



Research Article

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Prevalence of malocclusion and occlusal traits of Malay adults (18-23 years) in Shah Alam, Malaysia

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Abstract

Background: The incidence of malocclusion varies among countries, ethnicities, races, and ages. The recognition of malocclusion incidence is an important role in planning public health services. **Aims:** To assess the occlusal features of Malaysian Malay adults aged 18-23 years. However, few epidemiological studies have been conducted in Malaysia and a little information is available on Malay malocclusion. **Methods:** A total sample of 191 subjects (73 males and 118 females) was examined to register the occlusal status by using Angle classification as normal occlusion, Class I, Class II/1, Class II/2 and Class III malocclusion. Other variables were recorded such as overbite, over-jet, crowding, spacing, midline diastema, crossbite, scissors bite, midline shifts, canine displacement, missing teeth, supernumerary teeth, traumatically fractured teeth, traumatic gingival contact, tongue thrust and lip coverage. **Statistical analysis:** Descriptive statistics were used for all measurements and the chi-square test was used for gender differences. **Results:** Class III was the most predominant with gender significant ($P < 0.05$). Class II/2 was the lowest incidence (1%). Overall, the anterior crowding was high (75.9%). There was a significant association between crossbite, scissors bite and genders ($P < 0.05$). The anterior crossbite was more commonly associated with Class III and the antero-posterior unilateral crossbite was found only in subjects with Class III. **Conclusion:** The incidence of Class III was higher in Malay; therefore, the orthodontic management of Class III would be more common in the clinic so that it is necessary to start a plan to promote the preventive and interceptive orthodontic treatment in Malay population.

Keywords: Occlusal status, Angle classification, malocclusion, Malaysian Malays.

INTRODUCTION

Although various epidemiological studies were carried out in the world, the information on occlusal features of Malay is limited. All previous studies was focused in limited age group such as Woon *et al*^[1] who studied of 347 subjects from three ethnic groups in Malaysia aged 15-19 years and Soh *et al*^[2] who studied Malays, Chinese and Indians age 17-22 years, their study was restricted on army males only. NOHSS^[3] were conducted in the three ethnic groups in Malaysia, age 12 and 16 school-children by using Index of Orthodontic Treatment Need (IOTN). However, it did not report any information regarding molar classification; it only provided information on severity of malocclusions. Some studies focus only on adult patients with orthodontic experience like^[4]. Although Angle classification was criticized by a number of authors, it is still a common classification in the world^[5]. Class I normal occlusion is restricted to subjects with ideal or near ideal occlusion, any deviation as crowding, spacing, rotation were categorized as Class I malocclusion^[6, 7]. El-Mangoury and Mostafa^[8] evaluated malocclusion in Egyptians aged 18-24 years, they found that Class I was most prevalent while the class III was of lowest incidence with more frequently in males. Guichard *et al*^[9] who studied 58 skulls that lived 500 years ago in France and compared them with 82 men aged 19-25 years from present day population, they found that Class I was the most common in medieval sample. Soh *et al*^[2] reported that Chinese and Malays had higher prevalence of Class III incisor and molar relationships, whereas Class II division 1 was more common in Indians. Although, several studies have reported on prevalence of malocclusion in the world, limited study was conducted in Malaysia and little baseline data is available, therefore the purpose of this study was to determine occlusal status and occlusal features in Malaysian Malay adults.

MATERIALS AND METHODS

Ethical approval was given by research committee UiTM (600-RMI (5/1/6/01), a consent form was signed by all subjects who participate in this survey. The intra- inter examiner reliability was performed on 10% of the sample and kappa test was used to evaluate the level of agreement between the examiners.

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The sample was collected at Klinik Rawatan Utama, Faculty of Dentistry of Universiti Teknologi MARA. The collection of sample was Convenient whereas all subjects should meet the inclusion criteria as follows: the subjects should be Malaysian Malays and Age ranging from 18 to 23 years. The exclusion criteria were the subjects had syndromes, clefts and systemic disease, orthodontic treatment, multiple missing teeth (more than four), facial operations and facial deformity.

