

Enamel hypoplasia in patients with acute lymphoblastic leukemia

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ABSTRACT

Background: Dental abnormalities that affect the children with acute lymphoblastic leukemia were detected. The severity of this abnormality showed a linear relation between the time of receiving treatment (chemotherapy and radiotherapy) and the stage dental development. The aim of this study was to determine the prevalence of enamel hypoplasia in children with acute lymphoblastic leukemia.

Materials and methods: Forty eight children with acute lymphoblastic leukemia were examined clinically for the presence of enamel hypoplasia.

Results: 37.5 % of these patients have enamel hypoplasia and a significant correlation was found between increments of duration of disease with the severity of enamel hypoplasia.

Conclusion: Oral health care with frequent dental observation is important to patients with acute lymphoblastic leukemia.

Keywords: Lymphoblastic leukemia, dental abnormalities. (J Bagh Coll Dentistry 2005; 17(3): 53 - 55)

INTRODUCTION

Cancer is the second most common cause of mortality in childhood. Acute lymphoblastic leukemia in children is more common. Complex therapy of chemotherapy and irradiation decrease the rate of mortality, but anticancer therapy may create acute and long term side effects that even involve teeth ^(1,2).

The frequency of dental abnormalities such as delayed dental development, microdentia, hypoplasia, agenesis, V – shaped root and shortened root were detected in acute lymphoblastic leukemic pediatric patients who had been on chemotherapy ^(3,4). Severity of this abnormalities was greater in children who received treatment before 5 years of age and if amelogenesis was not complete ⁽⁵⁻⁷⁾.

Enamel hypoplasia is of interest to both clinician and the basic scientists because it may indicate an increased risk for caries ⁽⁸⁾.

The aim of the present study was to determine the prevalence of enamel hypoplasia in Iraqi children patients with acute lymphoblastic leukemia receiving anti-neoplastic therapy including chemotherapy and radiotherapy.

MATERIALS AND METHOD

Forty eight children attending the teaching pediatric hospital in Escan, who were diagnosed with acute lymphoblastic leukemia and treated either with chemotherapy alone or chemotherapy beside irradiation. The patients were evaluated for the presence of enamel hypoplasia. The age of patients and duration of the disease were recorded.

Clinical records

All teeth were dried and the examined enamel is considered normal when tooth maintains its translucent appearance.

Both permanent and primary teeth were examined, enamel hypoplasia on buccal and palatal surfaces were recorded as well as those on the incisal edges and cuspal of occlusal surface of anterior and posterior teeth ⁽⁹⁾.

Enamel hypoplasia is defined as a quantitative defect in the enamel identified visually as involving the surface of enamel and associated with reduced enamel thickness ⁽¹⁰⁾. Clinically, enamel hypoplasia shows various types ⁽¹¹⁾ include:

- 1- Pits.
- 2- Horizontal grooves.
- 3- Vertical grooves.
- 4- Total or partial missing of enamel.

The statistical differences were tested by Chi – square test.

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RESULTS

Forty eight children with acute lymphoblastic leukemia were participated in the present study. Males represented 43.7 % of total number of patients with mean age of 7.5 years, while females represented 56.2 % with mean age of 5.5 years (Table 1).

Table (2) shows that eighteen (37.5 %) of acute lymphoblastic leukemic patients showed different types of enamel hypoplasia. Horizontal groove of enamel hypoplasia is showed to have more prevalence (50 %).

The dentition types in acute lymphoblastic leukemic patients with enamel hypoplasia show that (9 out of 18) with primary dentition, eight patients with mixed dentition and only one shows permanent dentition (Table 3).

Table 4 shows eleven patients (61.1 %) with enamel hypoplasia with duration of disease range from 8 – 36 months, while other seven (38.8%) patients with duration of disease range from 4 – 72 months.

The present result shows that thirteen children with enamel hypoplasia received chemotherapy during the duration of disease, while five out of eighteen received chemotherapy and radiotherapy (Table 5).

The results in table 6 report a significant difference ($P < 0.005$) between number of patients with enamel hypoplasia that affected the anterior teeth and patients with enamel hypoplasia affected the posterior teeth. The result shows a significant correlation of increment of duration of disease with the severity of enamel hypoplasia.

DISCUSSION

The present follow-up study has been carried out on the effects of chemotherapy both with and without prophylactic radiation on the enamel structure.

The result shows that 37.5 % of acute lymphoblastic leukemic patients had enamel hypoplasia. This high prevalence of enamel defects was related to the period of tooth development at time of cytotoxic drug administration and radiation therapy which is entirely consistent with severe disturbance to ameloblast during the secretory or post secretory phase activity. More confirmation has shown by result in Table 3 which reported nine out of eighteen patients have primary dentition and other eight patients with mixed dentition. The results are in agreement with Suckling *et al*, in 1985 and Purdell *et al*, in 1987 findings who concluded their studies that

either the presence of malignancy or the use of cytotoxic drugs during tooth germ was lead to dental abnormalities.^(12, 13)

The present study also showed predominance of enamel hypoplasia in anterior teeth of the patients. It is thought to be connected with the timing of dental formation, as the incisors had usually erupted when the disease was diagnosed. This result supports the result of Pajari *et al* in 1988⁽¹⁴⁾.

A significant correlation between increment of disease duration and severity of enamel hypoplasia was found in this study and it may be attributed to long time of exposure of ameloblast to cytotoxic drug and radiation therapy that impaired the activity and the number of ameloblast cells.

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Table 1: Age and gender distribution of forty-eight acute lymphoblastic leukemic children.

Gender	No. of patients	Age (years)	
		Range	Mean
Male	21 (43.7%)	(2 – 11y)	7.5y
Female	27 (56.2%)	(3 – 15y)	5.5y
Total	48	(3.5 – 13y)	6 y

Table 2: Sex and age distribution of acute lymphoblastic leukemic children with different types of enamel hypoplasia.

Types of Enamel hypoplasia	Female / Age range	Male / Age range	Total
Pits	4 (5 - 9y)	1(11y)	5(27.7%)
Horizontal groove	3(3 - 9y)	5(2 - 5y)	8(50%)
Vertical groove	3(9 - 11y)	1(4y)	4(22.2%)
Partial enamel missing	1(15y)	-	1(5.5%)
Total	11	7	18(37.5%)

Table 3: Dentition in Acute lymphoblastic leukemic patients with enamel hypoplasia.

Acute lymphoblastic leukemic patients	No. of patients with 1 st dentition	No. of patients with mixed dentition	No. of patients with permanent dentition
Female	3	7	1
Male	6	1	-
Total	9	8	1

Table 4: Enamel hypoplasia in acute lymphoblastic leukemic patients with duration of disease.

Acute lymphoblastic leukemic patients	Enamel hypoplasia	Duration range of disease / month
Female	11 (61.1%)	(8 – 36 months)
Male	7 (38.8%)	(4 – 72 months)
Total	18	

Table 5: Enamel hypoplasia with different treatment regimens in patients with Acute lymphoblastic leukemic.

	Chemotherapy	Chemotherapy and radiotherapy
Female	10	1
Male	3	4
Total	13	5

Table 6: Prevalence of enamel hypoplasia with duration of disease in acute lymphoblastic leukemic children.

Types of Enamel hypoplasia	Mean of duration / month	No. of patients anterior teeth / affected	No. of patients posterior teeth / affected
Pits	10 month	4*	1
Horizontal groove	22 month**	7	1
Vertical groove	24 month	1	3*
Partial missing enamel	24 month	1	-
Total		13	5

* Significant difference $P < 0.05$, ** Significant difference $P < 0.05$