Prevalence of congenitally missing teeth among a population of disabled school children in Kuwait

M. SHYAMA*, SA. AL-MUTAWA*, E. HONKALA**

ABSTRACT: Aim This was to determine the prevalence of congenitally missing teeth in the permanent dentition among a population of disabled schoolchildren in Kuwait. Methods The study involved 702 subjects (383 males and 319 females) with sensory, physical or developmental disabilities attending the special needs schools and ranging in age from 8-29 years (mean = 13.3 years). Diagnosis and recordings were carried out according to the WHO criteria. Statistics Chi-square tests were used to test the differences in the frequencies between groups. Multivariate analysis was used to test the associations of various socio-demographic and other factors for the occurrence of the congenitally missing teeth. Results The overall prevalence of congenitally missing teeth was 11.8%. The most frequent condition was the absence of one tooth (6.3%), followed by the absence of two teeth (3.1%), three teeth (0.6%) and four teeth (1.3%). The most severe cases had congenital absence of 5 or 6 teeth (0.6%). The maxillary lateral incisor was found to be the most frequently missing tooth. Our results confirm the high prevalence of congenitally missing teeth in a Down’s syndrome group (29%), which had a higher risk for occurrence (OR = 4.1; 95% CI = 1.5-11.1). Conclusion Congenitally missing teeth were more common among these disabled subjects than in the earlier studies concerning normal Arabic children.

KEYWORDS: Congenitally missing teeth, Disabled, School population.

Introduction

Hypodontia (HD) refers to the developmental absence of one or only a few teeth and it has been proposed that it arises as a result of a combined effect of genetic and environmental factors. HD can occur as an isolated abnormality, or be associated with conditions such as Down’s syndrome and ectodermal dysplasia. HD may present with varying degrees of severity and can be classified as mild (from 2 to 5 congenitally missing teeth), moderate (from 6 to 9 congenitally missing teeth), or severe (10 or more congenitally missing teeth) [Øgaard et al., 1995]. The most common dental anomaly occurring in association with congenital absence of the permanent lateral incisor/second premolar is the absence of other teeth [Zhu et al., 1996]. The most frequently missing teeth usually are third molars, maxillary lateral incisors, maxillary and mandibular second premolars and mandibular incisors [Stark, 1982].

Various studies on the prevalence of HD have revealed discrepancies in results which can be usually attributed to differences in sampling techniques, diagnostic criteria and the racial derivation of the groups examined. Excluding the third molar, population prevalences of HD across the world vary between 3.5% and 6.5% in the permanent dentition. Congenitally missing teeth are more common among persons with Down’s syndrome (50%) when compared with the general population (2%), though the distribution of missing teeth is similar in both populations [Stark, 1982].

The prevalence of HD in subjects who do not have Down’s syndrome has been reported to vary from 2.2 to 17% [Arte et al., 1996]. HD among primary teeth is a relatively rare occurrence with a prevalence of less than 1% and ranges from 0.08% to 1.55% [Whittington and Durward, 1996].

The prevalence of HD has been reported to be 11.6% in orthodontic patients in Kuwait [Al-Enezi et al., 2002], but no data exist from normal Kuwaiti population. The prevalence in normal Arabic children has been variously reported as 2.2% [Salem, 1989], 4% [Al Emran, 1990], 2.6% [Salama and Abdel-Megid, 1994] in Saudi Arabia.
HD may result in functional disability, aesthetic problems and can modify the occlusion and position of the teeth and growth of the jaws [Nik-Hussein, 1989]. Early recognition during the primary and mixed dentition periods would allow for more comprehensive long range treatment planning, favourable prognosis, minimise the need for extensive treatment and, therefore, of special significance for dental practice.

The purpose of this study was to determine the prevalence of congenitally missing teeth in the permanent dentition among a population of disabled school children and young adults living in Kuwait.

Materials and methods

The study population involved 702 subjects (383 males and 319 females) with visual impairments (n = 55), hearing impaired (n = 281), physical (n = 204) or developmental disabilities (n = 162), who were attending all 11 special needs schools in Kuwait (Hawally Governorate), between the ages of 8-29 years (mean = 13.3 years). The disabling conditions were mutually exclusive. Examinations and recording of data for HD were carried out according to the WHO (1997) criteria.

Oral examinations were carried out by a single investigator (MS). Ten percent of the subjects were re-examined and a kappa score for the intra-examiner reliability was calculated. There was no routine radiographic examination of the subjects as the schools were not equipped with these facilities and it was very difficult to transfer children/young adults to dental centres where the facilities were available.

A tooth was registered as congenitally missing when it was confirmed that the tooth had not been extracted because of caries, orthodontic reasons, periodontal disease, trauma etc.

