Oral health status and dental treatment for children with learning disabilities in southern Turkey

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Abstract

Aim and Objective: Physical disability, low intelligence quotient, and developmental disorders, when combined with limitations in access to health services, result in elevated complications related to oral health for children with disabilities. The aims of this study were; i) to determine the oral health status of children with disabilities, ii) to assess the knowledge of parents regarding oral health care, and iii) to provide training for the parents on oral health care and to complete necessary follow-up treatment.

Method: 59 children with disabilities (11 with Down syndrome, 7 with autism, 36 with learning disabilities, and 5 with cerebral palsy) were included in the study. The mean age of the children was 12.1±2.5 (range: 6-18). Caries examinations were carried out in accordance with WHO criteria. All parents were provided with tooth brushing education. Screening oral health care were performed again at the end of the second year.

Results: DMFT and dmft scores were 3.4 and 0.9, respectively, and there were no differences among groups at the beginning of the study. The oral hygiene index (OHI-S) at the end of the study was found to be 1.1±0.7 compared to 2.1±1.6 at the beginning.

Conclusion: Increased awareness of the parents helped the long-term decrease oral treatment needs of their children with disabilities. Regular and long-term follow-ups result in the majority of the children needing only preventive advice and treatment.

Key words: *Access to dental clinics, oral health, learning disabilities.*

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Introduction

In order to sustain and improve public health, health services must be provided comprehensively and in a timely manner to individuals who form society and demonstrate demographic, cultural, and economic differences (Simpson *et al.*, 1997; Newacheck *et al.*, 2000). The most important requirements concerning this endeavour are the provision of health insurance for individuals and defining and resolving the problems regarding access to health services. The problems associated with oral health account for a considerable proportion of general health problems (Petersen 2004; Petersen *et al.*, 2005). Oral health is a factor that affects children's physical and psychological development. Pain caused by caries can be severe, often takes a long time to relieve and can adversely affect the quality of life of children (Charlotte et al., 2005).

When the general health status, behavioural problems, cognitive and mental states of children with learning disabilities were considered, it was reported that treatment was required to be provided in private health centres due to increased risk factors (Lopez-Perez *et al.*, 2002; Owens *et al.*, 2010; Houtrow *et al.*, 2011; Monsen *et al.*, 2013). The investigation and identification of oral health problems of

children with learning disabilities that also have other health problems are important, so that the treatment methods and facilitation of access to other health services can be addressed.

When it is considered that 2.9% of the total child population in Turkey have disabilities (Turkish Statistical Institute, http://www.tuik.gov.tr/PreTablo.do?alt_id=1017), the importance of ensuring that these children have unhindered access to treatment services emerges. The scientific studies carried out on the treatment needs of this group revealed that they needed more treatment and that their dental treatments were more complex, requiring more appointments in comparison to children without disabilities (Hennequin *et al.*, 2008, Purohit *et al.*, 2010). The reasons for this are explained in general by the fact that their families or teachers assign lower priority to oral health. Furthermore, disability-associated incompetency in cleaning mouths and teeth, the difficulty of access to a dentist, and dentists not sufficiently qualified or confident to provide treatment for children with a disability are additional barriers to overcome.

Data and studies regarding oral health and hygiene statuses of children with disabilities in Turkey are scarce. Furthermore, the impact of knowledge of parents and educators of children with disabilities on oral health is not comprehensively assessed. There is also insufficient literature coverage concerning whether oral hygiene training for parents or caregivers of children with disabilities and diligence in follow-up treatment would result in quantifiable improvement in the oral health levels of this target population. The aim of this study, therefore, was to fill this knowledge gap by; i) determining the oral hygiene status of children and young adults attending special schools for children with disabilities, ii) assessing the knowledge of parents regarding oral health care, and iii) to provide training for the parents and caregivers on oral health care and to complete necessary follow-up treatment for the children in their schools under the supervision of their teachers and parents.

Methods

Upon approval by the Ethics Committee of Cukurova University Faculty of Medicine, Adana, Turkey, 64 children with disabilities between the ages of 6-18 were selected randomly from those registered at various care and rehabilitation centres operated by the Turkish Ministry of National Education in southern Turkey. Informed consent was sought from the children's parents, who had been provided with detailed information on the study protocol. Five parents out of 64, approached by telephone, denied consent for their children to participate in the study, while consent from the rest was obtained.

