# Study of the Dental and Periodontal Health of Children Suffering from Leukemia in Northern Turkey

## *TÜRKİYE'NİN KUZEYİNDE YAŞAYAN LÖSEMİLİ ÇOCUKLARIN DİŞ VE PERİODONTAL SAĞLIKLARININ İNCELENMESİ*

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## Abstract

**Objective:** The aim of this study was to evaluate the dental and periodontal health status of 39 children suffering from acute lymphoblastic leukemia (ALL) in Northern Turkey.

**Material and Methods:** The female to male ratio in the study population was 22/17 and mean age was 7.7, ranging between 4 months-20 years old. All the patients were under remission-induction therapy. Periodontal examination was performed using plaque and CPITN indices. Dental status was evaluated by using def-t and DMF-T indices. Presence of oral lesions were also noted in the routine intraoral examinations.

**Results:** Three patients had mucositis and another 3 had localized gingival hyperplasia. The mean plaque index score was 1.42. CPITN scores revealed that 29% of the patients had healthy gingiva; 63% of the patients had plaque who needed only oral hygiene instruction and 7.9% of the patients had calculus who needed scaling and oral hygiene instruction. Both def-t and DMF-T values revealed that number of decayed teeth was higher than the missing/extracted teeth.

**Conclusion:** It may be concluded that, most of the hospitalized leukemic children required decay treatment and periodontal therapy composed of oral hygiene instruction at least in order to prevent bacteremia that stems from intraoral infection.

**Key Words:** Leukemia, lymphoblactis, acute; dental caries; mucositis; periodontal ındex

## Özet

**Amaç:** Bu çalışmanın amacı, Türkiye'nin kuzeyinde yaşayan akut lenfoblastik lösemili (ALL) 39 çocuğun diş ve periodontal sağlığını değerlendirmekti.

**Gereç ve Yöntemler:** Çalışma populasyonundaki kızların erkeklere oranı 22/17 idi. Yaş durumu 4 ay ile 20 yıl arasında değişip, ortalama 7.7 idi. Bütün hastalar remisyon-indüksiyon tedavisi görmekteydi. Periodontal muayene plak ve CPITN indeksi kullanılmak suretiyle yapılırken, dişlerin sağlık durumu def-t ve DMF-T indeksleri kullanılarak değerlendirildi. Oral lezyonların mevcudiyeti de rutin ağızıçi muayene esnasında kaydedildi.

**Bulgular:** Üç hastada mukozit ve bir başka 3 hastada ise dişeti büyümesi gözlenmiştir. Ortalama plak indeks skoru 1.42 idi. CPITN skorları hastaların %29'unun sağlıklı dişetine sahip olduğunu, %63'ünün oral hijyen eğitimine ve %7.9'unun da diş taşı mevcudiyeti sebebiyle oral hijyen eğitimi ve diş yüzeyi temizliğine ihtiyaç gösterdiğini ortaya koymuştur. def-t ve DMF-T değerleri çürük dişlerin eksik/çekilmiş dişlerden daha fazla olduğunu göstermiştir.

**Sonuç:** Yatan lösemi hastalarının çoğunun, ağız içinden kaynaklanan bakteriyemiyi önlemek için çürük tedavisi ve oral hijyen eğitiminden oluşan periodontal tedaviye ihtiyaç duydukları sonucu elde edilmiştir.

**Anahtar Kelimeler:** Akut lenfoblastik lösemi; diş çürüğü; mukozit; periodontal indeks

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Acute lymphoblastic leukemia (ALL) is the most common malignant disease in children.[1] Antineoplastic chemotherapy and irradiation results in destruction or prevention of formation of tumor cells. However, it has also been proven to lead to fatal toxicity in some of the cases.[2] Oral cavity is the part of the body where the side effects are frequently observed. Therefore, elimination of the oral symptoms of the disease not only improve the quality of life of these patients, but also support anticancer therapy. Total relief may always not be achieved but creation of a healthy oral condition prior to chemotherapy results in minimized undesirable side effects.[3] Peterson

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suggests that preventive treatment consisted of oral hygiene instruction and scaling of the tooth surfaces might reduce the severity of oral complications.[4]

The aim of this study was to evaluate the oral health status of a group of children suffering from ALL in Northern Turkey and also to draw the outlines of the dental treatment protocol.

## Material and Methods

The study population consisted of 39 children who were under remission-induction therapy at Ondokuz Mayıs University Pediatric Oncology Department. The female to male ratio was 22/17 and the mean age was 7.7 ranging between 4 months and 20 years old. Almost all children received 0.12% chlorhexidine as a mouthwash or an oral swab. The study was undertaken according to the ethical principles of Helsinki Declaration. Patients were examined taking into consideration the following parameters after the informed consents were obtained:

### Prevalence of caries

The estimation of caries prevalence was performed according to the criteria of WHO by using def-t index (d+e+f) for primary teeth and DMF-T index (D+M+F) for permanent teeth where;[5]

d and D= the average number of decayed teeth

e= the average number of extracted teeth

M= the average number of missing teeth.

f and F= the average number of teeth with fillings.

For children aged 5 years or over missing primary incisor teeth were not considered as 'missing'. Similarly, for children aged 9 years and over missing primary molars and canines were not classified as 'missing'.

### Periodontal examination

Community Periodontal Index of Treatment Needs (CPITN) was used for the assessment of gingival health by using WHO sound.[6]

Code 0: Healthy periodontal tissues that require no treatment (TN:0).