The subjects had their dental records available at the time of the examination and they were used to investigate developmentally absent permanent teeth. Past dental histories and the treatment records were checked to ensure that extracted permanent teeth were not diagnosed as congenitally missing. All subjects who participated in this study had no history of orthodontic treatment. The presence or absence of the third permanent molars was not considered for the presence of missing teeth.

Statistical methods. The data were analysed using the statistical software SPSS, Windows 11.0. Chi-square ($\chi^2$) tests were used to test differences in frequencies between the groups and for testing the associations of the variables (namely gender, nationality, disabling condition) with the prevalence of congenitally missing teeth. In the analyses, multivariate analysis (logistic regression) was used to test the associations of the various socio-demographic and other factors for the occurrence of the congenitally missing teeth. Odds ratios (OR) and their confidence intervals (95% CI) were estimated for the condition. The following explanatory factors were included in the logistic regression model: disability condition, gender and nationality.

Results

Of the 702 subjects examined, 83 demonstrated a congenital absence of one or more teeth. The kappa score for intra-examiner reliability was calculated as 0.95. The prevalence of congenitally missing teeth was 11.8% (Table 1). The most frequent condition was the absence of one tooth (6.3%), followed by two teeth (3.1%), 3 teeth (0.6%) and 4 teeth (1.3%). The most severe cases had congenital absence of five or six teeth (0.6%). None of the subjects had severe HD. The distribution of missing teeth in the sample is shown in Figure 1. The subjects with HD missed a combined total of 116 teeth.

The maxillary lateral incisor was found to be the most frequently missing tooth followed by the mandibular lateral incisor. No maxillary or mandibular first molars were found to be absent. There were no differences according to the gender and nationality. The prevalence of congenitally missing teeth was 9.1% in the visually impaired, 7.5% in the hearing impaired, 4.9% in the physically disabled and 29% in the developmentally disabled (p < 0.001).

Our results confirm the high prevalence of congenitally missing teeth in the Down’s syndrome group (29%), which also had higher risk for occurrence (OR = 4.1; 95% CI = 1.5-11.1) of congenitally missing teeth (Table 2). In this group the teeth most often missing were the maxillary lateral incisors (15.4%), followed by the mandibular laterals (9.9%), maxillary second premolars (8%), mandibular second premolars (6.8%) and mandibular centrals (5.6%) (Fig. 2).

Discussion

Although panoramic radiographs have been shown to be useful in the dental evaluation of patients with developmental anomalies, they were not possible in this study. This was a major limitation. Also some earlier studies have not utilised radiographs for reporting the prevalence of congenitally missing teeth [Cohen et al., 1970; Yonezu et al., 1997; Nordgarden
et al., 2002]. The dental records were reviewed to prevent the inclusion of normally developed teeth that were missing due to trauma or extraction. The factors proposed as the causes of HD in the permanent dentition have been absence of primary tooth, injury to the developing tooth germ, physical obstruction or disruption of the dental lamina, space limitation, functional abnormalities of the dental epithelium or underlying mesenchyme and lack of nerve supply during tooth development [Kjaer et al., 1994].

The prevalence of HD in the present study was 11.8%, and is similar to the previous report on the orthodontic patients from Kuwait [Al Enezi et al., 2002]. The prevalence reported in Arabic children (Saudi Arabia) has varied from 2.2% [Salem, 1989] to

<table>
<thead>
<tr>
<th>No. of missing teeth</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>44</td>
<td>6.3</td>
</tr>
<tr>
<td>2</td>
<td>22</td>
<td>3.1</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
<td>0.6</td>
</tr>
<tr>
<td>4</td>
<td>9</td>
<td>1.3</td>
</tr>
<tr>
<td>5</td>
<td>2</td>
<td>0.3</td>
</tr>
<tr>
<td>6</td>
<td>2</td>
<td>0.3</td>
</tr>
<tr>
<td>Total</td>
<td>83</td>
<td>11.8</td>
</tr>
</tbody>
</table>

Total population of children examined = 702

**TABLE 1** - Prevalence of the congenitally missing teeth according to the frequency of missing teeth in a population of Kuwaiti disabled school children.