Questionnaire

In the first stage of study, the parents or the caregivers of the children were invited to a meeting. The participants were asked to fill in a questionnaire assisted by a paediatric dentist working at Cukurova University Faculty of Dentistry Department of Pediatric Dentistry. The questionnaire was designed to collect demographic data, to assess the knowledge of the parents concerning dental treatment, and barriers to dental care. Oral health screening was performed on 59 children with disabilities.

Screening for oral health care

Before enrollment of the participants, dental examiners (senior dental students) were trained and calibrated in oral screening procedures. Oral health screening was performed in the school nursing room using natural daylight and a single-use mouth mirror and explorer in accordance with WHO guidelines. Screening was supervised by a paediatric dentist employed by Cukurova University, Faculty of Dentistry, Department of Pediatric Dentistry. A form was filled by each dental examiner, specifying the name, surname, age, gender, grade level, and the disability condition of the child.

Total number of decayed, missing, and filled primary and permanent teeth (dmft, DMFT) were recorded for each child. The conditions of the teeth were recorded for each tooth in child's mouth as caries-free, filled, decayed, filled with secondary caries, absent due to caries, missing, fissure sealed, or prosthetically treated. The treatment requirement for each tooth was recorded with a different score, such that every carious tooth's treatment would be indicated as no treatment, a fissure sealant, a one-surface restoration, a two- or three-surface restoration, a stainless-steel crown, or an extraction. No radiographic examination was undertaken.

Oral hygiene status was measured by the Oral Hygiene Index (OHI-S) of Greene and Vermillion (Green JC and Vermillion JR, 1964). OHI-S of the patients were recorded separately for the maxilla and mandible, which in turn were subdivided into three sections. The values used in scoring were 0 (no plaque), 1 (minimal plaque and/or food debris in the section), 2 (plaque accumulation and/or food debris in several parts of the section of the arch being investigated), and 3 (plaque covering more than two thirds of the exposed tooth surface). Also, oral hygiene status of each patient was classified as 'good' when the OHI-S score was 0–0.9, 'fair' when it was 1.0–1.9, and 'poor' when it was 2-6.

The parents were invited to the school for an instructional talk on the importance of oral hygiene and demonstrated how to brush the teeth using dental training model. The supervisor oversaw the oral health instruction, ensuring that the techniques were properly grasped by the parents and teachers. The relationship between nutrition and caries was also explained. The parents were asked to take into consideration the disabilities of their children while brushing their teeth.

Dental treatment

In the second stage, after assessing the children via medical history and communication with the patient and/or caregiver, informed consent was obtained from the parents. A mobile oral health vehicle was parked in the garden of the children's own school which they were familiar with. The dental treatment of the children who allowed it in the mobile dental care vehicle was provided. Anxiety and fear about dental treatment caused some patients to be uncooperative. This was challenging for the caregivers and the dental health

professional. Although the majority of behavioural challenges were overcome through 'behavioral guidance', in some cases, precautions against fidgeting or self-injury had to be taken and protective equipment, such as that preventing head banging, was used during the dental treatment.

The mobile oral health vehicle was provided by the Provincial Special Administration of Governorship. Technical equipment for dental treatment under field conditions was made available in the vehicle. Parents were always invited to be present during treatment, though at times the children were accompanied by their teachers. All dental treatment was performed by the same paediatric dentist assisted by dental examiners. Regular monthly contacts were made with the school administration and teachers about the brushing activities of the children during school hours. At the end of the second year, OHI-S index scores were evaluated for all children in the study.

Statistical analysis

SPSS 17.0 statistical software package was used for the statistical analysis of the data. The categorical measurements were summarised as numbers and percentages. Continuous measurements were summarised as mean and standard deviation (median, minimum and maximum, where needed). Distributions were controlled during the comparison of continuous measurements among the groups. One-way variance analysis was used in the parameters which showed normal distribution according to the variables and the Kruscall Wallis test was used in the parameters which did not show normal distribution. The level of statistical significance was taken as 0.05 in all tests.

