Original Article

Occlusal features of 12 years old Malaysian Malay school-children in Shah Alam

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3) Running title: **Occlusal features of 12 years old Malaysians**

Abstract

Objectives: To assess the occlusal features, tongue habits, lip competence and their gender dimorphism in 12 years old Malaysian Malay school-children. **Materials and methods:** The method involved clinical examination of 208 subjects from public schools in Shah Alam, Selangor, Malaysia. Occlusal status was assessed according to Angle classification. The following features were also assessed and recorded: overjet, overbite, traumatic overbite, crowding, spacing, midline diastema, cross bite, scissors bite, dental midline shifts, canine displacement, missing teeth, traumatically fractured teeth, tongue thrust and lip competence. Descriptive statistics were used for all measurements; Chi-square was used to assess gender differences. **Results:** Class I malocclusion is most prevalent in boys and girls (44.0% and 43.8% respectively), followed by Class III malocclusion (31% in boys and 30.4% in girls). Anterior crowding was found in 69.7% of the sample while anterior spacing was found in 30.8%. Incompetent lips were more common in boys than girls. **Conclusions:** The prevalence of malocclusion in this age group may warrant the need for more preventive and interceptive measures in dental and oral health planning.

Keywords: Angle classification, occlusal status, malocclusion prevalence, Malaysian Malay

Introduction

Incidence of malocclusion features varies among races, ethnic groups, and populations. As the recognition of malocclusion incidence is considered important in public dental health service planning, several epidemiological studies were conducted in different parts of the world to determine the percentage of malocclusion (1-5). However, the information on occlusal features of Malays is limited. In addition, assessing the occlusal features at the early permanent dentition stage could modify treatment plans for preventive or Interceptive treatment before growth completion, and may inhibit malocclusion progression and severity (6). Although Angle classification was criticized by a number of authors and many classifications and indices were proposed, it is still a popular and accepted classification and commonly used in epidemiological studies (7-10). The purpose of present study was to assess the occlusal features, tongue habits, lip competence, and their gender dimorphism in 12 years old Malaysian Malay school children in Shah Alam, Selangor.

Materials and methods

A cross sectional study was conducted in 2011 on a sample of 12 years old Malaysian Malay

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school children in Shah Alam, Selangor, Malaysia. The age was chosen as it represents the early establishment of permanent dentition (11).

The sample was calculated by adopting confidence interval of 95% (α = 0.05) and test power of 90% (β = 10%). The sample consisted of 208 subjects (116 boys and 92 girls).

Ethical approval was obtained from Universiti Teknologi MARA ethical committee. Permission to conduct the study was given by the Ministry of Education. Subjects parents were notified about the study by the schools and consent forms were signed by them.

All selected subjects met the following inclusion criteria: (a) Malaysian Malays (both of their parents and grandparents are Malays); (b) 12 years of age; (c) permanent dentition stage; (d) no clefts, syndromes or systemic diseases; (e) have not received any orthodontic treatment; (f) have no facial deformity (12).

The materials used for the intra-oral examination were, disposable dental mirror and sliding dental calipers with accuracy up to 0.1 mm.

Intra oral examination of school children was performed in a class room under artificial light. For each subject, 10-12 minutes were needed to record the occlusal features in a prepared form. Subjects were seated in an upright position with Frankfort plane parallel to the floor (13).The following occlusal features were registered:

1. Occlusal status was assessed by Angle Classification, in which class I normal occlusion are restricted to subjects with ideal or near ideal occlusion and any deviation as crowding, spacing, rotation, abnormal overjet, and abnormal overbite were categorized as class I malocclusion, class II division 1, Class II division 2 and class III malocclusion (14-16). Subjects with different Angle classification on right and left side were categorized into single class depending on predominant pattern of occlusion and /or canine's relationship (14, 15).

2. Overjet and overbite were measured in millimeters using sliding dental caliper (15, 17).

3. Open bite was recorded as anterior or posterior (18).

4. Traumatic overbite (18).

5. Crowding was considered present when the total contact point displacement between adjacent teeth is at least 2 mm. Crowding was assessed for the upper and lower anterior segment. Posterior crowding was not evaluated (19).

6. Spacing was considered present when total gaps were at least 2 mm, and assessed only for the anterior segment. Upper midline diastema was registered if the space is more than 1mm (15, 16).

7. Anterior and posterior cross bite (12).

8. Upper and lower dental midline shifts were registered if the shift is more than 1 mm (13).

9. Missing teeth (13).

10. Traumatically fractured incisors.

11. Buccally displaced canines (13).

12. Lip coverage was recorded as competent and incompetent lips (18).

13. Tongue thrust was diagnosed when there is tongue protrusion during speech (19).

Statistical analysis was carried out using SPSS version 16. Descriptive statistics for all variables was obtained. Chi square test was performed to assess gender differences for all variables.

