

# Traumatic dental injuries experience in children and adolescents with special health care needs

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## 장애를 가진 소아 및 청소년의 치아 외상 경험에 대한 분석

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**Purpose:** 특별한 건강 관리가 필요한 소아 및 청소년들에 있어서 치아 외상의 발생 빈도는 그들의 신체적 부자유로 인해 더 높게 나타난다. 그럼에도 이러한 소아 및 청소년이 치과 서비스에 접근하는 것은 쉽지 않다. 이에 본 연구에서는 장애를 갖는 소아 및 청소년의 치아 외상의 특성을 평가하고자 하였다.

**Materials and Methods:** 치아 외상을 주소로 본원에 내원한 특별한 관리가 필요한 모든 환자를 연령에 따라 두 군으로 나누었다. 첫 번째 군은 장애를 가진 소아 환자군( $n=40$ )이며, 두 번째 군은 장애를 가진 청소년 환자군( $n=22$ )이다. 의무기록을 사용하여, 치아 외상의 종류와 원인, 그리고 외상 후 치과에 내원하기까지 경과 시간에 대한 자료를 분석하였다. 분석된 자료의 통계분석에는 chi-square test와 Mann-Whitney U test가 사용되었다.

**Results:** 가장 흔한 치아외상의 원인은 두 군 모두에서 낙상(fall)이었다. 장애를 가진 소아 환자의 대부분은 집에서 치아외상을 경험한 반면, 장애를 가진 청소년 환자의 대부분은 교육기관에서 대부분의 치아외상을 경험하였다. 치아 및 주위조직 손상과 관련하여, 장애를 가진 소아 환자에서 가장 흔한 외상은 아탈구(51.3%)였으며, 장애를 가진 청소년 환자에서는 완전 탈구(75%)가 가장 흔한 가장 흔한 외상이었다( $p<0.05$ ). 모든 환자의 절반 이상이 치아외상 후 치과 방문까지 24시간 이상 지연되었으며, 단지 6.5%의 환자만이 외상 후 1시간 이내에 치과에 방문하였다. 그러나 두 군 사이에 치과에 내원하기까지 경과 시간은 통계적으로 유의한 차이는 없었다( $p>0.05$ ).

**Conclusion:** 본 연구의 결과 치아외상에 있어서 장애를 가진 소아 및 청소년 환자와 장애를 갖지 않은 환자 사이에 큰 차이가 있음을 알았다. 따라서 이러한 차이를 인지하고, 지역사회 기반의 건강보건 서비스를 통한 교육 및 사회 프로그램의 개발이 필요할 것으로 사료된다.

**Key words :** dental care for the disabled, handicapped, special health care needs, traumatic dental injury

## Introduction

People with special health care needs (SHCNs) are those who suffer from a physical, mental, or social disability. The number of people with SHCNs is increasing globally but these individuals tend to receive either less or lower quality oral health care than the general population.<sup>1,2</sup>

Traumatic dental injuries (TDIs) commonly occur at a young age.<sup>3</sup> Children and adolescents with SHCNs are more susceptible to traumatic dental injuries (TDIs) due to

their disabilities, which may be neurological, intellectual, behavioral, or physical.<sup>4</sup> However, their access to dental services appears to be compromised.

The consequences of TDIs can affect quality of life in these individuals, causing functional, esthetic, psychological and social problems.<sup>5</sup> Although TDIs in the SHCNs population remain an important area of study due to their dental care needs, few studies have been conducted on this topic. Moreover, most of the available literatures related to TDIs in children and adolescents with SHCNs have only

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been concerned with the relationships between TDIs and the specific type of disabilities, but not of children and adolescents with SHCNs in general.<sup>4,6,8</sup> However, a recent study regarding TDIs in children with SHCNs have reported that these individuals suffer more from uncomplicated crown fractures when compared to healthy children.<sup>9</sup>

Because both children and adolescents are in the transitional phase of growth and development, there will be marked differences between these individuals, including patterns of daily living, difficulties in performing activities, dentition, and skeletal maturity. We hypothesized that the differences can affect the characteristics of TDIs between children and adolescents with SHCNs. Therefore, the purpose of the study was to evaluate and compare the characteristics of TDIs in children and adolescents with SHCNs.

## Materials and methods

This study was conducted in the Department of Pediatric Dentistry, School of Dentistry, Kyung Hee University, Seoul, Republic of Korea. We retrospectively analyzed the medical records gathered from 1991 and 2016. Only patients with SCHNs younger than 18 years were considered for inclusion in the present study. Patients with a lack of information were excluded. The study proposal was reviewed and approved by the ethics committee of

Kyung Hee Medical Center, Kyung Hee University, Seoul, Republic of Korea (KHD-IRB-1506-3).

