

Dental Health Status of Children with Acute Lymphoblastic Leukaemia and Haemophilia: Data from a Hospital-Based Paediatric Dental Unit

SUMMARY

Background. Minimal data about dental health from children with leukaemia and haemophilia are available in the southern part of Marmara, Turkey.

Aim. To determine possible differences in the status of dental health from children with acute lymphoblast leukaemia (ALL, n=67) and haemophilia (n=75) with children without systemic or general illnesses (controls, n=218) in order to provide a novel data for the region.

Design. In this retrospective study, the prevalence of caries, caries experiences, restoration index and treatment needs were determined.

Results. The prevalence rates and experiences of the whole sample were found high. Children with ALL had significantly higher scores of caries experience, requiring more than 1-surface filling in both primary and permanent dentitions comparing to the haemophiliac cases and controls ($p<0.01$; $p<0.05$).

Conclusions. It was strongly suggested that dental supervision should be included into the medical care of children with ALL and haemophilia. In order to improve dental health of both healthy and systemically compromised children, new goals should be integrated to hospitals in this region.

Keywords: Dental Health; Acute Lymphoblastic Leukaemia; Haemophilia; children

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Introduction

At a global level, rapid changes in the pattern of oral disease have been observed during the past decade. In most developed countries, the occurrence of dental caries in children has declined dramatically, both in terms of lower prevalence and reduction of mean dental caries experience^{4,11}. In contrast, reports are available on growing dental health problems in a number of developing countries, such as Turkey. The prevalence of dental caries among children in our country ranges between moderate to high, as classified by the World Health Organization criteria⁹. A recent epidemiological study showed that the prevalence of dental caries was over 90% at age 6 and

approximately 80% in children aged 12¹⁸. According to the report, dmf/t and DMF/T values increase with age. For both age groups, the D/d component constituted most of the caries indices, indicating the need for dental care. Although minimal data about dental health from children with leukaemia and haemophilia are available, current findings are similar as in the general child population^{8,17}.

Chemotherapy has been widely used for the treatment of leukaemia and may have adverse effects on the oral cavity¹². Various reports indicated the relationship between dental caries prevalence and chemotherapy^{5,14-16}. These studies suggested that leukemic children had more carious teeth comparing to healthy subjects. Oral mucositis, xerostomia, oral fungal infections, gingival

bleeding, and dental abnormalities are also frequent^{2,10,12}. Therefore, children with leukaemia are considered to be a high risk group for dental care.

Although there have been several reports dealing with surgical management of haemophilia, there are few data for the dental health of children^{3,21}. All the data indicated lower caries prevalence in haemophiliacs compared to healthy children since they receive more vigorous dental prevention programme than the general population when they attend a dental department.

Children receive treatment of haematological diseases at the Faculty of Medicine, which is the unique tertiary referral centre in the southern part of Marmara region in which no dental faculty exists. Therefore, the Paediatric Dental Unit located at the Faculty of Medicine is the only tertiary referral centre in which the data on dental health has been recorded since its establishment in 2002. In this unit, a trained paediatric dentist works for systemically compromised children, as well as the healthy ones in close connection with the paediatricians.

The **aim** of the present study was to determine possible differences in the dental health status of children with ALL and haemophilia compared to children without systemic or general illnesses in order to provide a novel data for the southern part of Marmara region.

Material and Methods

Sample Selection

This randomized descriptive study consisted of 360 consecutive child patients (mean age was 8.47 ± 0.18 years; male/female ratio 198/162) admitted and referred to the Paediatric Dental Unit in the period 2002-2009. Informed written consent was obtained from each family. The study was also approved by the ethics committee of the Uludağ University, Faculty of Medicine, Bursa, Turkey.

Assignment of Children to the Study Groups

Children were divided into 3 groups based on the child's medical history: (1) Group I (n=67) - children who were completed intensive chemotherapy period for ALL; (2) Group II (n=75) - children with haemophilia; and (3) Group III (Controls; n=218) - children without systemic or general illnesses. Children from groups I and II had dental symptoms and were referred to the Paediatric Dental Unit; children in group III were admitted to the unit for routine dental examination or treatment.

