Assessment of malocclusion and orthodontic treatment need in disabled children in Nigeria

I L Utomi BDS, FWACS¹ and C O Onyeaso BDS, FWACS²

¹Department of Child Dental Health, College of Medicine, University of Lagos, Nigeria; ²Department of Child Oral Health, College of Medicine, University College Hospital, Ibadan, Nigeria

Abstract

Objective: To compare the prevalence of malocclusion and orthodontic treatment needs of three major groups with disabilities in Lagos, Nigeria using the Dental Aesthetic Index (DAI). Methods: The study sample consisted of 428 disabled children (114 intellectually disabled, 253 with hearing impairments, 61 physically disabled) aged 6–18 years randomly selected from five special schools/centres in Lagos. Results: Dental appearance which required no orthodontic treatment or slight need accounted for 65.7% of the sample. Just over 17% had a definite malocclusion where treatment was ‘elective’; 9.3% had a severe malocclusion with treatment ‘highly desirable’ and 7.7% had a severe or handicapping malocclusion with treatment considered mandatory. The intellectually disabled group presented the highest mean DAI score (p < 0.001). In addition, there were statistically significant differences between the disabled groups in all the categories of orthodontic treatment needs according to the DAI. There was a statistically significant association between severity of malocclusion and type of disability (p < 0.001). The prevalence of severe and handicapping malocclusions was significantly higher in the intellectually disabled children. Significant differences were found in certain malocclusion traits between the groups. The intellectually disabled children had a significantly higher prevalence of missing teeth, anterior maxillary irregularity, anterior open bite and molar relationship discrepancies when compared to the other disabled groups. Conclusion: Significant differences in mean DAI scores (p < 0.001) were found between the disabled groups with the intellectually disabled group presenting the highest mean DAI score. The significantly higher differences in the intellectually disabled children could qualify them for publicly subsidised orthodontic care.

Key words: Disabled children, orthodontic treatment need, DAI, Nigeria

Introduction

Worldwide, numerous reports have been published on diverse aspects of dental care in disabled people (Brown and Schodel, 1976; Brown, 1980; Bober-Moken and Clark, 1981; Oreland et al., 1989; Waldman, 1989; Davies and Whittle, 1990; Nunn and Murray, 1990; Bratel and Berggren, 1991; Nunn et al., 1993; Becker and Shapira, 1996; Chadwick and Asher-McDade, 1997; Becker et al., 2000; Chaushu and Becker, 2000; Nunn et al., 2000; Dinsh et al., 2003). Most conclusions from these studies concede a relative lack of care for individuals with special needs. The Nigerian experience is not different from the foregoing (Onyeaso, 2002a, 2003, 2004). Meanwhile, Chaushu et al. (2001) gave an encouraging report of some children who received orthodontic treatment in Israel.

Nigeria is one of Africa’s most populous countries with a population estimate in excess of 140 million. More than 12 million of this population live in Lagos which was the colonial capital of Nigeria and the commercial gateway to the country. The practice and teaching of orthodontics started at the Lagos University Teaching Hospital (LUTH), Ile-Ife, Lagos. Following the inception of orthodontic practice, teaching and research in Lagos, several reports have been presented on occlusion and malocclusion among Nigerians. Most of these studies have focused on the normal population (Richardson and Ana, 1973; Isiekwe, 1983, 1987; Aggarwal and Odusanya, 1985; Otuyemi and Adiboye, 1993; Otuyemi et al., 1999; Onyeaso, 2004). The only studies in orthodontics that have been reported on people with disabilities in Nigeria, are those of Onyeaso (2002a, 2002b, 2003, 2004). Social psychology has confirmed the importance of physical attractiveness on the socialisation process. Research evidence indicates that unacceptable dental appearance, including a visible dental appearance that deviates greatly
from the norm, are phenomena that may stigmatise, impede career advancement and compromise peer group acceptance. In addition, a poor facial appearance encourages negative stereotyping and has a profoundly negative effect on self concept (Adams, 1977; 1980). Severe, unaesthetic occlusions can compromise already difficult social relationships and potential employment opportunities. Individuals with disabilities need functional and aesthetic considerations comparable to that of ‘normal’ persons (Waldman et al., 2000).

Orthodontic treatment is provided to improve appearance and to enhance psychosocial well-being (Shaw et al., 1979; Gosney, 1986). For disabled people, attempts should be made to correct dentofacial anomalies, not only for better oral functions, but also for proper integration within society. According to Waldman (1989), the need for orthodontic care for disabled people is further highlighted by the increasing trend toward deinstitutionalisation of this group of people with special needs and subsequent resettlement of these people in smaller home environments.

