Oral hygiene status of disabled children and adolescents attending special schools of South Canara, India

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ABSTRACT  Objective. To evaluate the oral hygiene status of disabled children and young adults attending special schools in South Canara, Karnataka, India. Methods. All disabled individuals between 3 and 20 years attending the district’s eight non-residential special schools were examined by a single investigator between February and April 2002. Oral hygiene levels were assessed using the simplified oral hygiene index, and a modified version of this index was used to evaluate primary dentition. Information regarding tooth cleaning habits was obtained by questioning parents or adult guardians. Results. Of the 524 subjects recruited, the simplified oral hygiene indices in primary, mixed, and permanent dentitions were 1.48 (standard deviation, 0.93), 2.12 (1.09), and 2.76 (1.20), respectively. Subjects with severe intellectual disabilities had the worst oral hygiene (overall score, 3.22), followed by those with moderate intellectual disabilities (2.87). Hearing and visually impaired subjects had better oral hygiene (1.49 and 2.04, respectively) than other disabled individuals. Subjects using toothbrush and toothpaste had better oral hygiene than those using other indigenous modes of cleaning. Conclusion. Disabled children experience greater challenges to proper oral hygiene and health care, often due to a lack of basic manual skills and intellectual abilities that precludes adequate practices, such as toothbrushing. Organized action by India’s dental professionals and community and public health authorities is required to address the discrepancies in oral health and hygiene among disabled children and address the barriers to education and care that include cost, fear, and social attitudes.

Introduction

Oral health is a vital component of overall health, which contributes to each individual’s well-being and quality of life by positively affecting physical and mental well-being, appearance, and interpersonal relations. Oral health is an important aspect of health for all children, and is all the more important for children with special health needs. Because oral hygiene affects one’s esthetics and communication, it has strong biological, psychological, and social projections. People with disabilities deserve the same opportunities for oral health and hygiene as those who are healthy. Unfortunately, oral health care is one of the greatest unattended health needs of the disabled people.

A number of studies have shown that challenges to oral health are more complex for disabled children, who are often unable to adequately apply the techniques necessary to control plaque. In many instances, a disabled child’s oral hygiene care becomes the responsibility of another person, generally a parent or guardian, many of whom are emotionally or intellectually incapable of dealing with the health problems of their less fortunate affiliates.

The poor oral hygiene of disabled individuals, in comparison with age-matched non-disabled groups, has been widely reported. Moreover, some investigators have shown that the situation worsens with increasing age. Furthermore, both Murray and McLeod and Shaw et al. have identified a correlation between level of oral hygiene and severity of disability. However, comparison between these studies is difficult due to a multiplicity of measurement methods and the difficulty in standardizing criteria.
South Canara has a total estimated population of 2 million and an approximate population density of 340/km². Of the eight special schools in the district, four are in rural areas. All of the schools are run by non-government organizations and are non-residential. Although most of the schools have basic medical facilities, oral health care seems to be quite neglected; dental supervision is not provided. The present study was carried out to evaluate the oral hygiene status of the disabled children attending South Canara’s special schools.

Methods

A total of 537 disabled individuals between 3 and 20 years (mean, 12.3 years) were examined between February and April 2002. The representative sample includes six major disability groups:

1. Intellectually disabled individuals whose level of mental development and ability to adapt to their environment are significantly lower than that of normal individuals; almost half (47%) of these were Down syndrome patients. Based on the results of Stanford-Binet general intelligence tests recorded by an institutional psychologist at the start of the academic year, this group was further subdivided into mild (IQ, 52-67), moderate (IQ, 36-51), and severe (IQ, ≤35) intellectually disabled groups.

2. Visually impaired individuals whose limited vision restricts their normal activities.

3. Hearing impaired individuals whose poor hearing level restricts their ability to understand language.

4. Physically challenged individuals prevented from fully participating in normal activities by a physical condition such as muscular dystrophy, congenital limb defects, etc.

5. Medically compromised individuals with medical conditions that put their general health into further risk, such as asthma, bleeding disorders, etc.