Assessment of the Study Groups

All the subjects were examined 2 times in a year on a regular basis. The examinations took place in the dental unit. The visual dental findings, including caries

experience-indices for decayed-missed-filled-teeth in permanent dentition (DMF/T) and primary dentition (dmf/t) and restoration index (the filling teeth/ DMF/T or dmf/t ratio), were collected by a calibrated paediatric dentist with a No.4 plain mirror and compressed air where necessary. Inactive and non-cavitated carious lesions were included in the d/D component for recording the dmf/t and DMF/T indices. The subjects were re-examined and the scores were controlled by a blind and calibrated dentist at the same visit. Any radiographic examinations were included. Mean DMF/T and dmf/t scores for each child were calculated from the data of regular examinations. The method for calculating treatment needs was validated by classification of the cavities as no treatment, filling 1-surface, 2-surface, or 3-surfaces. All the carious teeth in each child were treated during the study period, and the treatment needs for both dentitions were calculated. There was no difference for the restorative procedures between primary teeth and permanent teeth.

Statistical Analysis

The data was analyzed using SPSS (13.0). Parametric and/or non-parametric tests were chosen by using Kolmogorov-Smirnov and Shapiro-Wilk tests. Statistical comparisons were performed using Mann Whitney-U and t-tests. Categorical data were compared using the chi-square test. A probability value less than 0.05 were considered significant¹³.

Results

Dental Caries Experiences

Table 1. Dental caries experience - DMF/T and dmf/t scores of study groups at the end of a 2-year follow-up

Caries Experience	ALL (N=67) Mean ± SD	Hemophilia (N=75) Mean ± SD	Controls (N=218) Mean ± SD	p
dt	5.7 ± 0.7	4.9 ± 0.5	4.7 ± 0.3	N.S
mt	0.0 ± 0.0	0.1 ± 0.0	0.1 ± 0.0	N.S.
ft	0.0 ± 0.0	0.1 ± 0.0	0.1 ± 0.0	N.S.
dmf/t	5.7 ± 0.7	5.1 ± 0.5	5.2 ± 0.3	N.S.
DT	3.3 ± 0.6	1.1 ± 0.2	1.6 ± 0.1	<0.01
MT	0.3 ± 0.0	0.0 ± 0.0	0.0 ± 0.0	<0.05
FT	0.3 ± 0.2	0.1 ± 0.0	0.2 ± 0.0	N.S.
DMF/T	3.9 ± 0.7	1.2 ± 0.2	1.8 ± 0.1	<0.01

N.S. = $p > 0.05$.

The prevalence of caries in ALL, haemophilia and controls was found 88%, 77%, and 87%, respectively. No significant difference ($p>0.05$) was found in terms of caries prevalence among the groups. Caries experience indices were high in all groups regardless of the children's medical condition (Tab. 1). The highest score of both DMF/T and dmf/t indices was obtained in the decayed teeth component (DT/dt) in all groups. However, children with ALL had significantly higher scores of DT, MT and DMFT ($p<0.05$; $p<0.01$; $p<0.01$) compared to haemophiliacs and controls.

Restoration Index

The percentages of restoration index in permanent dentition were 13.04% in ALL group, 9.3% in haemophiliacs, and 17.94% in controls, whereas this finding in primary dentition was 0%, 2.08%, and 8.86%, respectively. The results were not significantly different.

The mean restoration index level in all groups was very low for both primary (3.6%) and permanent dentitions (13.42%), which was also non-significant among groups ($p>0.05$).

Treatment Needs

The mean numbers of teeth requiring treatment in each group, according to primary and permanent dentition, were displayed in table 2. Children with ALL had significantly profound and wider caries in both dentitions, requiring more than 1 surface filling compared to other groups. They had either 2 or 3 surface fillings in primary dentition but, 1 and 2 surface fillings in permanent dentition. Children with ALL also had significantly ($p<0.05$) more inactive carious lesions on permanent teeth requiring no treatment *versus* haemophiliacs and controls.

