

Short communication

## Distribution of malocclusion types in 7–9-year-old Iranian children

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توزُّع أنماط سوء الإطباق الأسنان بين الأطفال الإيرانيين من الفئة العمرية 7 – 9 سنوات  
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**الخلاصة:** تم في إطار هذه الدراسة تقييم أنماط سوء الإطباق وارتصاص الأسنان الشديد، ومدى الحاجة إلى القلع المتتابع للأسنان، في عينة عشوائية من الأطفال من الفئة العمرية 7 – 9 سنوات في مدينة شيراز الإيرانية. وقد أظهرت الدراسة أن 30.6% من عينة الأطفال البالغ عددهم 3776 طفلاً لديهم إطباق عادي، و47.4% لديهم سوء إطباق من الدرجة الأولى، و13.7% لديهم سوء إطباق من الدرجة الثانية والقسم الأول (نسبة الذكور إلى الإناث 3 : 2)، و1% لديهم سوء إطباق من الدرجة الثانية والقسم الثاني (نسبة الذكور إلى الإناث 3 : 1)، و2.1% لديهم سوء إطباق من الدرجة الثالثة. كما تبين أن 47.9% من الأطفال الذين تم فحصهم يعانون من مشكلات ارتصاصية في الأسنان، وأن 14.7% منهم لديهم سوء إطباق من الدرجة الأولى، وكانت نسبة الإناث أعلى من الذكور (17.3% مقابل 12.1%). ولم يُلاحظ أي ترابط بين أنماط سوء الإطباق وبين حجم الأسرة، أو مهنة الوالدين، أو مستوى التعليم.

**ABSTRACT** This study assessed the malocclusion types, very severe crowding and need for serial extraction among a random sample of 7–9-year-old children in Shiraz, Islamic Republic of Iran. Of the 3776 children 30.6% had normal occlusion, 47.4% class I malocclusion, 13.7% class II division 1 malocclusion (male/female ratio 3:2), 1.0% class II division 2 malocclusion (male/female ratio 3:1) and 2.1% class III malocclusion. Among the children examined, 47.9% had crowding problems and 14.7% of them had class I malocclusion with very severe crowding—more girls (17.3%) than boys (12.1%). No correlation was observed between the types of malocclusion and family size, parents' occupation or level of education.

### Distribution des types de malocclusions chez des enfants iraniens âgés de 7 à 9 ans

**RÉSUMÉ** La présente étude a évalué les types de malocclusions, l'encombrement très sévère et le besoin d'extraction en série dans un échantillon aléatoire d'enfants âgés de 7 à 9 ans à Chiraz (République islamique d'Iran). Sur les 3776 enfants, 30,6 % présentaient une occlusion normale, 47,4 % une malocclusion de classe I, 13,7 % une malocclusion de classe II division 1 (rapport des sexes masculin/féminin de 3:2), 1,0 % une malocclusion de classe II division 2 (rapport des sexes masculin/féminin de 3:1) et 2,1 % une malocclusion de classe III. Parmi les enfants examinés, 47,9 % avaient des problèmes d'encombrement et 14,7 % présentaient une malocclusion de classe I associée à un encombrement très sévère – davantage chez les filles (17,3 %) que chez les garçons (12,1 %). Aucune corrélation n'a été observée entre les types de malocclusions et la taille de la famille, la profession des parents ou le niveau d'instruction.

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## Introduction

Severe malocclusions including irregular teeth can affect a person's emotions and self-confidence. Differences in malocclusion characteristics between different countries would be expected because of differences in racial and ethnic composition. Many studies in the United States of America (USA) have determined the percentage of children who would fall into Angle's 4 groups: 30% having Angle's normal occlusion, 50% to 55% class I malocclusion, 15% class II malocclusion and < 1% class III malocclusion [1]. According to El-Mangoury and Mostafa, 25% of children in Denmark were class II, with class III problems most prevalent among oriental populations [2].

Prompt diagnosis of teeth irregularities and preventive measures can prevent intense malocclusions developing in the future [1]. "Serial extraction", first described by Kjellgren, called "guidance of eruption" by Hotz, is an interceptive process for correcting discrepancies between tooth size and arch size [3-12]. It can reduce the need for appliances, the treatment time, the cost of treatment, discomfort for the patients and potential iatrogenic sequelae. During the serial extraction, guidance of the eruption of permanent teeth leads to proper formation of periodontal fibres. As a result, orthodontic treatment will be more stable, and relapse after treatment will be reduced [4]. Different criteria for selecting patients for serial extraction have been suggested [6-12].

This study was undertaken to determine the distribution of malocclusion types, the prevalence of very severe dental crowding and the need for serial extraction due to dental crowding in Iranian children in Shiraz.

## Methods

In 2001, a prospective study was performed on a random selection of 3776 out of 280 000 primary school students (146 000 males and 135 000 females) in Shiraz city, southern Islamic Republic of Iran. The pupils were selected using multi-stage cluster sampling from the 4 districts of education in the city of Shiraz, each with 20-25 junior high schools. Two schools were randomly selected from each districts. In those schools the students who agreed to participate and matched the following criteria were selected: (1) aged 7-9 years, (2) having no proximal caries, restorations or early extraction of deciduous teeth, (3) receiving no orthodontic treatment, (4) healthy and (5) showing good cooperation during examination. The first stage of data collection was carried out by a dentist referring to schools and the second stage was completed by a specialist in the Orthodontics Department of Shiraz University of Medical Sciences. All examiners were trained before the start of the study.

