Chapter

Caries Experience and Oral Disorders of Disabled Children

Berna Kuter

Abstract

Dental caries is a major health problem for disabled children. These special children have chronic diseases; oral disorders; and physical, mental, behavioral, and cognitive impairments; and sensual disorders. They have higher and more severe oral disorders than healthy children, and the majority of these children have poor oral hygiene with high caries prevalence and gingivitis. These special children suffer from oral disease, especially in terms of periodontal disease, oral mucosal pathology, and malocclusion. Parents and caregivers must be educated and encouraged regarding these special children's dental care and tooth brushing. The dentist should know more information about these special children and should be more careful during treatment. Pediatric dentists must take care of special attention to the oral healthcare of these special children and help them to have healthy smiles.

Keywords: dental caries, disabled children, oral health, oral disorders, oral hygiene

1. Introduction

Dental problems are more common among disabled children [1]. This situation is due to both mental disability and insufficient oral health care. Disabled children need special dental care [2]. They have chronic diseases, poor oral hygiene and physical, mental, behavioral, cognitive impairment and sensual disorders [2]. Furthermore, the articles reported that they had more untreated caries, poorer oral health, periodontitis and fewer remaining teeth [3, 4]. The disabled children could not understand and take responsibility for cooperate with preventive oral health practices [5]. Information about pain in these children is inadequate and less trustworthy for a physician [1, 2]. The dentist should know more knowledge about these special children and should be more careful during treatment [5]. Therefore, it is important to know data especially about the oral health of disabled children. First of all, it could be useful to learn about the oral hygiene and dental caries of disabled children to prevent their dental caries and provide good oral hygiene. Moreover, having more information about oral hygiene and dental caries status of these special children will provide an easier treatment process for both dentist and disabled children.

2. Dental caries and disabled children

A high caries value was declared among disabled children [6–8]. It was reported that the oral hygiene of disabled children was poor, and they need dental treatment [9, 10]. These children have problem in brushing their teeth [11].

Pain is a subjective experience that to alert them of danger [12]. It limits exposure to additional injury. Children learn to preclude and overcome their pain. However, it is very difficult to define pain especially for disabled children [13]. Untreated, acute or chronic pain could have significant and lifelong consequences [12]. Pain, fear and anxiety are similar for children and they usually confound them. However, disabled children have a problem of not being able to clarify pain, in additionally [13]. Parents or caregivers usually describe that disabled children's pain, experience and treatment [14, 15]. It was stated that disabled children have more pain than the healthy individuals because of systemic diseases associated with their disorders. It is appeared to have more caries risk factors such as associated medical conditions and intake of medications in disabled children [16].

Oral disorder is significant health problem for disabled children [17]. They have a higher prevalence and severity of oral disease compared to the healthy children. Dental caries, missing teeth, supernumerary teeth prolonged retention of primary teeth, periodontal disease, crowding and malocclusion are causes poor oral health in these special children.

It was stated that the DMFT score of mentally disabled children was significantly higher, while the dft values of healthy children was higher [16]. Some researchers reported that the disabled children had higher both DMFT and dft indices compared to healthy children [18, 19]. These special children could be more susceptible to dental caries if they reside at home and feeding with cardiogenic snacks and other unhealthy foods [20]. It was reported that disabled children have more dental problems and more untreated dental disease relative to other children [18, 19].

3. Oral hygiene and disabled children

Disabled children often depend on parents and caregivers for oral hygiene practices in comparison with healthy children who take care of their own oral health [21]. It was stated that these special children suffered from dental disease up to seven times as frequently as the healthy children, particularly with respect to periodontal disease, oral mucosal pathology and malocclusion [22, 23].

Caregivers must be educated and encouraged regarding these special children' dental care and tooth brushing [24]. Dentists should also be encouraged regarding the proper training of parents and caregivers. Tesini stated regular contact should be provided with their families and caregivers and they should be educated on diet to improve oral hygiene [25].

Some researchers explained that the use of anticonvulsant medications that affect gum health [26, 27], parent and caregivers' poor understanding of the importance of dental hygiene and the fear of dental treatment [28] promoted poor oral health among disabled children.

4. A major cariogenic organism: *Streptococcus mutans* and disabled children

Streptococcus mutans was a major etiologic agent for dental caries [29]. It is a major cariogenic organism that contributes to the formation of dental biofilm matrix and produces large amounts of organic acids [30]. It was defined that a gene was as a DNA segment [31, 32]. It contributes to phenotype and genotype is the genetic structure of an organism or a cell. Children usually have fewer *S. mutans* genotype than adults and *S. mutans* genotype c is the most common form of dental caries in children [33].