The materials were used dental mirrors; caliper and patient information sheet was used to record all variables. All subjects were seated in upright position with Frankfort plane parallel to the floor. The occlusal status was assessed by using Angle classification as (Class I normal occlusion, Class I, Class II Division 1, Class II Division 2 and Class III). The subjects who had a different Angle classification on either side were categorized into single class depended on predominant pattern of occlusion and /or the relationships of canines [7]. In case of slightly shifts of the first permanent molar less than half cusps it considered Class I, while if it are more than half cusps, it considered Class II or Class III [10]. When the first permanent molar is missing the classification is performed on the canines [11]. The over-jet was measured in milli-meters, in case of protrusion the over-jet were registered at most proclined central incisors [12] the over-jet was classified as normal 2-3 mm, increased more than 3 mm, reduced less than 2 mm, the reversed over-jet was registered when both right and left upper incisors were lingual to lower incisors at centric occlusion. [7] the overbite was recorded in milli-meters by marking the incisal edge overlap of the upper incisors on the labial surface of the lower incisors, then the vertical distance was recorded between the mark and lower incisal edge at centric occlusion by using dental caliper [13]. The overbite was classified into normal 2-3 mm, increased greater than 3 mm, whereas reduced less than 2 mm, and reversed overbite was present when reversed over-jet found [7]. The edge to edge bite was present when upper and lower incisors occluded on their incisal edges at centric occlusion. Open bite was recorded according to Mitchell *et al* [14] as anterior open bite when vertical gaps was found between the upper and the lower incisors, whereas posterior open bite was recorded when gaps found between the upper and lower posterior teeth at the centric occlusion. Dental crowding was recorded if the contact point displacement between adjacent teeth is at least 2 mm in each segment and dental spacing was registered if total gaps were at least 2 mm in each segment, while spacing due to extracted teeth was not considered [15]. Midline diastema is registered according to [6, 7]. Crossbite was registered according to, [14] the edge to edge also included in buccal crossbite [10]. Lingual crossbite or scissors bite was registered according to Mitchell *et al* [14] anterior crossbite was recorded if one or more maxillary incisors located lingual to lower incisors at centric occlusion, and overall crossbite when subject had anterior as well as posterior bilateral crossbite.

Midline shifts according to [14] Mitchell *et al* were registered when midline between upper central incisors or midline between lower central incisors were not coincide with facial midline at centric occlusion. Missing teeth were registered in case of permanent teeth were extracted or clinically missing except third molars.

Erupted supernumerary teeth according to [14] Mitchell *et al* was registered clinically if there are extra teeth erupted in arches. Traumatic gingival or palatal contacts registered when traumatic ulceration was noticed in palatal tissue in subjects with increased overbite and lower incisors touched palatal tissue. Traumatically fractured incisor teeth were registered in both upper and lower arches.

Bucall displaced canines were registered in case of permanent canines were buccal placed to line of arch [14]. Soft tissue examination (lip coverage-tongue thrust) was classified into competent and incompetent lips according to [5, 14] Tongue thrust was diagnosed when there is tongue protrusion during speech and swallowing [13].

Statistical analysis was conducted by using statistical package for social science version 16 (SPSS). The chi square test used to show statistical significance, whereas P-value less than 0.05 considered as statically significant. The Kappa value for intra and inter-examiner reliability were (0.70-0.82 and 0.69-0.79 respectively).

RESULTS

A significant association between occlusal status and genders, 67.1% of males had Class III compared with only 37.3% of females, whereas Class II/2 was the least common in all sample. Class III was the most predominant as shows in Figure 1.