Table 2. Treatment needs of the study groups in primary and permanent dentitions

	ALL (N=67)	Hemophilia (N=75)	Controls (N=218)	p
	Mean \pm SD	Mean \pm SD	Mean \pm SD	
Primary Teeth	n=43	n=67	n=197	
No Treatment	15.1 \pm 0.6	16.2 \pm 0.4	15.8 \pm 0.2	N.S.
Filling 1 surface	2.0 \pm 0.3	1.7 \pm 0.3	1.8 \pm 0.1	N.S.
Filling 2 surface	1.4 \pm 0.2	0.7 \pm 0.1	1.0 \pm 0.1	<0.05
Filling 3 surface	0.5 \pm 0.1	0.02 \pm 0.02	0.1 \pm 0.05	<0.001
Permanent Teeth	n=44	n=52	n=149	
No Treatment	24.6 \pm 0.6	26.6 \pm 0.3	26.2 \pm 0.1	<0.05
Filling 1 surface	2.5 \pm 0.5	0.9 \pm 0.2	1.3 \pm 0.1	<0.01
Filling 2 surface	0.4 \pm 0.1	0.1 \pm 0.06	0.1 \pm 0.04	<0.001
Filling 3 surface	0.1 \pm 0.05	0.01 \pm 0.01	0.04 \pm 0.01	N.S.

N.S. = $p>0.05$

N: The total number of subjects

n: The total number of teeth

Discussion

The current study results clearly demonstrated that prevalence of caries and experiences in all groups were prominently high, indicating that the general children population in our region received low level of dental care and did not have benefit of advice how to prevent caries. As our unit is the only referral centre for paediatric

dentistry in this region, it can be assumed that the results of this data represent the paediatric population living in this part of the country.

In the present study, children with ALL had the highest dmf/t and DMF/T scores, 3.84 and 5.76, respectively. This can be explained by dental complications of intensive ALL therapy, complexity and quality of the oral flora during chemotherapy, which can make the teeth

more susceptible to caries^{1,20}. Similar or higher prevalence of dental diseases is reported for ALL compared to healthy children^{1,19}. Another study from Turkey also reported higher caries experiences in children with ALL/lymphoma compared to children without systemic or general disease⁶.

Haemophiliacs had 1-2 carious teeth in their permanent dentition and 5-6 caries in primary dentition (Tab. 1). Number of carious permanent teeth was similar with the controls but significantly lower than in children with ALL ($p < 0.01$). This suggested that leukaemia as a disease itself deteriorates dental tissues more than haemophilia. Children with haemophilia in our country do not receive regular dental recalls^{8,17}. Therefore, the number of carious primary teeth was found similar with the other subjects (Tab. 1). However, this situation is different in developed countries where all paediatric haemophiliacs attend for dental care during their haematological visit and receive a more vigorous dental prevention programme than the entire population. Therefore, haemophiliac children have lower caries prevalence compared to healthy subjects in those countries^{3,21}.

The restoration index in the present study was quite low in all groups for primary and permanent dentitions due to the insufficient and limited access to dental care. However, leukaemia children had significantly profound and wider caries in both, primary and permanent teeth, requiring more than 1 surface fillings for primary teeth and 1 and 2-surface fillings for permanent teeth (Tab. 2). The similar or higher degree of treatment need in children with cancer is reported comparing to healthy children in various reports^{6,7,15,19}. Carious lesions on permanent teeth requiring no treatment in the same group were also significantly high ($p < 0.05$). These findings indicated harsh effects of the chemotherapy on dental tissues, such as enamel demineralization and alteration in chemical structure and viscosity of saliva.

The results of this baseline study indicate that dental caries is a major problem in this region of Turkey and therefore an active and effective programme of caries prevention and dental care is necessary both for the children with ALL and haemophilia, as well as for the healthy population. Caries prevention should be added before dental care and also the importance of caries prevention rather than dental care should be emphasized regarding the risks that arise in the case of profound and untreated caries along with ALL and haemophilia. New dental health goals and alternative models of dental care delivery for all children living in this area should be integrated to the professional resources of the hospitals. Such goals for dental health both in Turkey and other developing countries will assist local health care planners to establish preventive programmes that target at general population, as well as the high risk groups such as leukaemia and haemophilia. It is crucial to evaluate regular dental health surveys

and eliminate potential sources of infection in mouth of children with ALL and haemophilia combined with their medical therapy.

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