Results

The study sample consisted of 208 subjects (116 boys, 92 girls). Class I malocclusion was the most prevalent (43.8%), followed by class III (30.8%), and class II division 1 (13%). Normal occlusion was recorded in 12.5%, and no cases were found for class II division 2. (Fig1). No significant difference was found between gen-

ders regarding occlusal status (Chi-square 0.216, $P > 0.05$).

Normal overjet was the highest occurrence (45.7%), followed by increased overjet (26.0%) and reduced overjet (11.1%).

Normal overbite was recorded in 46.2% of the sample (Fig 2). Statistical analysis showed no significant gender difference for all categories of overbite (Chi-square 6.78, $P > 0.05$).

Anterior open bite was registered in five subjects (2.4%), and Traumatic overbite was observed in 5.2% of the sample (8 boys and 3 girls).

In this study, anterior cross bite was recorded in 16 subjects (7.7%), 11 of them had class III occlusion. Posterior cross bite was found in eight subjects (3.8%), two subjects (1%) had anterior and posterior unilateral cross bite.

Anterior crowding was found in 69.7% of the sample. Significant gender differences were found for upper anterior crowding, in which the girls had higher prevalence ($P<0.001$), whereas lower anterior crowding was higher in boys ($P<0.001$).

Anterior Spacing was found in 30.8% of the sample (Table 1).

Midline diastema was recorded in 15.9%, and canine displacement was recorded in 53.4% of this sample.

Soft tissue features: Lip incompetence was more common in boys than girls (55.2% and 44.6% respectively), and tongue thrust was registered in 31 subjects. Both soft tissue features have no significant gender difference.

Boys have almost double the incidence of traumatically fractured anterior teeth recorded in girls (30 and 16 respectively). In this study statistical analysis showed no association between increased overjet and traumatically fractured anterior teeth.

Missing teeth (Incisors-premolars-canines) were found in 33 subjects, and there was no significant gender difference (Chi-square 2.05, $P > 0.05$).

Discussion

Many studies were conducted in different populations to determine the features of occlusion in mixed or permanent dentition and to provide data for proper dental health planning (Table 2).It is considered difficult to make comparison of epidemiological data of different studies because of the different methodologies adopted for recording malocclusion, in addition, different studies varies in sample age, sample size, and recording criteria (14).

In the present study, the prevalence of malocclusion was high (87.5%). High prevalence of malocclusion was recorded in some of the previous studies in other populations (9, 20), while other studies recorded a lower prevalence (5, 16). These differences could be attributed to racial and ethnic differences.

Class I malocclusion has the highest percentage in the present study, a similar finding was reported by many previous studies (14, 21, 22).

Class III malocclusion in the present study has a high prevalence (30.8%) compared with previous studies in table 2. However, a high prevalence for class III was recorded by Woon et al (23) and Soh et al (4) on Asian samples.

Class II malocclusion in this study has the least prevalence among malocclusion. Although a similar finding was reported by Ajayi (9), other studies listed in Table 2 have a different outcome. Ethnic and racial factors could be the cause of this difference.

In the present study, no significant gender difference was found between the school children regarding occlusal status, a similar conclusion was reported by Mugonzibwa et al (24).

Normal overjet and overbite was the most prevalent finding in this sample, a similar finding was reported in other studies (6, 8). On the other hand, Woon et al. (23) reported edge to edge bite in 50% of his Malay sample. This difference

could be attributed to the older age group in his study.

In this study anterior crowding was found in 69.7% of the sample. A similar finding was reported in other studies (4, 8, 23, and 24).

Significant gender difference was found in the present study for anterior crowding (Table 1). Upper anterior crowding was more common in girls (20.7%) than in boys (1.7%), while lower anterior crowding was more common in boys (25.9%) than in girls (6.5%). Similar finding was reported by Keski-Nisula *et al* (25). Although his may be due to mandibular growth in boys being faster and longer than girls (26), further studies are needed to elucidate this finding.

The present study demonstrated that midline diastema was more common in girls (18.5%) than boys (13.8%). A similar finding was reported in a Brazilian study (10).

In our study Crossbite was found in 12.5% of the school children. This finding is in agreement with the results of the national oral health survey of 12 years Malaysian school children (NOHSS, 2007), (27) which was 13.8%.

Anterior cross bite was found in 7.7% of the school children. Studies from other populations reported lower incidence of anterior cross bite. Keski-Nisula *et al*. (25) reported 2.2% in Finnish children, and Lauc (8) reported 0.9% in Croatian children. This could be due to the fact that in this study, class III malocclusion had a higher incidence than the Finnish and Croatian studies. In this study, scissors bite was found in 1% of the sample, this finding is close to the results found in (NOHSS, 2007) (27) which was 0.7%.