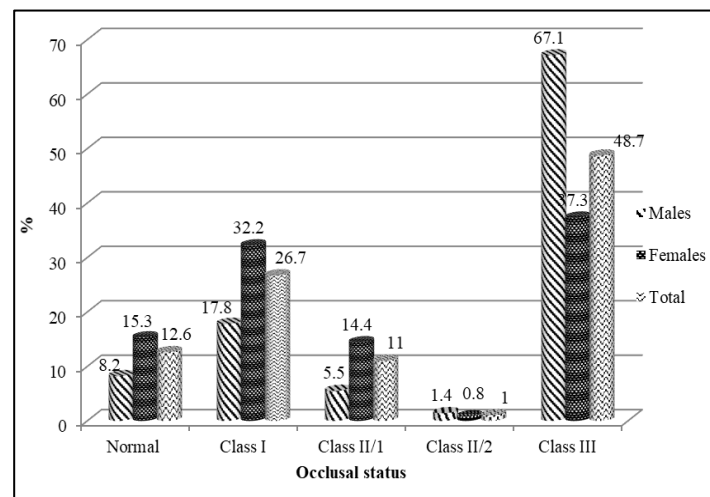


Figure 1: Occlusal status of Malaysian Malay Adults

Normal overbite was the most common finding in 35.1%. A gender significant difference was found regarding overbite distribution ($P < 0.05$). Females had more increased overbite than males. Edge to edge and reversed overbite were higher in males than females. Anterior open bite was found in one male and five females

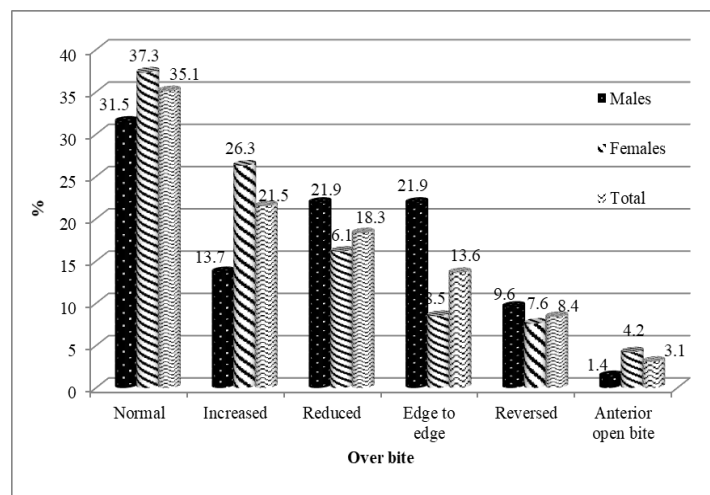


Figure 2: Over bite distribution in Malaysian Malay adults

Normal over-jet was the most prevalent, followed by increased over-jet and then reduced over-jet. Reversed over-jet was slightly higher in males than females without significant difference between them ($P > 0.05$) as shown in Figure 2. One male had anterior open bite (1.4%), three males had posterior open bite (4.1%). Four females had anterior open bite (3.4%) and one female had antero-posterior unilateral open bite (0.8%). There was a significant difference between open bite distribution and genders ($P < 0.05$). (Table 1) showed in male posterior unilateral right and left crossbite were equal (1.4%). Over all crossbite was not reported. Incidence of scissors bite was in males and females (2.7% and 5.1%,

respectively). There was a significance association between crossbite, scissors bite and genders ($P < 0.05$). Anterior crossbite was more commonly associated with Class III and antero-posterior unilateral crossbite was found only in subjects with Class III. (Table 2) showed that anterior crowding was high (75.9%) whereas both arches crowding was the most common in males and female without significant difference

between them. Anterior spacing was 22.5% whereas, both arches spacing was slightly higher in males than female with gender significant difference was found between them. Midline diastema was (15.7%) without significant difference between genders and open bite was found in 4.7%.