The clinical data was collected a questionnaire containing 2 parts. The first was for demographic data: name, family size, occupation and parents' educational level. The second part recorded specific information such as occlusion categories, the assessment of crowding and presence or absence of very severe crowding. Very severe crowding was defined as cases with any 2 of the following signs: crowded mandibular incisor teeth with at least 5 mm space deficiency in each quadrant; maxillary mandibular alveolar dental protrusion without interproximal spacing; midline displacement of the permanent mandibular incisors; bilateral primary mandibular canine exfoliation; splaying of the permanent

maxillary or mandibular incisor teeth; gingival recession on the labial surface of the prominent mandibular incisor; or ectopic eruption of the permanent maxillary first molars [3].

Children who showed 2 of the signs of very severe crowding were referred to a dental clinic for a consultation with the orthodontist. These students were visited and followed up and treated later.

The data were then analysed using chi-squared tests.

## Results

Our results showed the distribution of different malocclusion types were as follows: 30.6% class I normal occlusion; 47.4% class I malocclusion; 13.7% class II division 1 malocclusion; 1.0% class II division 2 malocclusion and 2.1% class III malocclusion (Table 1).

Table 1 shows the distribution of malocclusions by sex. Class II division 2 malocclusion in boys was 3 times more common than in girls and the primary dentition in boys was 1.2 times more than girls in the same age. The difference was statistically significant ( $P < 0.001$ ).

Of 1791 students with class I malocclusion, 332 (18.5%) were referred to a

specialist and 263 (14.7%) of them showed the symptoms of very severe crowding, able to be treated by serial extraction.

Crowding was detected in 47.9% of children (males 47.0%, females 48.9%).

## Discussion

In our study, there was no significant difference between the sexes except for class II division 1 and class II division 2 malocclusions, which were more common in boys than girls. The prevalence of class I malocclusion was 47.4% which was comparable with Lauc's study on 224 children (47.3% for class I malocclusion) [13]. However, their prevalence of class II and class III malocclusion (45.1% and 5.4% respectively) was greater than that in our study. The differences might be due to age differences, environmental factors, genetic and nutritional influences; Lauc showed that those with a higher rate of inbreeding and traditional diet had more class II malocclusions than the general population. A study on 3–5-year-old nursery schoolchildren showed a higher proportion of class I dental malocclusions (77.3%) and lower class III [14]. Decrease in class II malocclusions (13.3%) from the age of 3 to 5 years was

Table 1 Distribution of malocclusion types in 7–9 year old Iranian children

Dentition and malocclusion types	Female		Male		Total	
	No.	%	No.	%	No.	%
Primary dentition	86	4.5	106	5.6	192	5.1
Mixed dentition						
Class I normal occlusion	608	32.1	547	29.1	1155	30.6
Class I malocclusion	951	50.2	840	44.7	1791	47.4
Class II division 1	196	10.3	323	17.2	519	13.7
Class II division 2	10	0.5	29	1.5	39	1.0
Class III	44	2.3	36	1.9	80	2.1
Total	1895	100.0	1881	100.0	3776	99.9

related to environmental factors such as thumb-sucking.

Although not examined in the present study, class II malocclusion may have increased due to habits during this period such as pen-biting (or other signs of anxiety) or tongue thrust during the transition from primary to permanent dentition. In a similar study performed on 2032 students (9–11 years old), the prevalence of class III malocclusion was 2.2% [15] and in another study which was performed on 632 students aged 13–15 years in 1995, the prevalence of malocclusion types was 9.7%, 61.0%, 18.0%, 3.3% and 4.5% for class I normal occlusion, class I malocclusion, class II division 1, class II division 2 and class III, respectively [16]. This difference between the prevalence of class III malocclusion might be due to the difference in the age and number of students in both studies. Cessation of the growth period might be considered as one of the causes. Also environmental factors might lead to a normal occlusion to be changed first functionally and second skeletally into other kinds of malocclusion.

Schopf showed the prevalence of class III malocclusion on 6–7-year-old children was 1.9% which is comparable with our study [17]. In Schopf's study in 19.6% of the children, a supporting zone was reduced, which necessitated interceptive measures such as the insertion of a space maintainer or extraction therapy. In another study, Lippold et al. reported the prevalence of class I malocclusion to be 63%, and class II and class III to be 32% and 5%, respectively, which is higher than our study [18]. They

showed a potential correlation between weak body posture and class II malocclusion [18].

The prevalence of class II malocclusion, which was reported by Proffit to be 15%–20%, was 14.7% in our study [1]. The amount of crowding in our study (47.9%) was comparable with a study in the USA in 1960 on a population of 8000 children aged 6–11 years, 40% of whom showed crowding [9]. In the present study, about 12.1% of boys and 17.3% of girls with class I malocclusion had very severe crowding which needed serial extraction. In Buschang and Shulman's study of 9044 untreated patients 15–50 years old in the USA, 40% had moderate to severe irregularity that is comparable with the results of our study [19]. Considering the fact that 1.5 times more girls than boys were referred in our study, this difference could be justifiable.

The results of this study can be used by health authorities. If health instructors at schools notice any severe crowding among children, they can refer them to dentists and later to orthodontist if there is severe space deficiency, thereby deciding about serial extraction treatment. In this way, more children can be treated less expensively.

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