Prevalence of malocclusion in a sample of Lebanese schoolchildren: an epidemiologic study

F.K. Saleh

ABSTRACT The study aimed to provide oral health planners in Lebanon with information on the prevalence of malocclusion in schoolchildren in an attempt to define the target population for orthodontic services in the future. A total of 851 schoolchildren (446 males and 405 females) aged 9–15 years were examined for malocclusion using Angle's classification. In all, 59.5% of the sample had malocclusions, 35.5% of which were of dental origin and 24% had skeletal discrepancy (19% Class II and 5% Class III malocclusions). A statistically significant difference was found between males and females. The findings are compared with those of studies of other ethnic groups and suggestions for future epidemiological research are presented.

La prévalence des malocclusions dans un échantillon de la population libanaise: étude épidémiologique

RESUME Le but de cette étude était de fournir aux planificateurs des soins de santé buccodentaire des informations adéquates sur la prévalence des malocclusions chez les écoliers pour essayer de définir la population cible des services d'orthodontie dans le futur. Au total, 851 écoliers (446 garçons et 405 filles) âgés de 9 à 15 ans ont été examinés à la recherche de malocclusions en utilisant la classification d'Angle. En tout, 59.5% de l'échantillon avait des malocclusions, dont 35.5% étaient d'origine dentaire et 24% présentaient des anomalies squelettiques (19% des malocclusions de Classe II et 5% de Classe III). Les résultats ont été comparés à ceux des études d'autres groupes ethniques et des suggestions concernant les futures recherches épidémiologiques sont présentées.

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Introduction and literature review

Quantitative methods of recording and measuring occlusal features are important for epidemiologists and for those planning the provision of orthodontic services in a certain community. Untreated malocclusion may lead to mandibular dysfunction and severe psychological problems.

In recent years, there has been a steady increase in the number of young and adult patients seeking orthodontic treatment in the dental schools and other public or private dental care centres in Beirut. The phenomenon of busy clinics and long waiting lists reflects the mismatch between the growing demand for orthodontic treatment and the lack of resources needed to provide high quality oral health services.

Angle’s classification of malocclusion in 1899 was an important step in the development of orthodontics [7]. It not only subdivided the major types of malocclusion, but also provided the first clear definition of normal occlusion in natural dentition. Since then, numerous classifications and indices have been developed but as yet none has been universally accepted. This could be due to variations in the terminology, sampling differences of age and sex, levels of severity and the accuracy of examining methods [2].

Angle’s classification is based on the antero-posterior relationship of the jaws with each other and does not take into account the vertical or transverse discrepancies. Despite early criticism by Cryer [3], Case [4], Hellman [5], Simon [6] and Ackerman and Proffit [7], Angle’s classification has remained widely accepted and used in most dental schools and practices [8]. Moyers [9] considered it the most practical and popular method of studying occlusion. Recently, Graber and Vanarsdall [10] confirmed the simplicity and practicality of this system.

To date, no epidemiological study of malocclusion has been conducted in Lebanon. This survey aimed to provide oral health care planners with information on:

- the prevalence of malocclusion in a Lebanese population group as compared with other ethnic groups;
- the sex distribution of occlusal variation and whether a significant difference exists among the children examined.

Subjects and methods

Sample
The sample consisted of 851 Lebanese schoolchildren (446 males and 405 females) randomly selected from five different comprehensive schools. The criteria for selection were:

- The participants and their parents must be of Lebanese origin.
- They must be between 9 years and 15 years of age.
- They must be free of any serious illness and have no history of trauma or surgery that could affect occlusion.

Methods
Clinical examination of each participant was carried out and the occlusal status was recorded in centric occlusion according to Parker [11]. The occlusion was then classified into normal occlusion or malocclusion using the first permanent molars as described by Angle [7]. The occlusal status of participants in the mixed dentition stage was recorded after clinical examination, which was supported by a good quality X-ray to confirm the presence, position and size of unerupted teeth.
The materials used for examination included:
- disposable dental mirrors and probes
- portable spotlight
- registration data sheet of occlusion, modified from Bjork et al. [12] and Massler and Frankel [13]
- panoramic X-ray for participants in the mixed dentition stage.

Results

A summary of the results is presented in Table 1 and Figure 1. The sex distribution and the percentage of occlusal variation among the schoolchildren are shown. A statistically significant difference was found between males and females which indicates occlusal variation is not independent of sex. Table 2 and Figure 2 compare the occlusal variation between the Lebanese and other ethnic groups.

Discussion

The purpose of this epidemiological study was to provide the oral health care planners in Lebanon with adequate information about the prevalence of malocclusion among the age group (9–15 years) that most often

Table 1 Prevalence of occlusal variations by sex among Lebanese schoolchildren

<table>
<thead>
<tr>
<th>Sex</th>
<th>Normal occlusion No.</th>
<th>CL I No.</th>
<th>CL II 1 No.</th>
<th>CL II 2 No.</th>
<th>CL III No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Males (n = 446)</td>
<td>169</td>
<td>154</td>
<td>87</td>
<td>9</td>
<td>27</td>
</tr>
<tr>
<td>Females (n = 405)</td>
<td>174</td>
<td>148</td>
<td>57</td>
<td>10</td>
<td>16</td>
</tr>
<tr>
<td>Total (n = 851)</td>
<td>343</td>
<td>302</td>
<td>144</td>
<td>19</td>
<td>43</td>
</tr>
</tbody>
</table>

\[ \chi^2 = 18.87 \]
\[ P = 0.0263 \]

