one which formed only (2.8%) and (6.9%) in the two samples respectively, and the percentage of the anterior open bite appear to be the lowest one (1.49%).

Table (2): Occlusal features distribution percentage in the sample

Variables	Al-Sharkhan	Al-Shamsiat	Total	p Value	
Anterior Dental Crowding	2.87	6.97	4.85	N.S	
Generalized Dental Crowding	7.91	23.25	15.29	S	
Midline Spacing	5.03	2.32	3.73	N.S	
Generalized Dental Spacing	23.0	40.31	31.34	S	
Anterior Crossbite	6.4	6.97	6.71	N.S	
Posterior Crossbite	U	3.59	1.55	2.51	N.S
	B	2.15	1.05	2.98	N.S
Anterior Open Bite	2.87	0	1.44	N.S	
Buccally Erupted Canine	U	4.31	3.10	2.98	N.S
	B	2.15	3.87	2.9	N.S

$p < 0.05$; U = Unilateral; B = Bilateral.

In relation to the changing in the overjet, we noticed that the slight increase (4-7) mm in overjet have the highest value, while the total overlapping of the lower central incisors have the highest percentage in relation to the change of overbite of the total sample (table 3).

Table (3): Percentage distribution of overjet and overbite in the sample

Variable	Al-Sharkhan	Al-Shamsiat	Total	p Value	
Overjet	Edge to Edge	1.43	0	0.74	N.S
	Slight Increase	2.8	8.52	5.59	S
	Extreme Increase	4.31	0.77	2.67	S
Overbite	½ Overlapping	0.71	0	0.37	N.S
	More Than ½ Overlapping	3.59	3.10	3.35	N.S
	Total Overlapping	6.47	7.75	7.08	N.S

$p < 0.05$

DISCUSSION

Malocclusion has often been referred to as a disease of civilization, signify that it is found primarily in developed, urbanized populations and rare in under-developed societies^(12, 18). Nowadays, this concept is changing in non-industrialial human population and many measurable occlusal variations could be assessed⁽¹⁹⁾.

Generally, there are two broad sets of theories use to explain irregular occlusal variation. One is based on genetic arguments, and the other emphasizes the role of the environment to describe clearly the ætiologic cause of malocclusion. Most orthodontists seemingly believe that the genetic factor is mostly important, considering any preventive measure an impossible; so, they demonstrated that the overjet, overbite, spacing and crowding are heritable ones^(20, 21). Other articles indicating that the familiar similarities are not causes for orthodontic problems and did not agree with research that call for discarding the environmental causes like those that lead to thumb-sucking, mouth breathing and premature loss of deciduous teeth^(22, 23).

Many previous researches⁽²⁴⁾ try to assess the prevalence of malocclusion at different communities, surprisingly little were done to examine these criteria at the rural populations, considering them as a close communities and some of them never experienced any professional dental care with exception of some extractions.

Nowadays, the younger residents of these areas have a different life style; many of them have had different dietary habits. Those persons raised on softer and more cariogenic foods, for that reason the occlusal variations started to be developed^(25, 26).

In relation to the present work, it was clear that this study has results that similar to those how as carried by some of malocclusion prevalence investigators mainly on the general pattern of the distribution of normal occlusion and the Angle's classes of malocclusion like Abu-Affan *et al.*⁽⁵⁾ who reported that the majority of the sample was Class I (normal and malocclusion). Also with Al-Emran *et al.*⁽²⁷⁾ which recorded that a total (62.4%) of male children at age (14) years old had one or more malocclusion features related to dentition at Saudi Arabia, and Afify and Hafez⁽¹⁾ who found that the normal occlusion percent was (42%) and total malocclusion prevalence was (57.9%) for a group of Awlad Ali Tribe at Egypt rural area.

While, in relation to other international studies, there was a large difference in normal and malocclusion distribution, as Ngang *et al.*⁽²⁾ found that the prevalence of malocclusion was (72%) in Kenyan adolescents, while Silva and Kang⁽²⁸⁾ indicated that more than (93%) of Latino adolescents who living in United States demonstrated some forms of malocclusion. These substantial differences were mainly related to different causes like racial variations among the population also to the differences in sampling technique.