6. Disabled individuals with more than one form of disability.

Prior consent to the study was obtained from the respective school authorities and from the subjects’ parents or guardians through the schools. To avoid false readings caused by other means of artificial light source, subjects were examined at their respective schools under natural light while seated on an ordinary chair, unless the subject was confined to a wheelchair. Clinical data were collected by two previously trained examiners, one main researcher, and one inter-examiner who conducted agreement testing. A previously trained recording clerk also assisted during the process. Information regarding the tooth cleaning habits of each subject was obtained by questioning parents or guardians. The subjects’ level of oral hygiene was assessed using the simplified oral hygiene index (OHI-S) by Greene and Vermillion, which was chosen because it was depicted as a “sensitive, simple method for assessing group or individual oral hygiene quantitatively.” The OHI-S was developed for the study of variations in gingival inflammation in relation to the degree of intellectual subnormality in children, but has proven useful as an epidemiological tool for evaluating oral health programs in both the general population and disabled groups.

The OHI-S has two components: the simplified debris index (DI-S) and the simplified calculus index (CI-S). Each of these indices, in turn, is based on numerical determinations representing the amount of debris or calculus found on six preselected tooth surfaces: the buccal/labial surfaces of the maxillary right first molar (tooth 16), the maxillary right central incisor (tooth 11), the maxillary left first molar (tooth 26), the mandibular left central incisor (tooth 31), and the lingual surfaces of the mandibular left first molar (tooth 36) and the mandibular right first molar (tooth 46).

The criteria for the debris and calculus indices are shown in Tables 1 and 2. The DI-S and CI-S scores were calculated separately by summing the attributed scores.
and then dividing the results by the number of examined surfaces. Results obtained using the OHI-S are represented by DI-S and CI-S scores.

For primary dentition, the modified version of the OHI-S by Miglani et al. was used, in which the index teeth are: the maxillary right second molar (tooth 55), the maxillary right central incisor (tooth 51), the maxillary left second molar (tooth 65), the mandibular left second molar (tooth 75), the mandibular left central incisor (tooth 71), and the mandibular right second molar (tooth 85). The scoring system was similar to the original OHI-S.

Inter-examiner diagnostic calibrations were performed for over 10% of the study sample; the Kappa score was over 90% and considered adequate. The data collected were analyzed, and the mean and standard deviation (SD) of each group were calculated and recorded.

Results

Of the total 537 disabled children and adolescents attending the eight special schools, 524 (98%) were examined. The remaining children were either absent from school for a long period or highly uncooperative and very difficult to examine.

Subjects were divided into three groups based on dentition (primary, mixed, and permanent; Table 3); OHI-S, DI-S, and CI-S results are shown in Table 4. Severely intellectually disabled subjects had the highest mean OHI-S of 3.22, followed by moderately intellectually disabled subjects with 2.87. However, hearing and visually impaired subjects had a lower mean of 1.49 and 2.04, respectively. As can be seen in Table 4, the whole group had moderate to low levels of oral hygiene. The mean OHI-S increased from primary dentition towards permanent dentition in all the disability groups.

Table 5 presents the OHI-S and component scores by tooth cleaning method. The highest OHI-S scores were recorded in subjects who used charcoal, brick powder, etc., while the lowest scores were found in those who used toothbrush and toothpaste.

Discussion

The removal of plaque and debris from the teeth is a skill that can be mastered only when an individual has the dexterity to manipulate the toothbrush and understands the objectives of these activities. The success of good oral hygiene reflects the skill, dedication, and motivation of an individual or those who are responsible for it.

Most studies of oral disease prevalence in disabled groups find significantly poor levels of oral hygiene, which is confirmed in the present study. Brown and Schodel reviewed 32 studies of disabled children and reported that such patients tend to have poorer oral hygiene than their non-disabled counterparts. Most of these findings highlight the difficulties encountered by disabled individuals in maintaining an adequate level of oral hygiene. The reasons for poor oral hygiene in disabled children have been attributed to low powers of concentration and lack of motor skills. Snyder et al. pointed out that the lack of manual coordination in disabled children is a factor in the difficulty of their oral hygiene maintenance. Others mentioned that the most obvious challenge is the physical inability to adequately clean the oral cavity. In general, there is a wide range of toothbrushing ability, which is related to coordinated muscular movements, innate skills, ability to understand instructions, and age of the individual.