The recent introduction of the National Health Insurance Scheme (NHIS), together with changing social policies and favourable legislation for people with disabilities in Nigeria suggest a possible increase in demand for dental services (including orthodontic care) by such people (Onyeaso, 2003).

Resources will never be sufficient to provide unlimited demands for orthodontic or other forms of healthcare services, regardless of their mode of financing (Cumming, 1994). This is particularly relevant to publicly funded programmes especially in a developing economy such as Nigeria. For a systematic and well organised orthodontic care programme for disabled people, there is a need for data, which can be used to estimate the proportion of the population that requires orthodontic treatment according to priority.

Presently, a number of different criteria and indices are being used to assess malocclusion and orthodontic treatment need such as the Index Orthodontic Treatment Need (Brook and Shaw, 1989), Peer Assessment Rating (PAR) Index (Richmond et al., 1992), and the Index of Complexity, Outcome and Need (Daniels and Richmond, 2000). Of the indices currently available, the Dental Aesthetic Index (DAI) has been accepted by the World Health Organisation as a cross cultural index (World Health Organisation, 1997). The Dental Aesthetic Index (DAI) is a simple, universally accepted index which can be used in epidemiological surveys to assess unmet treatment need and as a screening tool for determining priority for orthodontic care in publicly financed programmes (Jenny et al., 1993). Although there are some publications on people with special needs in relation to dentistry, including orthodontics, there are still relatively few reports on the objectively quantified orthodontic treatment need of this special population.

Therefore, the aim of this study was to compare malocclusions and orthodontic treatment needs in three major groups of young people with disabilities in Lagos, Nigeria using the Dental Aesthetic Index (DAI).

Materials and methods

The study population consisted of 428 children (252 males and 176 females) aged 6–18 years attending five special schools/centres for people with special needs in Lagos, Lagos State, Nigeria. The total sample comprised three major disability groups:

- Intellectually impaired (included both Down syndrome and non-Down syndrome intellectually disabled children)
- Hearing impaired
- Physically disabled.

Authorisation for the study was obtained from the respective school authorities and from the parents or guardians through the schools. One of the authors (UIL) used pre-structured questionnaires to record the clinical findings and the socio-demographic data such as name, age, gender and school/centre. The disabled subjects were examined in their respective schools under natural light. Following the WHO criteria (World Health Organisation, 1997), the same author (UIL) previously calibrated on the use of DAI, examined the subjects on all the 10 components of the index.

Statistical analysis

The Epi Info for Windows, version 3.2.2 (Epi Info 2004), developed by the Center for Disease Control, Atlanta, USA was used for data entry, validation and analysis. Frequency distributions were generated for all categorical variables. Means, standard deviations and other measures of central tendency (median and mode) and dispersion (range and variance) were determined for all quantitative variables. The chi-square test was used for the comparison of proportions and for evaluating associations in contingency tables. For the comparison of means between groups, the ANOVA (analysis of variance) was used. Differences and associations were considered statistically significant where the associated p-values were equal to or less than 0.05.

Reproducibility test

To assess the reproducibility of the measurements by the examiner, 30 subjects were re-examined during data collection at 3-week intervals. The intra-examiner agreement was tested using the Spearman rank correlation coefficient. The rank-order correlation (r = 0.96) showed very good agreement.

Results

Table 1 shows the results of analyses of variance of mean DAI scores of the disabled children according to demographic variables. Significant differences were found in mean DAI scores between gender (p< 0.05) and among age groups (p< 0.05). Significant differences in mean DAI
scores \( p < 0.001 \) were found between the disabled groups with the intellectually disabled presenting the highest mean DAI score when compared with those with hearing impairments and those with physical disabilities.