It is important to evaluate and compare the variety of *S. mutans* genotypes with respect to caries activity among healthy and mentally disabled children and to plan better strategies for early caries detection, prevention and management [34]. It was found that genotype encoding Primer 1 was present 82.5% in total population of both groups (healthy and mentally disabled children) and genotype encoding Primer 2 was present in 95% of the total population. However, genotype encoding Primer 3 was present in 20% of children associated with healthy and mentally disabled children. Prabhakar et al. stated that there was a significant difference between healthy and mentally disabled children in the distribution of *S. mutans* genotypes, however, there was no significant difference between healthy and mentally disabled children regarding amount of *S. mutans*. Total of 52 distinct genotypes for healthy children were identified, however, mentally disabled children have fewer number of them [35].

It was found that *S. mutans* were available in Down syndrome children that were responsible for a low caries rate [36]. However, there is lack of evidence on the genotypic variety of *S. mutans* in the mentally disabled children and the relationship between its molecular diversity and the specific species of *S. mutans* that causes dental caries is yet to be understood [34].

5. Relationship between oral disorders and dental caries in the disabled children

Oral health of disabled children was worse than that of healthy children, because of the existing disability or social, economic or medical reasons [37]. Researches on the dental health of mentally disabled children showed that majority of the children had poor oral hygiene with high caries prevalence and gingivitis [38, 39]. Studies have also stated that disabled children have poor oral health and greater treatment needs than those of healthy children. Dental caries and the premature loss of primary teeth could lead to malocclusion in the permanent dentition [40]. Vellappally et al. stated that the prevalence of malocclusion and dental caries were found to be high in disabled children. However, it was reported that there was no positive correlation between caries and malocclusion in these children [41]. The other study [42] also revealed the same result in the mixed dentition. The results of the study revealed that the prevalence of malocclusion among mentally disabled children was 93%. Onyeaso reported 47% prevalence of malocclusion among mentally disabled children [43]. Furthermore, Baskaradoss et al. stated that a positive correlation was found between the dental caries and malocclusion and prevalence of malocclusion among mentally disabled children was much higher than that of healthy children [44]. Dental crowding, anterior diastema and antero-posterior molar relationship were reported as the common malocclusion among mentally disabled children by Dinesh et al. [45].

6. The most common types of disabled children with intra oral manifestations

6.1 Down syndrome

Down syndrome is an autosomal chromosomal disorder [46]. It is characterized by neurological changes, generalized hypotonia, structural cardiopathy, dental anomalies and orofacial dysmorphology [46–49]. The children with Down syndrome have specific orofacial features which include low prevalence of dental

caries, macroglossia, fissured lips and tongue, microdontia, mouth breathing, open bite, delayed teeth eruption, missing and malformed teeth, crowding, malocclusion, posterior cross bite, abnormally rounded labial forms of the tooth crown, partial anodontia, periodontitis and bruxism [49].

The children with Down syndrome were more susceptible to periodontal disease, reduced levels of calculus and had a greater need for oral hygiene compared to those of healthy children was reported [24, 50]. Periodontal disease is the most significant oral health problem in these children [51]. The difficulties in tooth brushing and reduced manual dexterity could lead to poor oral hygiene in these children [21]. Barnett et al. investigated the prevalence rates of periodontitis and dental caries in children with Down syndrome [52]. When Down syndrome children and mentally disability children compared, results revealed a greater prevalence of periodontitis and a lower prevalence of dental caries in Down syndrome children. The literature revealed that differences in the composition of the microbiota, dental morphology and salivary composition in children with Down syndrome were led to the low prevalence of caries and higher prevalence of bruxism [53]. It was reported that some syndromes, which have chromosomal abnormalities to be associated with low caries indices, as in Down syndrome [54]. However, the reason of the low incidence of caries in Down syndrome is unclear.

Dental treatments of these patients are required special attention [47–49]. Porovic stated that Down syndrome children have a high prevalence of caries, and extraction as a treatment option [55]. It is important to create oral health care programs with parental education and it is necessary to educate dental practitioners to work with these children.

It was reported as an important risk factor for malocclusion [56], decreased arch length, reduced dental arch dimension and diminished maxillary size in Down syndrome children [56–58]. The studies have reported a high prevalence of anterior open bite, posterior crossbite and overjet in children with Down syndrome compared to other children [59].