The intellectually disabled group in the present study included children with such severe disabilities that they have difficulty using a toothbrush. The standard of oral hygiene deteriorated with the severity of intellectual disability, which seems to confirm a correlation between level of oral hygiene and severity of the disability. It has also been observed that the mean OHI-S score increases from primary dentition towards permanent

### Table 3 Age and dental status of subjects by disability group

<table>
<thead>
<tr>
<th>Type of handicap</th>
<th>Mean age (SD) [years]</th>
<th>Primary dentition, n=33</th>
<th>Mixed dentition, n=162</th>
<th>Permanent dentition, n=329</th>
<th>Total, n=524</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mildly intellectually disabled</td>
<td>12.5 (4.8)</td>
<td>12 (10.1%)</td>
<td>33 (27.7%)</td>
<td>74 (62.2%)</td>
<td>119</td>
</tr>
<tr>
<td>Moderately intellectually disabled</td>
<td>11.9 (5.3)</td>
<td>3 (3.4%)</td>
<td>33 (37.5%)</td>
<td>52 (59.1%)</td>
<td>88</td>
</tr>
<tr>
<td>Severely intellectually disabled</td>
<td>13.6 (6.5)</td>
<td>3 (3.5%)</td>
<td>32 (36.8%)</td>
<td>52 (59.8%)</td>
<td>87</td>
</tr>
<tr>
<td>Visually impaired</td>
<td>15.5 (10.3)</td>
<td>1 (5.6%)</td>
<td>5 (27.8%)</td>
<td>12 (66.7%)</td>
<td>18</td>
</tr>
<tr>
<td>Hearing impaired</td>
<td>12.2 (5.6)</td>
<td>10 (8.9%)</td>
<td>34 (30.4%)</td>
<td>68 (60.7%)</td>
<td>112</td>
</tr>
<tr>
<td>Physically challenged</td>
<td>13.3 (7.1)</td>
<td>1 (2.0%)</td>
<td>12 (23.5%)</td>
<td>38 (74.5%)</td>
<td>51</td>
</tr>
<tr>
<td>Medically compromised</td>
<td>11.2 (8.1)</td>
<td>1 (4.4%)</td>
<td>2 (8.7%)</td>
<td>20 (87.0%)</td>
<td>23</td>
</tr>
<tr>
<td>Multiple disabilities</td>
<td>9.6 (6.3)</td>
<td>2 (7.7%)</td>
<td>11 (42.3%)</td>
<td>13 (50.0%)</td>
<td>26</td>
</tr>
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</table>

* SD standard deviation
dentition. Murray and McLeod and Noah also observed a falling level of oral hygiene with an increase in age.

Many systemic conditions increase the risk of poor oral hygiene, which in turn is a risk factor for a number of systemic conditions. In the present study, the intellectually disabled had a proportionally higher number of individuals with Down syndrome. Cohen et al. and Johnson and Young reported that in their subjects with Down syndrome, oral hygiene was poor, and calculus and materia alba were abundant. A number of studies point towards abnormalities of polymorphonuclear (PMN) leukocytes and monocytes in Down syndrome individuals. Independent of the total PMN count, these individuals usually have a preponderance of younger cell forms, which could be explained by an increased turnover rate of PMN. In Down syndrome, however, the absolute values of PMN are not significantly different from healthy people; the disorders are of a qualitative type in which cells fail to exert their normal bactericidal functions. For example, different stages of bacterial activity may be affected and neutrophil adhesiveness may be reduced. Barkin et al. noted a reduced capacity for PMN phagocytosis in Down syndrome; although monocytes had normal phagocytosis, their opsonization was defective.
Regarding medically compromised subjects, asthmatic children tend to have more calculus compared with healthy children, a phenomenon possibly related to the increased levels of calcium and phosphorus found in submaxillary and parotid saliva. It was noted that secretion rates of whole saliva and parotid saliva are decreased in asthmatic children using beta-2 agonists.

The present study also revealed that visually and hearing impaired children had better oral hygiene than other disabled individuals. Sogi and Bhaskar and Rao et al reported OHI-S scores of 1.75 (SD, 0.67) and 1.29 (SD, 0.59), respectively, in normal school children of Karnataka State. Children with hearing disabilities come closest to being ‘normal’ and probably were able to function well both manually and intellectually, which is in concordance with other reports. Individuals with problems of vision are able to comprehend oral hygiene instructions and also have more normal kinetic skills; however, they may still have difficulty seeing and removing plaque. Thus the most important variable in determining oral health status is the type of disability and how that disability impacts the maintenance of adequate or sound oral hygiene.