The distribution of the treatment needs in the total population sample according to the DAI is shown in Table 2. More than half (65.7%) of the study group had a dental appearance where orthodontic treatment need was ‘slight’ or ‘not indicated’. Individuals who had a ‘definite’ malocclusion where treatment need was elective accounted for 17.3%. ‘Severe malocclusion’ with treatment ‘highly desirable’ was found in 9.3% of the sample. ‘Handicapping malocclusion’ where treatment was ‘mandatory’ was observed in 7.7% of the study population. There were statistically significant differences between the different disability groups in all the categories of orthodontic treatment needs, according to the DAI scoring system. There was a statistically significant association between severity of malocclusion and type of disability. The prevalence of severe and handicapping malocclusion was significantly higher in the intellectually disabled group when compared with other groups \( \chi^2 63.64, \text{df} \; 6, \; p < 0.001 \).
Table 3 shows the distribution of the DAI component scores of all the disabled groups. One or more missing teeth were observed in 3.7% of the study population. Significant differences in missing teeth \( (p < 0.01) \) were found, with the young people with intellectual disabilities having a higher number of missing teeth as compared to those with a hearing impairment and those with physical disabilities. Incisal crowding was noted in 27.3% of the sample and spacing was seen in 53.0%. In all disabled groups, a high proportion (over 47%) had spacing in one or two incisor segments. A midline diastema occurred in 32.7% of the total population. Anterior maxillary irregularity was seen in 25.9% of the sample and anterior mandibular irregularity was noted in 37.4%. Significant differences \( (p < 0.01) \) in maxillary irregularity were found between groups with those with intellectual disabilities having more frequent maxillary irregularity compared with the other groups. Similarly, significant differences in mandibular irregularity were found with the hearing impaired having more frequent mandibular irregularity compared with those with the other disabling conditions. An increased overjet of greater than 3mm was seen in 17.8% while reversed overjet accounted for 4.2%. Open bite occurred in 14% of the study population. The prevalence of anterior open bite was significantly higher in those with intellectual disabilities when compared to the other disabled groups \( (p < 0.001) \). Class I molar relationship was observed in 87.4% of the sample while 12.6% deviated from this normal molar relationship. The prevalence of half cusp and full cusp molar relationships was significantly higher in the intellectually disabled children when compared to other disabled groups \( (p < 0.001) \).

Discussion

There has been no comparative assessment of the prevalence of malocclusion and levels of orthodontic treatment need in the different disabled groups in Nigeria. In this study, the DAI index was adopted as an epidemiological tool because it combines the aesthetic and physical aspects of malocclusion mathematically to produce a single score. In addition, administrators of publicly financed programmes will find this index (DAI) useful in determining priority for orthodontic care. It has been shown to be very reliable and valid for determination of orthodontic treatment needs (Jenny and Cons, 1996).

The results of this study indicated that over half of the disabled children had a dental appearance that required no orthodontic treatment. This is comparable to the report by Onyeaso (2004) on children with special needs in Ibadan, Nigeria, which gave a value of 59% of the study population as not requiring treatment. However, it is lower than the figure (77%) reported by Otuyemi et al. (1999) for normal Nigerian children. In this present study, there were significant differences in orthodontic treatment need between the disabled groups. Compared with the hearing impaired and the physically challenged, the intellectually disabled group had a higher mean DAI score and hence more need for treatment. The intellectually disabled group had a proportionally greater number of children with severe and handicapping malocclusion when compared to the other disabled groups. This is consistent with the report of Dinesh et al. (2003). A correlation seems to exist between the incidence of intellectual impairment and severity of craniofacial disability, and thus those with an intellectual impairment display a higher prevalence of malocclusion than other people with disabilities (Koster, 1976; Oreland et al., 1987; Oreland et al., 1989; Onyeaso, 2004).

Furthermore, this study showed that girls had significantly higher mean DAI scores \( (p < 0.05) \) than boys. This is in contrast to an earlier report on normal Nigerian children (Otuyemi et al., 1999). Similarly, there was a statistically significant difference in mean DAI scores in relation to different age groups which disagreed with the study by Otuyemi et al. (1999).

The results of this study have revealed significant differences between the disabled groups in relation to certain malocclusion traits. The young people with intellectual disabilities had a significantly higher prevalence of missing teeth, anterior maxillary irregularity, anterior open bite and molar relationship discrepancies than the other disabled groups.

The higher prevalence of missing teeth observed in those with intellectual disabilities may be due to systemic conditions associated with their impairment. This higher prevalence of missing teeth is reflected in the increased frequency of spacing of teeth also observed in the young people with intellectual disabilities compared with the other groups. Spacing of the anterior teeth and a midline diastema were quite common among the disabled children. This is consistent with the literature on the Nigerian population (Richardson and Ana, 1973; Otuyemi et al., 1999; Onyeaso, 2004). The maxillary midline diastema, which is often associated with the spacing of teeth among Nigerians, is regarded as a sign of natural beauty (Richardson and Ana, 1973).