6.2 Autism

Autism is defined by impaired functions of management, lack of attention, speech disorders, repetitive behaviors and communication difficulties [60]. Muhle reported that etiological factors causing autism were genetic, post-encephalitic infection, autoimmune factors and Vitamin D deficiency [61]. Autism is seen four times more in males than in females was reported [62]. The orthodontic disorders in autistic children are class II molar relationship, anterior open-bite, tongue thrusting and dental crowding [63]. Autistic children tend to keep food inside their mouths due to poor tongue coordination. Taking anticonvulsant drugs [64], unsuitable brushing habits, lack of communication, tend to keep it inside their mouths due to poor tongue coordination are caused of gingivitis and was stated that autistic children had more prevalence of caries degree than healthy children [65, 66]. However, the results of the other studies were reported no significant differences in the prevalence of caries degree, oral hygiene and gingivitis [67, 68]. On the contrary, some researchers reported that there is a lower incidence of dental caries in autistic children [39], and there was no statistically significant difference in periodontal health between the healthy and the autistic children [69]. Thus, it is seen that the articles were provided inconclusive answers concerning whether autism is a risk factor for caries and periodontal health.

It was reported that 26.4% of the autistic children had systemic diseases and 72.6% used medication [69]. Seventy-seven percent of autistic children used drugs were stated in the other study [70]. Specific drugs are prescribed for accompanying

with autism such as hyperactivity, epilepsy and anxiety and the most common drugs taken by the autistic are antipsychotics, antidepressants and anticonvulsants [71]. It was thought that these drugs which used autistic children may be a reason of gingivitis because of their side effects. However, Marshall et al., stated that the psychoactive drugs have been not found to be a risk factor for caries in terms of xerostomia side effects [72].

It was reported that bruxism, tooth wear, deep-palate and tongue thrusting disorders were significantly higher percentage in the autistics than those of the healthy children [73]. Bruxism and tongue thrusting in the autistics could result in orthodontic disorders [74]. As a result, it was reported that the anterior open bite in autistics was significantly higher than that of the healthy in that study [70]. However, it was pronounced that no statistically significant differences were found between the autistics and healthy children related to the open bite in the other study [69]. Moreover, dental crowding in the healthy children was more than that of the autistic children in that study.

6.3 Cerebral palsy

Cerebral palsy is a common pediatric disorder resulting from a non-progressive deterioration to the developing brain and motor disorders are accompanied by disturbances in coordination, cognition, communication and seizure disorders [75, 76]. Muscle incompetence impairs lip seal and lead to an anterior posture of the tongue, an aberrant tongue and head posture, anterior crowding, anterior open bite, missing teeth, early eruption of primary teeth, anterior diastema [56, 77]. Class II malocclusions were most common features among children with cerebral palsy. It was also reported that a maxillary overjet in these children was reported to be the caused by lip deficiency and deformity of the maxillary orbicularis muscle. Studies have shown that these disorders lead to the higher risk of dental disease in these children [78]. Pseudo-bulbar palsy affects coordination of sucking, swallowing, chewing and excessive drooling which it could be related to increased production of saliva secondary to an irritating oral lesion, and dental caries [79]. Gastroesophageal reflux disease is common problem in children with cerebral palsy causing vomiting and it affects the dental health and results in dental erosions [80]. Dental erosion is common in these children and percentage of dental erosion is between 55% and 73% of cerebral palsy [81, 82]. It was stated that dental erosions affect both primary and permanent teeth, most commonly the upper molars, lower molars and upper incisors [83].

Motor incoordination affects the ability to perform adequate oral hygiene and as a result of this, gingival hyperplasia and associated bleeding occurs with higher frequency in children with cerebral palsy [84]. The use of antiepileptic drugs, particularly phenytoin is important factor for periodontal diseases.

Akhter et al. stated that children with cerebral palsy in a low-income had high dental caries experience [85].

Sialorrhea appears to be the consequence of a dysfunction in the coordination of swallowing mechanisms and occurs in up to 30% of children with cerebral palsy [79, 86].

It was reported that both bruxism and traumatic dental injuries were significantly higher percentage in children with cerebral palsy [77, 87]. The exact mechanisms causing the development of bruxism is not fully known, however, it was reported that it could be related to abnormal proprioception in the periodontium, sleep disorders could be predispose to the development of nocturnal bruxism, particularly in those with severe visual impairment [88].

Forty percent of children with cerebral palsy were born prematurely and they are at an increased risk for having developmental enamel defects and these defects are in a symmetrical manner in both primary incisors and first molars [89].

Children with cerebral palsy are at a significantly higher risk for developing temporomandibular joint disorders and boy gender, malocclusion, mouth breathing, and mixed dentition were identified as risk factors for developing this disorder [90].

7. Conclusions

It has been widely reported in literature that disabled children have poor oral healthcare and high caries prevalence. As the difficulties in tooth brushing and reduced manual dexterity could lead to dental caries and poor oral hygiene and these disabled children have a problem of not being able to clarify pain, it must be taken care of special attention in oral healthcare of these special children by dentists, their parents and caregivers.

Conflict of interest

No other relationships/conditions/circumstances that present a potential conflict of interest.

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