Degrees of freedom = 4
<table>
<thead>
<tr>
<th>Authors</th>
<th>Ethnic group</th>
<th>Sample</th>
<th>Occlusion</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Size</td>
<td>Normal</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(years)</td>
<td>(%)</td>
</tr>
<tr>
<td>Saleh (1997)*</td>
<td>Lebanese</td>
<td>851</td>
<td>9–15</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(446 M, 405 F)</td>
<td></td>
</tr>
<tr>
<td>Luffingham and Campbell (1974)</td>
<td>Scottish</td>
<td>269</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(127 M, 142 F)</td>
<td></td>
</tr>
<tr>
<td>El-Mangoury and Mosta’a (1990)</td>
<td>Egyptian</td>
<td>501</td>
<td>18–24</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grewe et al. (1968) [16]</td>
<td>Indian</td>
<td>651</td>
<td>9–14</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Massler and Frankel (1951)</td>
<td>White</td>
<td>2758</td>
<td>14–18</td>
</tr>
<tr>
<td></td>
<td>American</td>
<td>(1238 M, 1520 F)</td>
<td></td>
</tr>
<tr>
<td>Tipton and Rinchuse (1991)</td>
<td>White</td>
<td>101</td>
<td>18–32</td>
</tr>
<tr>
<td></td>
<td>American</td>
<td>(57 M, 44 F)</td>
<td></td>
</tr>
<tr>
<td>Goose et al. (1957) [18]</td>
<td>British</td>
<td>2956</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ingervall (1974) [19]</td>
<td>Swedish</td>
<td>301</td>
<td>18</td>
</tr>
</tbody>
</table>

* Present study

M = male  F = female
seeks orthodontic treatment. Although assessment of occlusion in non-growing and permanent dentition periods is more reliable, this range was chosen for two reasons: first, it represents the majority of candidates for orthodontic treatment, and second, studying occlusion in the mixed dentition period could modify treatment plans for preventive or interceptive treatment before growth is completed.

The results showed that 40.3% of the Lebanese schoolchildren surveyed had normal occlusion as shown in Table 1 and Figures 1 and 2. When the findings were compared with similar studies, it was found that the British had the highest percentage with normal occlusion (67.3%) [18] followed by white Americans (51%) [17], the Lebanese (40.3%) (our study), Indians (34.5%) [16], Egyptians (34.3%) [15] and Swedish (10%) [19] (Table 2 and Figure 2).

The prevalence of class I malocclusion in the Lebanese sample was 35.5%; it was higher in females. The Swedish had the highest incidence of Class I malocclusion followed by the Indians, the Lebanese, the Egyptians, white Americans and then the British (Table 2 and Figure 2).

Angle’s Class II malocclusion was found in 19% of the total sample (16.9% division I and 2.2% division 2). The prevalence of Class II, division I in males was much higher than females. However, the prevalence in Class II, division 2 was higher in females. When these findings were compared with other ethnic groups, Egyptians had the highest prevalence of class II malocclusion (21%), followed by Lebanese (19.1%), British (16.1%), white Americans (16%), Indians (9.6%) and Swedish (3%).

Angle’s class III malocclusion was found in only about 5% of the Lebanese sample studied. In descending order, the prevalence of class III malocclusion was highest in Egyptians (10.6%), followed by Scots (8%) white Americans (7%), Lebanese (5.1%), Swedish (4%), Indians (2.9%) and British (2.9%) (Table 2).

The main focus of this survey was to collect information on the prevalence of malocclusion in a sample of Lebanese schoolchildren. The survey found that 59.7% of the Lebanese children between 9 years and 15 years of age had a certain degree of malocclusion; 35.5% had local irregularities with a relatively normal jaw relationship, the remaining 24.2% had some jaw disharmony in addition to local irregularities.

To distinguish between those whose malocclusion is severe enough to require orthodontic treatment and those with minor deviations, one needs to establish certain criteria to rank patients properly according to the severity of the case, and to develop a treatment priority index relevant to the resources available.

Several indices have been presented since the 1950s. Among these are those by Massler and Frankel [13], van Kirk and Pennell [20], Draker [21], Bjork et al. [12], Salzmann [22], Summers [23], Luffingham and Campbell [14]. However, none of these has become a universally accepted method for reliably assessing occlusion [24]. Recently Brook and Shaw [25], and Richmond et al. [26] have developed the two most commonly used indices of occlusion (PAR index and 10TN index). They claim the indices can be used to assess severity and treatment needs.

Conclusions and suggestions for further study

In this study the sagittal relationship in a sample of Lebanese children was assessed according to Angle’s classification. Other
occlusal features such as crowding, overjet, overbite, crossbite, lips competency should be examined if reliable information on the severity of malocclusion is to be obtained. In the author’s opinion, the key to providing the best possible orthodontic service to the population is qualified manpower. Highly educated, skilled and experienced specialists can develop indices relevant to the local needs, collaborate in teams, improve the quality of education and services in dental schools and private practice, and stimulate epidemiological research projects.

References


The collaborative programme in oral health continued to focus on promoting national capacities to develop oral health preventive programmes, particularly those targeting children. This direction is in accordance with the regional strategy to prioritize programmes for both pre-school children and schoolchildren as the principal activity to combat rising regional trends in oral health morbidity. The collaborative programme also maintained its commitment to promoting the adoption of the atraumatic restorative treatment technique, which does not require electrically driven equipment, so as to widen the coverage with restorative oral health treatment. Consultants visited Lebanon and Pakistan to train national master trainers in the skills of atraumatic restorative treatment.