Code 1: Presence of bacterial plaque around the teeth that require oral hygiene instruction (TN:1).

Code 2: Presence of bacterial plaque and calculus that require TN1+ calculus removal and scaling (TN:2).

Code 3: Pocket depths of 4-5 mm requiring TN1+ calculus removal and scaling (TN:2).

Code 4: Deep periodontal pockets of 6 mm or more requiring TN1+TN2+complex therapy (TN:3).

Level of oral hygiene was also determined according to Silness-Löe plaque index.[7]

### Estimation of mucositis and gingival overgrowth

Mucositis was scored by the use of an index modified by Ferretti:[8]

Grade 0 (none): No symptoms.

Grade 1 (mild): Mucosal redness with 1 or 2 small ulcerations (<1 cm) and minimal discomfort

Grade 2 (moderate): Mucosal ulcerations with 1 or 2 large ulcerations (>1 cm) and substantial discomfort; patient able to eat.

Grade 3 (severe): Multiple mucosal ulcerations with severe discomfort; patient unable to eat.

Gingival overgrowth was classified as localized or generalized.

Children under 2 years old were only examined for the presence of mucositis and gingival overgrowth.

## Results

The results of def-t and DMF-T indices are shown in the Table 1. The mean def-t value for primary dentition was 3.09 and the mean DMF-T value for permanent dentition was 2.5. Both def-t and DMF-T values revealed that number of decayed teeth was higher than the missing/extracted teeth. It was obvious that number of decayed in primary dentition was extremely higher than that of permanent dentition. Number of filled teeth comprising both dentition was only 5 (Table 2).

**Table 1.** Dental caries experience in the primary and permanent dentition of the study population.

| Def-t index | Number of patients | DMF-T index | Number of patients |
|---|---|---|---|
| 0 | 9 | 0 | 6 |
| 1 | 0 | 1 | 2 |
| 2 | 6 | 2 | 3 |
| 3 | 6 | 3 | 0 |
| 4 | 4 | 4 | 6 |
| 5 | 1 | 5 | 2 |
| 6 | 5 | 6 | 0 |
| 7 | 0 | 7 | 0 |
| 8 | 1 | 8 | 1 |
| 13 | 1 | - | - |

The mean plaque index score was 1.42. CPITN scores revealed that 29% of the patients had healthy gingiva (TN:0); 63% of the patients had plaque who needed oral hygiene instruction (TN:1) and 7.9% of the patients had calculus who needed scaling plus oral hygiene instruction (TN:2). Only 1 patient had generalized gingival recession associated with severe bone loss who needed complex periodontal treatment (TN:3). Mucositis with grade 1 was observed in 3 patients and localized gingival overgrowth in another 3 patients.

## Discussion

Low study population and absence of a healthy control group may be the limitations of this study which prevented the authors to draw a more definitive conclusion and compare the results with those of other studies. However, this study aimed to present the dental and periodontal profile of the leukemic (ALL) children living in Northern Turkey and to draw the outlines of the dental treatment protocol.

The large number of decayed teeth versus the small number of filled teeth in both dentition pointed out to the i) absence of regular dental check-ups and ii) delay in the treatment of the decayed teeth due to the profound thrombocytopenia and neutropenia. The first point brings out the absolute necessity of the collaboration with a special pediatric dental team at the oncology unit.[9] Solution for the second point ideally should be the achievement of the dental and periodontal treatment before chemotherapy in order to eliminate any possible foci of dental disease interfering with the positive outcome of the chemotherapy.[10] However, Ellegard et al. suggest that daily plaque removal from the teeth resolves gingival inflammation also in severely granulocytopenic patients.[11] The reason why the number of decayed teeth in primary dentition was higher than those of permanent dentition was probably related with the inadequacy in manual dexterity in the early ages and the more prolonged time the primary teeth were exposed to the insult of bacterial plaque.

The low number of patients presenting localized gingival overgrowth and mild mucositis may be explained by the relatively low plaque index scores resulting probably from the use of chlorhexidine mouthwash. Another possibility is that, gingival tissues may not have been affected by leukemic cell infiltration at all in those ALL patients as stated by other authors.[12-14] If this was the case, gingival overgrowth observed in leukemic patients was the result of preexisting plaque–induced gingival inflammation.[15] Whatever the reason was, it was hard to clarify this situation due to the difficulty in obtaining biopsies from the study population. It is obvious that more than half of the patients still needed oral care regimen at least for the maintenance of infection-free oral cavity to minimize the negative effects of chemotherapy. Unfortunately, establishment of good oral hygiene in this patient group was quite difficult. Since, small age and debilitating nature of the leukemia

**Table 2.** D, M, F and d, e, f values of the study population.

| D (Decayed teeth) | d (decayed teeth) | M (Missing teeth) | e (extracted teeth) | F (Filled teeth) | f (filled teeth) |
|---|---|---|---|---|---|
| 38 | 81 | 10 | 18 | 2 | 3 |

prevented performing good oral hygiene and usually necessitated the help of the parents.

## Conclusion

In conclusion, most of the hospitalized leukemic children had poor dental status requiring filling of the decayed teeth in majority and at least needed oral hygiene instruction for the establishment of periodontal health. Therefore, a meticulous oral hygiene regimen should be initiated accompanied with simultaneous caries treatment in order to prevent dental and periodontal infection which has proven to interfere with general systemic condition. Although periodontal treatment during chemotherapy is also suggested,[11] remission phase seems to be the right time to initiate dental treatment procedures, but taking into consideration the results of the blood investigations especially in case of invasive procedures.

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