This research was also evaluated in relation to those which were carried out at Iraqi population but without direct numerical comparisons. The differences that occurred were mainly related to the sample age, sex and also to the location as some of them^(9, 10) were carried at city center; such differences were shown in table (4).

Our findings were in disagreement with others who carried their studies at Iraqi population⁽⁹⁻¹¹⁾ as they recorded that the dental crowding is the predominant occlusal feature at their samples but in this research we found the generalized dental spacing was the predominant one followed by the dental crowding, but there were agreement with Jasim⁽¹⁰⁾ in relation to the distribution of the anterior open bite and with Salman⁽⁹⁾ in relation to the posterior crossbite.

Table (4): Percentage distribution for normal and malocclusion classes for Iraqi studies

Variables	Present Study	Al-Sayagh	Jasra	Al-Safman
Normal Occlusion	38		24.4	
Class I Malocclusion	45.14	84.84	54.4	79.4
Class II Division 1	8.20	7.99	16.5	15.84
Class II Division 2	2.23		2.2	1.98
Class III Malocclusion	6.32	7.17	2.0	2.80

The buccally erupted canine appears to have much less value than those which recorded by Kinaan ⁽²⁹⁾ as he indicated that (27%) of orthodontic patients were complained of malposed canine (24% in the upper and 3% only in the lower arches). Other Iraqi investigator ⁽³⁰⁾ showed that the unilateral are more common than the bilateral one. We are here in agreement with that conclusion.

The overbite and overjet patterns were distributed differently from other studies with the exception of Al-Sayagh ⁽¹¹⁾. This will reflect the differences found in certain craniofacial and dentoalveolar structures

After all of these, this distinct difference in the prevalence of the occlusal feature like dental crowding as well as the variation of vertical incisal occlusion seem to reflect some hereditary or environmental factors which are expressed as dentoalveolar or skeletal differences among population.

CONCLUSIONS AND RECOMMENDATIONS

1. The percentage of normal occlusion was lower than that of the malocclusion in both rural communities of Al-Sharkhan and Al-Shamsiat. The Class I malocclusion was the highly percentage one in both populations and in relation to total sample, while the Class II Division 2 was the smallest one.
2. The percentage of the generalized dental spacing was higher than that of the dental crowding (the anterior or the generalized), while the anterior open bite have the lowest percentage.
3. There was a slight increase in the overjet which range between (4-7) mm and the total overlapping of the lower central incisors by the upper antagonist was more predominant.
4. The significant difference between two rural communities was appeared on the Class I malocclusion, generalized dental crowding and spacing. Also at the slight and extreme increase of the overjet percentages.

After this assessment for some occlusal features, we recommended for more epidemiological studies so as to determine the prevalence of more specific malocclusion criteria, examine the effects of different environmental factors on the occlusion of the offsprings in comparison with parents, and more epidemiological researches are needed to determine the difference between rural and urban communities.