Results

The distribution of the demographical characteristics of the 59 children and families is summarised in *Table 1*. The mean age of the children was 12.1±2.5 (range: 6-18). 59.3% of the children were boys and 40.7% girls; 79.7% of the children's parents were living together and 66.1% of the children's parents were related. The socio-economic levels of the families were determined according to their household income. Families with <500, 500-1,000, and >1,000 TL (Turkish Lira) income were grouped a low, middle, and high socio-economic level, respectively; 47.5%, 32.2%, and 20.3% of the families falling into these categories respectively. The median number of people living in the same household was 5 (range 2-8) with a median number of 3 (range 1-10) siblings, and a median number of 1 child with disabilities. While 84.7% of the children with disabilities had social security, 15.3% of them did not; 74.6% of the children were on regular medication. When the disabilities were analysed, 11 of the children (18.6%) had Down syndrome, 7 (11.8%) were autistic, 36 (61%) had learning disabilities, and 5 (8.5%) had cerebral palsy. The average age of the mothers of the children who participated in the study was 42.5±7.4 and that of the father was 46.6±7.4; 6.8% of the mothers and 83.1% of the fathers were employed. Slightly fewer mothers, 5.1%, claimed to have a specialty or trade.

Children's oral health care habits and background are summarised in *Table 2*. While 91.5% of the children had their own toothbrushes, 34% were sharing a toothbrush with one or more of the family members, and 5.1% of them did not have a toothbrush. In total, 25.4% of the children were brushing their teeth twice a day, 37.3% once a day, 11.9% several times a week, and 25.4% only occasionally; 76.3% of the children were brushing their teeth by themselves, 91.5% were using toothpaste, 1.7% of the children stated that they were using dental floss and 5.1% said they were using oral care products.

A total of 36 children had access to a dental clinic before this study. Of the ones who had visited another dentist, 6 children (16.7%) received dental scaling, 10 (27.8%) had tooth extraction, 9 (25%) had at least one restorative procedure, and 11 (30.5%) received no treatment. The dentist provided no explanation as to why 11 of the children had not received any treatment at the time of their first dental visit. In the year previous to the study, 23 of the children (39%) had toothache once or twice, 10 (16.9%) had toothache more than twice and 26 (41.1%) did not complain about toothache. Only 6 of the parents (10.2%) could take their children to a dentist because of these complaints. According to the parents, 50 of the children (84.7%) were afraid of going to a dentist.

The questionnaire, regarding access to dental care and associated problems, prepared for the parents of the children with disabilitiesis is summarised in *Table 3* along with percentage distribution of the answers. The distribution of dental treatments provided and the number of teeth treated for each child are shown in *Table 4*. The total number of carious teeth, and those lost due to caries, together with the OHI-S index for each child scored at the beginning and end of the study were evaluated and compared according to their disability groups. DMFT and dmft scores were 3.4 and 0.9, respectively and 11.86% of the children had no caries or fillings at the beginning of the study. Even though a difference in OHI-S was not found to be statistically significant among groups, oral hygiene status was observed to be getting better in comparison to the beginning of the study. The paediatric dentist's scorings corresponding to disability groups were evaluated on average. Statistical comparisons among groups are summarised in *Table 5*.

Discussion

When studies on the oral health of children with disabilities were analysed, it was concluded that the oral hygiene of the children was erratic and the gingival problems, such as gingivitis and periodontitis were more commonly observed compared to children without a disability (Forsberg *et al.*, 1985; Kao *et al.*, 1991; Gizani *et al.*, 1997; Al-Qahtani *et al.*, 2004; Purohit *et al.*, 2010). Oredugba and Akindayomi (2008) conducted a study in Nigeria to evaluate the oral health status and treatment needs of 54 children and young adults with special health care needs. They reported that 46% had good and 21% had poor oral hygiene. Gizani *et al.* (1997) found poor oral hygiene in 31.8% of their study population. Oral hygiene status of all children with disabilities in this study fared poorly, with no