<table>
<thead>
<tr>
<th>Variables</th>
<th>OR</th>
<th>95% CI</th>
<th>Statistical significance (p)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Disability condition</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blind</td>
<td>1.0</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Hearing impaired</td>
<td>0.5</td>
<td>0.2 - 1.5</td>
<td>0.23</td>
</tr>
<tr>
<td>Physical handicap</td>
<td>0.4</td>
<td>0.1 - 1.1</td>
<td>0.08</td>
</tr>
<tr>
<td>Down syndrome</td>
<td>4.1</td>
<td>1.5 - 11.1</td>
<td>0.00</td>
</tr>
</tbody>
</table>

| **Gender**          |     |         |                              |
| Male                | 1.0 | -       | -                            |
| Female              | 1.3 | 0.8 - 2.2 | 0.32                         |

| **Nationality**     |     |         |                              |
| Kuwaiti             | 1.0 | -       | -                            |
| Non-Kuwaiti         | 0.9 | 0.5 - 1.7 | 0.83                         |

**TABLE 2** - Estimated relative risks (OR) and their confidence intervals (95% CI) for occurrence of congenitally missing teeth in a population of Kuwaiti disabled school children.

**FIG. 1** - The distribution of congenitally missing teeth by tooth type in a sample of disabled Kuwaiti school children and young adults (n = 702).

**FIG. 2** - Prevalence (%) of congenitally missing teeth in a group of Down’s syndrome school children and young adults living in Kuwait (n = 162), according to tooth type.
The prevalence of congenitally missing teeth in Kuwait could be the same in the normal population, but there are no studies published to confirm this. However, the prevalence in this study was higher than reported by the previous investigators [Locht, 1980; Nik-Hussein, 1989; Warnakulasuriya, 1989; Rolling and Poulsen, 2001] on normal children.

In this study, the prevalence of the moderate HD was very low and none had severe but a mild expression was the most common condition. There was no gender difference, as has been reported earlier by others [Ruprecht et al., 1986; Kumasaka et al., 1997; Yonezu et al., 1997]. However, some investigators have reported a female predilection [Nik-Hussein, 1989; Rolling and Poulsen, 2001].

The reported prevalence of congenitally missing teeth was 9.1% in the visually impaired, which is higher than that reported in Saudi Arabian schoolchildren [Salem, 1989; Salama and Abdel-Megid, 1994; Al Emran, 1990]. The prevalence in the hearing impaired (7.5%) coincided with the findings in some other studies [Locht, 1980; Davis, 1987] and higher than in Arabic children. The prevalence of 4.9% in the physically disabled is in agreement with the finding in one study in Saudi Arabia [Al Emran, 1990] and that in Norway [Nordgarden et al., 2002].

The prevalence of HD (29%) in this study in the Down’s syndrome group is similar to that reported in an earlier study [Cohen et al., 1970]. However, it was considered to be low when compared with the results of some other previous reports [Bamba et al., 1994; Kumasaka et al., 1997; Mestrovic et al., 1998; Acerbi et al., 2001]. In children with Down’s syndrome, the rate of HD can be as high as 23.3% [Barlka, 1966]. It was indicated that this “Trisomic insult” will greatly increase the susceptibility of the host to partial anodontia, while not affecting specific tooth buds [Stark, 1982]. It may be postulated that a higher prevalence might be found in cross-sectional studies due to the delayed formation of tooth germs. This might be misinterpreted as congenitally missing teeth among young subjects [Orner, 1973; Bamba et al., 1994].

The most commonly involved teeth in HD are usually maxillary lateral incisors, maxillary and mandibular second premolars [Cohen et al., 1970; Jara et al., 1993]. Certain teeth are missing more frequently than the others and there appears to be some controversy regarding the most likely type of the missing tooth. In this study, the maxillary lateral incisor was found to be the most frequently missing. Several studies have shown maxillary lateral incisors to be the most frequently missing in normal children [Ruprecht et al., 1986; Nik-Hussein, 1989; Salem, 1989].

Depending on the population studied, the maxillary lateral incisors have been the most often missing teeth in the subjects with Down’s syndrome [Cohen et al., 1970; Jensen et al., 1973; Mestrovic et al., 1998]. Kumasaka et al. (1997), who found the mandibular lateral incisors to be the most affected teeth, reported a different sequence. The mandibular incisor was the most commonly missing tooth in an earlier study on normal children [Davis, 1987]. Studies on individuals without Down’s syndrome have shown that the second premolars or the maxillary lateral incisors are the most frequently missing teeth [Symons et al., 1993; Kotsomitis and Freer, 1997]. The mandibular second premolar has been the most frequently missing tooth, followed by the maxillary lateral incisor and then the maxillary second premolar in some studies [Locht, 1980; Salama and Abdel-Megid, 1994].

The clinical relevance of the early recognition of hypodontia in any patient requires appropriate treatment planning, the maintenance of primary teeth or an early orthodontic intervention. Treatment decisions should be made after reviewing the radiographs with a concern for the space maintenance.

Conclusion
Conegitanly missing teeth were more prevalent among disabled school children and young adults in a Kuwaiti Arab population. This has implications for treatment planning and the provision of dental care.

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References