The frequency of anterior open bite noted in this study (14%) is higher than that reported in normal Nigerian school children (10.2%) by Otuyemi et al. (1999). It is also higher than that (9.8%) reported by Onyeaso (2004) for children with special needs in Ibadan, Nigeria. This may be attributed to the fact that no Down syndrome case was included in that report (Onyeaso, 2004). The prevalence of anterior open bite in the young people with intellectual disabilities in this study (27.2%) is greater than the 16% and 4.2% reported by Onyeaso (2003) and Dinesh et al. (2003), respectively. However, Vigild (1985) reported a higher prevalence of 38% in Down syndrome individuals and 23% anterior open bite in non-Down syndrome young people. The roles of oral functions in shaping normal dental arches and of abnormal muscular activity in the development of malocclusion have been acknowledged (Jensen et al., 1973).
It has been concluded by several investigators that intellectual impairment is often associated with oral dysfunction (Oreland et al., 1987; Oreland et al., 1989). Deviant or poor oral function has been suggested as being responsible for the increased prevalence of malocclusion in young people with intellectual disabilities (Oreland et al., 1989). Deficient maxillary growth and abnormal tongue size have been reported as contributing factors in the production of anterior open bite in individuals with Down syndrome (Jensen et al., 1973). Aetiological factors associated with the high prevalence of anterior open bite in the young people with intellectual disabilities include habit development (including finger sucking, tongue thrusting, mouth breathing) and general poor muscle development (Waldman et al., 2000).

The results of this study indicated that the young people with an intellectual impairment had proportionally fewer individuals with a normal molar relationship when compared to the other disabled groups. This agrees with the report of Dinesh et al. (2003) on disabled individuals in South Canara, India. This finding may be due to the inclusion of Down syndrome subjects in the present study group. In their literature review, Brown and Schodel (1976) showed that, except for individuals with Down syndrome and severe cerebral palsy, there was no conclusive evidence that malocclusion was common in people with special needs. Brown (1980) noted also that the distribution of molar relationship in children with learning disabilities did not differ widely from the normative values for the general population provided children with Down syndrome were excluded. Individuals with Down syndrome often have altered cranial base relationship which predispose them to a class III malocclusion (Bober-Maken and Clark, 1980).

This study showed that the young people with an intellectual impairment had a higher prevalence of increased overjet when compared to the other disabled groups. The value of the overjet in this study (17.8%) is higher than 14% and 13% reported by Otuyemi et al. (1999) and Onyeaso (2004) for normal and children with special needs in Nigeria, respectively. This is an oral health concern as previous Nigerian studies (Henshaw and Adenubi, 1980; Naqui and Ogudan, 1990) have shown a relationship between trauma to anterior teeth and increased overjet. In one Nigerian study by Denloye (1996), the prevalence of fractured anterior teeth among young people with an intellectual impairment was 20%.

A high proportion of the study population (17%) had severe to very severe malocclusion where treatment is considered 'highly desirable' or 'mandatory' based on decision points along the DAI scale. It is expected that these children would receive orthodontic care. Unfortunately many of these children may not have access to orthodontic care due to the low number of orthodontic specialists and high cost of treatment. As well, the fact that orthodontic care is given low priority in oral health care in Nigeria possibly due to the poor economic condition in the country. Access to treatment is further limited by the relatively low dental awareness among Nigerians when compared with developed countries like the United Kingdom and the United States of America. The situation is exacerbated by the absence of publicly financed health programmes.

These findings have planning and implementation consequences for treatment in a time of competing demands on the limited resources in Nigeria. Presently, there is increasing social pressure for the provision of subsidized health care services for the less privileged members of the society. The recently introduced National Health Insurance Scheme (NHIS) in Nigeria may provide hope for the provision of effective oral health services for people with special needs (Onyeaso, 2003).

Conclusions

This study has shown that statistically significant differences exist in certain malocclusion traits, using the DAI, between those with a hearing impairment, those with an intellectual impairment and young people with physical disabilities in Nigeria. The young people with an intellectual impairment had a significantly higher prevalence of missing teeth, anterior maxillary irregularity, anterior open bite and molar relationship discrepancies when compared with the other disabled groups.

There were statistically significant differences between the three disabled groups at all the levels of orthodontic treatment needs. The prevalence of severe and handicapping malocclusions was significantly higher in the young people with an intellectual impairment when compared with the other disabled groups.

Improved access to orthodontic services and oral health education targeting parents is necessary for effective delivery of oral health care including orthodontic services to people with disabilities. There is a need for government and non-governmental organisations to give more attention to orthodontic care of people with special needs in Nigeria.

References


Epi Info version 3.2.2 developed by the Center for Disease Control, Atlanta, Georgia, USA. (Website: http://www.CDC.epiinfo/).


Address for correspondence

Dr I.L. Utomi,
Department of Child Dental Health,
College of Medicine,
University of Lagos,
P.M.B. 12003, Lagos,
Nigeria
Email: ifeomautomi@yahoo.com