Table 1: Descriptive characteristics of the children and parents in the study

Variables		Total n (%)
Gender	Female Male	24(40.7) 35 (59.3)
Age *(Mean±SD)*		12.1±3.5
Family Condition	No family Parents live together Divorced Parents live separately	3 (5.1) 47(79.7) 5 (8.5) 4 (6.8)
Are the parents related?	Yes No	39 (66.1) 20 (33.9)
Total number of children		3 (1-10)
Total number of people living in the house		5 (2-8)
Socio-economic Status	Low Middle High	28 (47.5) 19 (32.2) 12 (20.3)
Does the child have social security?	Yes No	50 (84.7) 9 (15.3)
Regular medication use	Yes No	44 (74.6) 15 (25.4)
Disability identification	Down Syndrome Autism Learning disability Cerebral Palsy	11 (18.6) 7 (11.9) 36 (61.0) 5 (8.5)
The educational level of mother	Nil Primary School Secondary School High School University	14 (23.7) 33 (55.9) 2 (3.4) 9 (15.3) 1 (1.7)
Does the mother have an occupation?	Yes No	3 (5.1) 56 (94.9)
Is the mother working at the moment?	Yes No	4 (6.8) 55 (93.2)
The age of the mother *(Mean±SD)*		42.5±7.4
The educational level of the father	Nil Primary School Secondary School High School University	6 (10.2) 33 (55.9) 4 (6.8) 13 (22.0) 3 (5.1)
Does the father have an occupation?	No	4 (6.8)
	Civil Servant Freelance Private Company	30 (50.8) 21 (35.6) 4 (6.8)
Is the father working at the moment?	Yes No	49 (83.1) 10 (16.9)
The age of the father *(Mean±SD)*		46.6±7.4

Table 2: The oral health care habits and background of the children

Children's oral health care habits		n (%)
Does the child have his/her own toothbrush?	Yes No She/he is sharing a toothbrush with one of family members	54 (91.5) 3 (5.1) 2 (3.4)
Frequency of brushing teeth	Twice a day Once a day Several times a week Fewer times	15 (25.4) 22 (37.3) 7 (11.9) 15 (25.4)
Can your child brush his/her teeth alone? (Yes)		45 (76.3)
Does your child use toothpaste? (Yes)		54 (91.5)
Does your child use dental floss? (Yes)		1 (1.7)
Can your child use oral care products? (Yes)		3 (5.1)
Children's oral health backgrounds and physician experiences		**n (%)**
Concussion or injury in the facial region? (Yes)		10 (16.9)
Has the child been to a dentist between the ages of 0 and 6? (Yes)		11 (18.6)
Has the child been to a dentist before? (Yes)		36 (61.0)
Treatment applied during the first visit to the dentist	Dental scaling Tooth Extraction Restorative procedure No treatment	6 (16.7) 10 (27.8) 9 (25.0) 11 (30.5)
Complaint of toothache in the last year	No Once-Twice More than Twice	26 (41.1) 23 (39.0) 10 (16.9)
The probable symptoms of tooth problems	Drooling Sleeping with the mouth open at night Snoring	34 (57.6) 26 (44.1) 27 (45.8)
Referring to a physician because of the symptoms above		6 (10.2)
Is your child afraid of going to a dentist?	A lot Yes A bit No No, not at all	9 (15.3) 14 (23.7) 27 (45.8) 5 (8.5) 4 (6.8)
What are the physical obstacles you are faced with during the treatment of your child?	Inappropriate entrances to buildings Not having an elevator in the buildings Not having direction signs Not having attendants	38 (64.4) 34 (57.6) 11 (18.6) 38 (64.4)
What is the most difficult point for you and your child in accessing dental treatment?	Not having a specialist dentist Dentist's not feeling himself/herself competent. Inadequacy of attendants	50 (84.7) 43 (72.9) 33 (55.9)
How do you find your child's teeth?	Very poor Poor Average Good Very good	3 (5.0) 13 (22.0) 16 (27.1) 21 (35.6) 6 (10.2)