The final samples was comprised of 62 patients and divided into 2 groups according to their age: (1) Children with SHCNs (CSHCNs; <13 years;  $n=40$ ), (2) Adolescents with SHCNs (ASHCNs; <18 years;  $n=22$ ). The average age of CSHCNs was 7.8 years (ranging from 2.0 to 12.8 years) and the average age of ASHCNs was 15.5 years (ranging from 13.0 to 17.5 years). Based on the medical records available, we collected and evaluated data including demographic characteristics, type of disability, type and cause of any TDIs, and any delay in the time from TDIs to the initial dental visit. Regarding delayed time, we classified this into 4 different grades: Grade 1 — less than 1hr delayed dental visit, Grade 2 — less than 3hr delayed, Grade 3 — less than 24hr delayed, and Grade 4 — more than 24hr delayed.<sup>10</sup>

The data was analyzed using SPSS 15.0 software (SPSS Inc., Chicago, IL, USA). To verify the statistical significance, the variables were analyzed using the Chi-square test and the Mann-Whitney U test. *P*-values less than 0.05 were considered statistically significant.

## Results

The demographic data of the patients are shown in Table 1. The major cause of TDIs was due to falls in both groups

**Table 1.** Demographic characteristics of study samples

	CSHCNs		ASHCNs		Total	
	n	%	n	%	n	%
<b>Gender</b>						
Male	27	67.5	12	54.5	38	61.3
Female	13	32.5	10	45.5	24	38.7
Total	40	100	22	100	62	100
<b>Type of disability</b>						
Cerebral palsy	13	32.5	3	13.6	16	25.8
Intellectual disability	10	25	14	63.6	24	38.7
Developmental disability	14	35	2	9.1	16	25.8
Down syndrome	2	5	2	9.1	4	6.5
Others*	1	2.5	1	4.5	2	3.2
Total	40	100	22	100	62	100

\*Other type of disabilities in children with SHCNs included Poland syndrome, and Prader-Willi syndrome was included in Adolescents with SHCNs. Abbreviation: CSHCNs, children with special health care needs, ASHCNs, adolescents with special health care needs.

**Table 2.** Frequency distribution of type of traumatic dental injuries in child and adolescents with special health care needs

	CSHCNs		ASHCNs		Total	
	n	%	n	%	n	%
<b>Hard tissue injuries (for tooth)</b>						
Uncomplicated crown fracture	14	66.7	12	41.4	26	52
Complicated crown fracture	4	19.0	12	41.4	16	32
Crown-root fracture	1	4.8	4	13.8	5	10
Root fracture	1	4.8	0	0	1	2
Alveolar bone fracture	1	4.8	1	3.4	2	4
Total	21	100	29	100	50	100
<b>Periodontal tissue injuries (for tooth)*</b>						
Concussion	1	2.6	0	0	1	1.8
Subluxation	20	51.3	0	0	20	36.4
Lateral luxation	4	10.3	3	18.8	7	12.7
Intrusive luxation	3	7.7	0	0	3	5.5
Extrusive luxation	3	7.7	1	6.3	4	7.3
Avulsion	8	20.5	12	75	20	36.4
Total	39	100	16	100	55	100
<b>Soft tissue injuries (for person)</b>						
Abrasion	1	8.3	0	0	1	5.3
Contusion	1	8.3	0	0	1	5.3
Laceration	10	83.3	7	100	17	89.5
Total	12	100	7	100	19	100

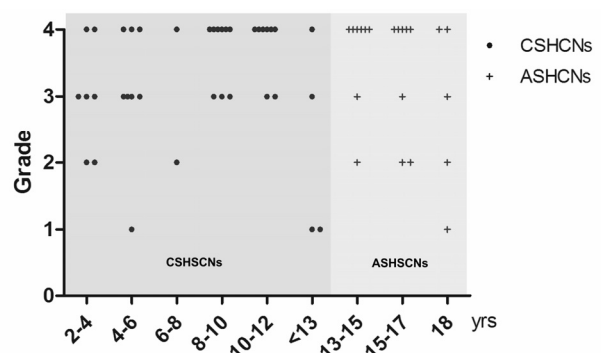
\* $p < 0.05$ , chi-square test

(57.5% in CSHCNs and 32.5% in ASHCNs). However, the location where the injuries occurred were different. Most CSHCN individuals experienced TDIs at home (45%), whereas most ASHCNs experienced TDIs at educational institutions, such as schools and special facilities for daily nursing.