The oral hygiene status of all the disabled groups in the present study faired poorly when compared with a study conducted by Sogi and Bhaskar on 13- and 14-year-old students in Davangere, Karnataka State. They reported that the OHI-S of those children who used toothbrush and toothpaste, toothbrush and tooth powder, and finger and toothpaste were 1.29 (SD, 0.75), 1.61 (SD, 0.93), and 2.11 (SD, 0.89), respectively.

The comparison of tooth cleaning methods and modes suggests that the promotion of cleaning the dentition with toothbrush and toothpaste will go a long way toward improving oral hygiene. In rural India, the use of toothbrush and toothpaste is considered expensive and, probably because of this reason, indigenous methods of cleaning the teeth are still used. However, the majority of those who use a toothbrush are unaware of proper brushing techniques. Other oral hygiene aids, such as dental floss, interdental cleaning aids, and mouthwashes, are not widely available and are rarely used. Furthermore, a lack of knowledge about good oral hygiene practices among the concerned authorities, lack of motivation, the low priority given to oral health care in the society, and the generally poor socio-economic status of parents or guardians may be other explanations of the poor level of oral hygiene among the disabled children.

Disabled children are generally incapable of obtaining an adequate oral hygiene level by manual brushing because of their limited motor skills and lack of knowledge of oral hygiene and effective brushing technique. It has been suggested that complete plaque removal with a conventional toothbrush is not realistic for this group. According to some investigators, powered brushes are particularly well suited for people with reduced motor skills. On the other hand, many different types of specially designed manual toothbrushes have been developed. Among them is the triple-headed brush, which is designed to clean the oral, buccal, and occlusal surfaces of the teeth with a single stroke and is recommended for certain individuals with limited manual skills.

The oral health care of children with disabilities, as perceived by dental professionals, varies greatly along a continuum running between professional uncertainty and professional commitment, attributable to individual differences among dental staff and to organizational conditions. It is an obvious conclusion that variability in management has contributed to inequalities in oral health care for children with disabilities. Even though the dental profession wants to serve this group, capacity is sometimes restricted because of a lack of knowledge and experience, and a constrained work environment (including restricted financial resources). According to other authors, the main barriers to equal access to dental treatment for individuals with disabilities seems to be inadequate facilities and insufficient time; these are the same barriers as for non-disabled individuals, i.e. costs, fear, and negative attitudes to dentistry.

Even though efforts have been made in the western world to improve the oral health of these less fortunate children, no attention has been directed by the health authorities in India. In our opinion, oral health care should be approached jointly with general health care in order to achieve a more holistic view of the individual's physiological and psychological well-being. In order to prevent inequalities in dental care and orofacial health, it is important to:

1. Identify and give priority to children and adolescents with disabilities;
2. Allocate resources in terms of finances and dental care personnel to these patients; and
3. Take advantage of the dental staff's interest and good will to provide support for patients with disabilities and their families by improving educational opportunities.

Health authorities should consider school dental health programs based on:

1. Improving school-community relations by forming a dental health council that include teachers, parents,
community leaders, dental professionals, etc.;
2. Conducting dental inspections, which can serve as a basis for dental health instruction;
3. Conducting dental health education;
4. Establishing specific programs, such as toothbrushing education campaigns, classroom-based fluoride rinsing programs, diet counseling, etc.;
5. Referrals for dental care; and
6. Follow-up of dental inspections.

The way a society looks after its disabled members is a perceptive reflection of its cultural level. To improve the oral hygiene status of individuals with disabilities is a daunting task, but it can be achieved if the parents or guardians are given suitable health education. Due to the fact that this 'less fortunate' population is increasing dramatically, advanced and continuing education programs are needed to train general and pediatric practitioners. As both oral health status and disability are related to the patients' social acceptability, it is important for disabled children to have proper oral hygiene.

With proper planning, clear communication, and carefully drawn limits to services provided, the dramatic oral health negligence experienced by so many of the disabled individuals can be successfully alleviated.

References

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