Table 3: The Distribution of the difficulties in accessing dental care

Variables	Yes (%)	No (%)
Is there a dentist in your neighborhood?	17 (28.8)	42 (71.2)
Is the nearest dentist within walking distance of your house?	28 (47.5)	31 (52.5)
Can you use public transport to get to the dentist?	45 (76.3)	14 (23.7)
Is using public transport easy in your neighborhood?	43 (72.9)	16 (27.1)
Is transport to the dentist expensive for you?	27 (45.8)	32 (44.2)
Have you felt any biased approach towards your child while travelling by public transport?	29 (49.2)	30 (50.8)
Do you have a vehicle or does one of your family members have a vehicle to go to the dentist?	15 (25.4)	44 (74.6)
Do you get any help during transport to the dentist or the dental treatment services?	11 (18.6)	48 (81.4)
Is it easy to reach the elevator in the dentist's surgery and in the dental hospital?	22 (37.3)	37 (62.7)
Is there an attendant to help you?	12 (20.3)	47 (79.3)
Is there a parking lot for the disabled near the dentist's surgery/dental hospital?	4 (6.8)	55 (93.2)
Do you wait for long to be examined by the dentist?	27 (45.8)	32 (54.2)
Are the waiting rooms appropriate for you and your child?	27 (45.8)	32 (54.2)
Do you have problems about the appointment times?	20 (33.9)	39 (66.1)
Do you get any financial help?	3 (5.1)	56 (94.6)

Table 4: Distribution of dental treatment and numbers of treated teeth at the all children

Dental treatments	Number of teeth
Extractions of primary teeth	47
Extractions of permanent teeth	12
Composite fillings in primary teeth	66
Amalgam fillings in primary teeth	108
Composite fillings of permanent teeth	11
Amalgam fillings in permanent teeth	42
Root multiple-root canal treatments of primary teeth with apex locater	17
One-root canal treatment in permanent teeth with apex locater	21
Multiple-root canal treatments in permanent teeth with apex locater	54
Vital pulpotomy in primary teeth	22

significant differences found among disability types. OHI-S index was 2.1±1.6 at the beginning and 1.1±0.7 in the second-year follow-up with no significant differences found these evaluations. The oral hygiene status of Down syndrome, autism and learning disability groups were fair; for the celebral palsy group it was good in the second year.

Based on this data, it was concluded that the oral hygiene status improved following the two-year oral hygiene training given to the parents. Also, it is believed that the parents and the teachers who observed the treatment environment understood the importance of oral hygiene and started to monitor their children's tooth brushing more carefully. Providing treatment after completing the brushing education was an effective measure in decreasing the OHI-S index as discovered during the second-year observation. No statistical difference can be shown due to the number of the children who participated in the study; 5 with celebral palsy, 7 with autism compared to 36 with learning disabilities.

When the dmft, DMFT values of the children with disabilities were analysed, some studies concluded that the children with disabilities generally show a higher prevalence of caries compared to children without a disability (Shyama *et al.*, 2001; Al-Qahtani *et al.*, 2004; Sarı *et al.*, 2014). Among studies that report the combined caries prevalence for both primary and permanent dentition, the reported results were variable (Oredugba and Akindayomi, 2008; Altun *et al.*, 2010). The studies which were conducted worldwide on the

Table 5: The Evaluations of the dentist

Variables	Down Syndrome	Autism	Learning Disability	Cerebral Palsy	Total	P
	Mean±SD	Mean±SD	Mean±SD	Mean±SD	Mean±SD	
Total number of carious teeth	2.5±2.6	3.1±2.0	3.4±3.0	4.0±2.1	3.2±2.7	0.610
The number of lost teeth because of caries	0.9±1.3	0.3±0.8	0.6±1.0	0.4±0.9	0.6±1.0	0.544
The number of treated teeth	0.3±0.5	0.3±0.5	0.5±0.7	0.2±0.4	0.4±0.6	0.555
The first year OHI-S index	2.1±1.8	2.6±0.5	2.0±1.6	2.2±2.2	2.1±1.6	0.842
Second year OHI-S index	1.2±0.7	1.2±0.8	1.1±0.7	0.9±0.9	1.1±0.7	0.833
dmft	0.8 ± 1.8	0.6 ± 0.8	1.0 ± 2.0	1.2 ± 1.8	0.9 ± 1.8	0.838
DMFT	2.8 ± 2.5	3.1 ± 2.0	3.6 ± 2.7	3.4 ± 2.6	3.4 ± 2.6	0.906

Kruskal Wallis test

dental health of children with disabilities showed that this population have better oral health in developed countries. Shaw *et al.* (1986) found that the DMFT value of children with disability was 1.85. In the present study, dmft and DMTF values were found to be 0.9 and 3.4 respectively. The reason that the DMFT value from the present study is higher than that reported by Shaw *et al.* (1986) may be partly due to the fact that there were many outlets around the school allowing easy access for children to highly cariogenic foods. Of the families who participated in the study 79.8% were in the low and middle socio-economic levels and the children were not growing up under ideal nutritional conditions. Gizani *et al.* (1997) found in their study of children with mild and moderate disabilities that the DMFT score was 2.9, similar to the present study. In their study, increasing the children's and their parents' awareness about oral health was shown to be an important factor in decreasing the DMFT and dmft scores.