Table 1: The distribution of cross-bite and scissors bite according to gender in the total sample

Crossbite	Males		Females		Total		Chi-square	p value
	N	%	n	%	n	%		
Anterior crossbite	5	6.8	9	7.6	14	7.3	0.002	0.966
Posterior Unilateral (right)	1	1.4	2	1.7	3	1.6	0.011	0.916
Posterior Unilateral (left)	1	1.4	11	9.3	12	6.3	5.409	0.020
Posterior Bilateral	6	8.2	2	1.7	8	4.2	6.296	0.012
Anterior and posterior unilateral	2	2.7	0	0.0	2	1.0	3.686	0.055
Overall crossbite	0	0.0	0	0.0	0	0.0	-	-
Scissor bite	2	2.7	6	5.1	8	4.2	0.521	0.470
Total	17	23.3	30	25.4	47	24.6	13.226	0.021

Table 2: The distribution of anterior crowding, spacing and midline diastema according to gender in 18-23 years old Malaysian Malay

Variables	Males		Females		Total		Chi-square	p-value
	n	%	n	%	n	%		
Anterior crowding								
No crowding	14	19.2	32	27.1	46	24.1	5.931	0.115
Upper arch	3	4.1	14	11.9	17	8.9		
Lower arch	20	27.4	27	22.9	47	24.6		
Both arches	36	49.3	45	38.1	81	42.4		
Total	73	100.0	118	100.0	191	100.0		
Anterior spacing								
No spacing	54	74.0	94	79.7	148	77.5	9.245	0.026
Upper arch	9	12.3	11	9.3	20	10.5		
Lower arch	1	1.4	9	7.6	10	5.2		
Both arches	9	12.3	4	3.4	13	6.8		
Total	73	100.0	118	100.0	191	100.0		
Midline diastema								
Present	15	20.5	15	12.7	30	15.7	2.092	0.148
Absent	58	79.5	103	87.3	161	84.3		
Total	73	100	118	100	191	100.0		

Incompetent lip was higher in males (64.4%) than females (48.3%). A significant difference was found between lip coverage and genders ($P < 0.05$). Traumatic gingival contact was found in two males (2.7%) and four females (3.4%), whereas traumatically fractured anterior teeth were found in nineteen males (26.0%) and seven females (5.9%). Tongue thrust was found in twelve males (16.4%) and eighteen females (15.3%), while supernumerary teeth were found in one male (1.4%) and two females (1.7%). Missing teeth were found in five males (6.8%) and twenty seven females (22.9%). Midline shifts were found in 52.1% of males and 37.3% of females. Statistical analysis showed no significant difference between genders ($P > 0.05$).

Lower midline shift was higher in males than females (68.4% and 47.7%, respectively), while the upper midline shift was higher in females (52.3%) than males (31.6%).