Traumatic overbite was found in 5.2% of school children, which is higher than the data reported for (NOHSS, 2007) (27), which was 0.3%. The fact that our sample includes children from Shah Alam only, might have caused this difference.

Traumatically fractured anterior teeth in this study were found in 22.1%, also higher than the percentage recorded in (NOHSS, 2007) (27), which was 6.0%. This difference may be due to the differences in sample size and study location.

Statistical analysis for our data showed no association between increased overjet and traumatically fractured anterior teeth, while (NOHSS, 2007) (27), reported that incidence of traumatic fractures of anterior teeth increased with increased overjet. Our study sample being from Shah Alam only is a possible explanation for this difference.

Missing teeth were recorded in 15.9% of the study sample, which is lower than the recorded finding in (NOHSS, 2007) (27), which was 32.5%. This could be due to the differences in sample size and study location.

Conclusions

In our study of 12 years old school children, normal overbite, normal overjet and Class I malocclusion, were the most prevalent in this sample. However, some features of malocclusion including Class III, anterior crowding, increased overjet, and displaced canine has a high incidence. This is an important point to be considered in planning public oral and dental health service for the society. We believe that dental health planning for malocclusion need to be more focused on preventive and interceptive measures.

Acknowledgements

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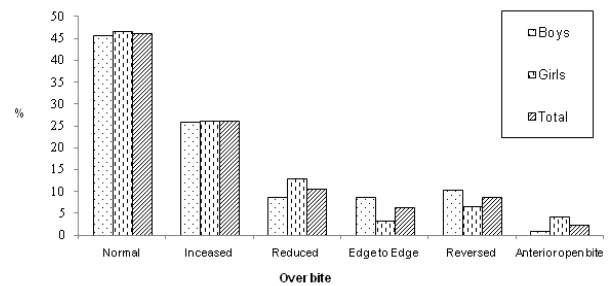26. Liua YP, Behrentsb RG, Buschangc PH (2010). Mandibular growth, remodeling, and maturation during infancy and early childhood. *Angle Orthod* **80,** 97–105.

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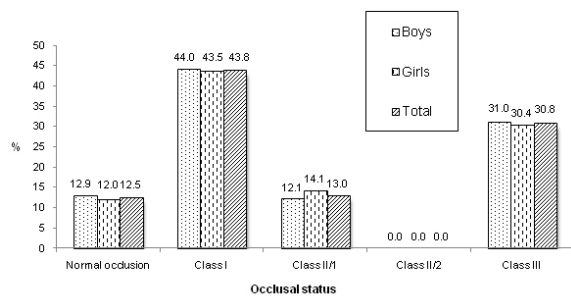
Figure 1: Occlusal status (Angle classification)

Figure 2: Over bite distribution

Tables:

Variables	Boys		Girls		Total		Chi-square	p value
	N	%	N	%	N	%		
Crowding								
Non	34	29.3	29	31.5	63	30.3	0.119	0.730
Upper	2	1.7	19	20.7	21	10.1	20.252	<0.001
Lower	30	25.9	6	6.5	36	17.3	13.409	<0.001
Both	50	43.1	38	41.3	88	42.3	0.068	0.794
Total	116	100.0	92	100.0	208	100.0	29.418	<0.001
Spacing								
Non	79	68.1	65	70.7	144	69.2		
Upper	15	12.9	8	7.8	23	11.1		
Lower	4	3.4	1	1.1	5	2.4		
Both	18	15.5	18	19.6	36	17.3		
Total	116	100.0	92	100.0	208	100.0	2.556	0.465

Table 1: Crowding and spacing distribution in school children

Author	Population	Sample size	Age	Normal	Class I	Class II	Class III
Silva and Kang	Latino	507	12-18	6.5%	62.9%	21.5%	9.1%
Martins and Lima	Brazilian	264	10-12	25.8%	47.7%	22.3%	4.2%
Sidlauskas and Lopatiene	Lithuanian	1681	7-15	-	68.42	27.66	2.79
Diagne	Senegalese	1708	11-19	-	73.3%	12.7%	4.4%
Onyeaso	Nigerian	636	12-17	24%	50%	14%	12%
Lauc	Croatian	224	7-14	-	47.3%	45.1%	5.4%
Saleh	Lebanese	851	9-15	40.3%	35.5%	19%	5%
Ajayi	Nigerian	441	13	15.9%	80.7%	1.5%	1.8%
Present study	Malay	208	12	12.5%	43.8%	13%	30.8%

Table 2: Occlusal status of different populations (Angle Classification)