Due to limited motor and mental capabilities, children with disabilities cannot carry out oral hygiene practices by themselves. Moreover, dental problems may present in a more severe form, often because their parents, who are more concerned by the child's other medical problems, use candy or pureed cariogenic foods, often mashed to ease swallowing. Liu *et al.* (2010) conducted a cross-sectional study in Taiwan and found 63.25% dental caries prevalence. Purohit *et al.* (2010) reported a prevalence of 95.9% and 89.1% in primary and permanent dentition, respectively. A dental caries prevalence of 84.6% was reported by Altun *et al.* (2010). Shyama *et al.* in Kuwait reported a dental caries prevalence of 88.8% and 75.8% in primary and permanent dentition respectively (Shyama *et al.*, 2001). In the present study, caries prevalence was found 88.14% at the all children with disabilities. Our study showed the same tendency that children with disability had a higher percentage in caries prevalence.

Burtner *et al.* (1990), in their study to determine access to dental services for patients with developmental disabilities living in group homes in North Florida, found that 40% of the patients had difficulties in finding a volunteer dentist for dental treatment. According to their statements, dentists were unwilling to treat these patients for arbitrary reasons, even though contact was made with 75% of them. In our study, the most commonly given answers to the question of 'What is the most difficult point for you and for your child concerning access to dental treatment services?' were 'not having a specialist dentist' (84.7%),dentist's not feeling competent' (72.9%), and 'inadequacy of the attendants' (55.9%). The parents report that dentists are not sufficiently competent in treating children with disabilities. From this data it can be concluded that there is a need for specialist dental staff to treat children with disabilities in Turkey. Other barriers to equal access to dental treatment for children with disabilities are found to be inadequate facilities, insufficient time, and lack of adequate knowledge. This may stem from the fact that dentistry students in Turkey receiving no specialised training on dental treatment of patients with disabilities. Suggestions have been conveyed to relevant authorities for dentistry students, such as those involved in the present study, to be exposed to special needs patients to gain clinical experience and confidence to treat children with disabilities as well as to understand associated difficulties (Dehaitem *et al.*, 2008).

Dental care needs and access to dental care score the worst in children with disabilities. The parents who participated in the questionnaire of this study reported that they could not obtain treatment for their children in private dental clinics and they could not benefit from the treatment services in public hospitals due to patient crowding in the waiting areas. In consideration of this data, presence of public health clinics could provide the appropriate environment and optimal treatment for the dental care of patients with disabilities.

Limitations of study

Although our study provided insight into an insufficiently studied subject area, there have been a number of limitations. The study lacked a control group, inter-rater

validity, calibration and more sensitive screening tool like ICDAS or similar could not be utilised to determine white spot lesions. Also, no radiographs were taken and only DMFT index was used for the treatment needs in children with disabilities. Future studies are needed to assess the attitude of parents regarding oral health care without self-report of parental behaviours and dental treatment need for children with learning disabilities with a larger sample size, using sensitive screening methods.

Conclusions

This study resulted in a database of statistical results regarding oral health status of a specific group of children with disabilities in southern Turkey, the nature of their access to oral health care, and the variability in knowledge of the parents and teachers due to demographic and socio-economic differences. In a two-year period, including dental treatment and follow-ups, it can be concluded that wider and more frequent utilisation of a mobile oral health vehicle will not only facilitate patient access to treatment in an environment that they are familiar with but will also provide an opportunity for parents to become more involved in their children's oral care. The increase in the awareness of the parents will decrease the treatment needs of their children in the long-term. Additionally, general dentists' competence in treating people with disabilities should be assured through specialised training during undergraduate studies by inclusion ofteaching and clinical exposure in the curriculum.

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