Table 2 shows the frequency distribution of the type of TDIs in both groups. In hard tissue injuries, uncomplicated crown fractures were the most common in CSHCNs. In ASHCNs, uncomplicated and complicated crown fractures occurred at the same ratio (41.5%). Regarding periodontal tissue injuries, there was a significant difference in both groups. Subluxation (51.3%) was most frequent finding in CSHCNs, whereas avulsion (75%) was the most frequent finding in ASHCNs ( $p < 0.05$ ). In soft tissue injuries, laceration was the most frequent injury in both groups.

Regarding the delayed time from any TDIs to dental care, the initial dental visit was delayed for more than 24 hours in approximately half of these individuals (Figure 1).

Only 6.5% of individuals received dental care within 1 hour. However, there was no significant difference in the delayed time to dental care between CSHCNs and ASHCNs ( $p > 0.05$ ).



**Figure 1.** Scatter plot of delayed time from traumatic dental injury to dental care of samples. Grade 1 — less than 1hr delayed dental visit, Grade 2 — less than 3hr delayed, Grade 3 — less than 24hr delayed, Grade 4 — more than 24hr delayed

## Discussion

The present study investigated TDIs in CSHCNs and ASHCNs and compared the results between two groups. Falls were the most common etiologic factor in these individuals and these findings were consistent with those in healthy individuals.<sup>10</sup> Falls were also the leading cause of TDIs occurred in the previous study that involved individuals with cerebral palsy.<sup>5</sup>

In relation to the location where TDIs occurred, CSHCNs most commonly experienced TDIs at home, whereas ASHCNs experienced at educational institutions. These findings may reflect the difference in pattern of daily living between CSHCNs and ASHCNs. Children spend most of their time at home after returning from their educational institutions.<sup>11</sup> The different results seen in ASHCNs may be associated with increased time spent in educational institutions compared to CSHCNs.

Regarding the type of TDIs, crown fractures were most common hard tissue injuries in both CSHCNs and ASHCNs. Among injuries to the periodontal tissues, a statistically significant difference was found between CSHCNs and ASHCNs. Subluxation (51.3%) was the most common type of TDIs in CSHCNs. Avulsion (75%) was the most prevalent injury in ASHCNs. Our explanation is that most individuals with SHCNs experience TDIs at home in the early stage of life. Their caregivers can easily check the status of injured tissues and they tend to be more anxious about young children, even after small accidents. This anxiety increases the likelihood of these individuals presenting to dental clinics. However, most ASHCNs experience TDIs at educational institutions. Due to limited cooperation and communication from their disabilities, teachers and other people in these educational institutions may only notice any TDIs that are easily visible or considered significant injuries by nonprofessionals. The absence of a concussion or subluxation in ASHCNs supports this explanation (Table 2). Therefore, more severe type of TDIs tends to occur in ASHCNs.

Regarding soft tissue injuries, lacerations were the major source of dental visits in both CSHCNs and ASHCNs. This is because laceration wounds are usually accompanied by bleeding. Hemorrhages are easily noticeable and this increases caregiver/guardian concerns about the status of injured tissues.<sup>10,12</sup>

In the present study, the first dental visit following a TDI was delayed in most cases. Only 6.5% of individuals received dental care within 1 hour. The first dental visit for TDIs was delayed by more than 24 hours in 47.5% of CSHCNs and in 59.1% of ASHCNs. A previous study regarding the amount of delayed time after TDIs in healthy Korean children reported that 62.8% of children had their first dental visit within 24 hours.<sup>10</sup> Compared to previous data regarding healthy children and adolescents, the visiting time of CSHCNs and ASHCNs was relatively prolonged. Considering the importance of immediate diagnosis and treatment in TDIs, efforts to minimize any delay after an injury are necessary. These findings highlight a need to develop educational programs on the management of TDIs for caregivers and for people working in special facilities for individuals with SHCNs.

The present study has certain limitations. As the data was collected and evaluated from a university dental hospital, the generalizability of the results can be affected by the small sample size. However, difficulties in patient enrollment should be considered because several studies have reported that there are still barriers to dental care for CSHCNs and ASHCNs due to their underlying conditions.<sup>13,14</sup> Future studies with a larger sample size and with multicenter enrollment will be required to lend more credence to the results of the present study.

In conclusion, the characteristics of TDIs in CSHCNs and ASHCNs are different from those of healthy individuals. The findings in this study emphasize community-based health services with educational and social programs for patients with SHCNs.

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