REFERENCES

1. Anify H, Hafez SA. Malocclusion in a group of adolescents of the tribe of Awlad Ali: An epidemiological study. *Egypt Orthod J.* 1993; 7: 225-234.
2. Ngang PM, Ohito F, Øgaard B, Valderhaug J. The prevalence of malocclusion in 13- to 15- year-old children in Nairobi, Kenya. *Acta Odontol Scand.* 1996; Apr 54(2): 126-130.
3. Tang EL. The prevalence of malocclusion amongst Hong Kong male dental students. *Br J Orthod.* 1994; Feb 21(1): 57-63.
4. Proffit WR, Fields HW, Moray LJ. Prevalence of malocclusion and orthodontic treatment need in the United States: Estimates from the NHANES III survey. *Int J Adult Orthod Orthognath Surg.* 1998; 13(2): 47-106.
5. Abu-Affan AH, Wisth PJ, Boe OE. Malocclusion in 12- year-old Sudanese children. *Odontostomatol Trop.* 1990; Sep 13(3): 87-93.
6. El-Mongoury NH, Mostafa GA. Occlusal variations among Egyptians. *Cairo Dent J.* 1985; 1: 117-124.
7. Al-Alousi W, Jamison HH, Legler DD. A survey of oral health in Iraq population characteristics, occlusion and enamel mottling of senior secondary school students. *Iraqi Dent J.* 1982; 9: 8-16.
8. Kinaan BK. The problem of malocclusion in Iraq. *Iraqi Dent J.* 1982; 9: 24-28.
9. Salman KhA. Problems of malocclusion among 11-15 years old of school children in the center of Mosul. Accepted for publication in *Al-Buhooth Al-Tachaniya.* 1997.
10. Jasim FY. Prevalence of malocclusion in Mosul City 12-14 years old children. Accepted for publication in *Iraqi Dent J.* 2000.
11. Al-Sayagh NM. Occlusal variations among Al-Sharkhan rural population. *Al-Rafidain Dent J.* 1(Sp Iss): 294-312.
12. Angle EH. Classification of malocclusion. *Den: Cosmos.* 1899; 41: 243-264.
13. Corruccini RS, Whitly LD. Occlusal variation in a rural Kentucky community. *Am J Orthod.* 1981; 79: 250-262.
14. Kerosuo H, Lain T, Nggssonen V, Honkala E. Occlusal characteristics in groups of Tanzanian and Finnish urban school children. *Angle Orthod.* 1991; 61(1): 49-56.
15. Kinaan B, Kand-Burk PH. Quantitative assessment of the occlusal features. *Br J Orthod.* 8: 149-156.
16. Bjork A, Krebs A, Solow B. A method for epidemiological registration of malocclusion. *Acta Odontol Scand.* 1964; 22: 27-41.
17. Benjamin H. Diagnosis and prevention of maxillary cuspid impaction. *Angle Orthod.* 1981; 5: 30-40.
18. Corruccini RS. An epidemiologic transition in dental occlusion in world population. *Am J Orthod Dentofac Orthop.* 1984; Nov: 419-426.
19. Omran AR. The epidemiologic transition. *Milbank Mem Fund.* 1971; 49: 509-538.
20. Lavelle CL. Maxillary and mandibular tooth size in different racial groups and in different occlusal categories. *Am J Orthod.* 1972; 61: 29-37.
21. Niswander JD. Genetics of common dental disorders. *Dent Clin North Am.* 1975; 19: 197-206.
22. Keene HJ. Epidemiologic study of tooth size variability in caries free recruits. *J Dent Res.* 1971; 50: 1331-1345.
23. Moorvees CF, Reed RB. Biometrics of crowding and spacing of the teeth in the mandible. *Am J Phys Anthropol.* 1954; 12: 77-88.
24. Hunt EE. Malocclusion and civilization. *Am J Orthod.* 1961; 47: 406-409.

25. Ast DB, Allawy N, Draker HL. The prevalence of malocclusion related to dental caries and lost first permanent molars in a fluoridated city and a fluoridated deficient city. *Am J Orthod.* 1962; 48: 106-113.
26. Abd El-Kader W, Hafez S. Prevalence of malocclusion in a group of children living in an over-fluoridated area. *Egypt Orthod J.* 1993; 7: 309-318.
27. Al-Emran S, Wisth PJ, Boe OE. Prevalence of malocclusion and need for orthodontic treatment in Saudi Arabia. *Community Dent Oral Epidemiol.* 1990; 18(5): 253-255.
28. Silva RG, Kang DS. Prevalence of malocclusion among Latino adolescents. *Am J Orthod Dentofac Orthop.* 2001; 119(3): 313-315.
29. Kinaan BK. Management of buccally malposed upper canine. *Iraqi Dent J.* 1983; 10: 3-23.
30. Ghaib NH. Buccally malposed maxillary canine. A survey on school children aged 13-14 years. MSc thesis submitted to the College of Dentistry, University of Baghdad. 1992.