DISCUSSION

In this study the prevalence of malocclusion was 87.4% this is in agreement with results in American children^[16]. A significant difference was observed between occlusal status and genders ($P < 0.05$) whereas Class II division 2 was observed only in 1% of the sample. Normal occlusion, Class I and Class II division 1 were higher in females than males. In contrast, Class III was the most prevalent in males than females, this finding is in agreement with results in Asian males^[2] and in Malays and Chinese.^[1] On the other hand, it disagrees with findings in Nigerians^[7] in China^[17] and in Jeddah Saudi^[18]. In males the highest incidence of Class III and the lowest of Class II in comparison with females may be due to the males grow at faster rate and longer period than the females^[19]. No significant difference between over-jet distribution and genders in contrast with overbite distribution in which a significant difference was found between genders. In this study the highest incidence of normal overbite and over-jet, this finding is in agreement with the results found in Brazilian^[6]. In the current study, increased overbite was more likely in females in contrast with edge to edge bite which is more likely in males. This finding are disagreed with the result reported by Yu *et al*^[17] who showed that males exhibited a higher rate of overbite than females in Shanghai, China. Anterior open bite in females was three times more common than males. Increased over-jet was higher in females than males, it may be due to forward growth of mandible is faster and longer in males^[14]. Another cause may be due to habit practicing like thumb sucking which is more common in girls^[10]. Reversed over-jet was found in 8.4% of adults this finding is in agreement with the results found in Caucasians^[20]. Unlike other studies which reported lower incidence of negative over-jet in Dresden^[21] and in Senegalese^[22]. The upper anterior crowding was higher in female than males without gender significant. In contrast both arches crowding was higher in males. Lower anterior crowding was higher in males this finding is in agreement with the results in Saudi Arabia males^[23]. The cause of higher lower anterior crowding in males may be due to the forward growth of mandible and slow growth of maxilla in addition, the pressure from soft tissue^[14]. A significant difference was observed between genders regarding spacing. Upper anterior spacing and both arches spacing were higher in males than females, while lower anterior spacing was lower in male, this finding is in agreement with results found in Israel population^[24]. No gender significant difference was found regarding midline diastema, it was more commonly in males this finding is in agreement with the results in Turkish patients^[25]. A significant difference was found between crossbite and scissors bite distributions and genders ($P < 0.05$). In males crossbite was 11.0%, this finding is lower than reported in Malay males 20.0%^[2]. Anterior crossbite was found in 6.8% of males which is lower than finding in Malay males 21.7%^[2]. Posterior crossbite was slightly higher in males than females this is in agreement with findings in Germans^[12]. Antero-posterior unilateral crossbite was 2.7% in males while in females no case was reported. Bilateral crossbite was higher in males than female. Scissors bite was higher incidence in females than males. Gender significant was found regarding the incidence of the open bite. Whereas in the current study,

the open bite was 4.7%, this finding in agreement with the results in Asian males 4%^[2]. While it is lower than the results in Turkish patients 10.0%^[25]. In contrast with, the black and white Americans were (7.7% and 12.2% respectively)^[26]. In this study anterior open bite was more likely to be found in females (3.4%) than males (1.4%). Posterior open bite was found in 4.1% males while in female no case was reported. Antero-posterior open bite was found in only one female (0.8%). Significant difference was found in adults regarding lip coverage, competent lips was higher in females (51.7%) than in males (35.6%). Incompetent lip was higher in males (64.4%) than females (48.3%). The causes of increase in the percentage of incompetent lips in males than females may be due to lack of lip tissue or normal lip length with unfavourable skeletal pattern in vertical position^[27]. A gender significant was found regarding canines displacement, whereas one canine displacement was higher in overall 16.8%. Traumatic gingival contact was found in 3.1%, which is higher than the finding in 12 years Malaysian school children survey which was 0.3%^[3]. In this study, 13.6 % had traumatic anterior fractured teeth, 9.9% in males and 3.7% in females. This finding is in agreement with findings in 16 years Malaysian males were more affected by trauma (6.4%) than females (2.7%) while in 12 years Malaysian fractures were 7.4% in males and 3.2% in females^[3]. The statistical analysis showed no correlation between increased overjet and traumatic fractured teeth in adults, this finding disagrees with finding in 16 years Malaysian school children survey which showed traumatic teeth incidence increased with increased overjet^[28], and tongue thrust was 15.7% of adults.

Supernumerary teeth were found in 1.6% of adult which is slightly higher than the finding in 12 years Malaysian school children survey 0.4%^[3]. Missing teeth were found in 16.7% of the adults which is lower than the finding in 12 year Malaysian school children survey 32.5%^[3].

CONCLUSION

Class III malocclusion is most prevalent while Class II/2 is the least finding. Therefore, the orthodontic management of Class III would be more common in the clinic so that it is necessary to start a plan to promote the preventive and interceptive orthodontic treatment in Malay population. Anterior crossbite was more commonly associated with Class III and antero-posterior unilateral crossbite was found only in subjects with Class III. The incidence of scissors bite and open bite are more common in females than males. However, the incidence of posterior crossbite and incompetent lips are higher in males than females.

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Conflict of Interest

The authors declare no conflict of interest.

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