

Dental Health Status in Children with Acute Lymphoblastic Leukemia

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Acute Lymphoblastic Leukemic (ALL) children were selected to evaluate the dental health status from Regional Cancer Centre, Kerala. A 12 item questionnaire was distributed to all selected 104 children's parents who were present in the hospital and the children's oral cavity was examined. The results revealed moderate gingival inflammation in most of the samples irrespective of treatment. Tenderness on temporo mandibular joint, oral mucositis, high DMFT values were observed in children who were under treatment. History of halitosis before diagnosis of ALL was a predominant feature in a statistically significant number of children.

Key words: Leukemia, Oral Mucositis, Dental Caries, Halitosis

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INTRODUCTION

Leukemia is defined as a malignant disease that starts in blood-forming tissue such as the bone marrow, and causes large number of blood cells to be produced and enter the blood stream.¹ Leukemia constitutes approximately 30% of all childhood cancers and Acute Lymphoblastic Leukemia (ALL) is the most common type of malignancy.² Nearly 75% of childhood leukemias are of the ALL type.³ India has a population more than 1000 million, with more than 36% of its people under 15 years of age. In India, childhood leukemia constitutes 2.3% of the cancer patients. Each year 6000 children in India develop acute lymphoblastic leukemia. The pediatric cancer pattern revealed by the records of the hospital cancer registry programme, at the Regional Cancer Centre, Thiruvananthapuram, which is apart of the National Cancer Registry programme of India, showed that pediatric cancer constitutes 4.3% males and 4% females of all cancers registered.⁴ Treatment modalities accepted widely for ALL is Chemotherapy alone and chemotherapy with radiation. Radiotherapy to or near the oral cavity may cause mucositis, infection, trismus or xerostomia which further interrupts radiotherapy, inducing malnutrition or systemic infection. When chemotherapy and radiotherapy are combined, the aforementioned complications are additive if not synergistic. Thus optimal care of oral cavity by the pediatric dentist is essential in Pediatric Oncology which has a real impact on quality of life and ultimate survival in a definite proportion of patients.

MATERIALS AND METHODS

The present study was carried out in children aged 2-14 years of both sexes who were attending for the treatment of Acute Lymphoblastic Leukemia in the Department of Pediatric Oncology, Regional Cancer Centre (RCC), Thiruvananthapuram, Kerala, India. Children who were unconscious, severely ill and uncooperative were excluded from the study.

A total of 104 children of both sexes who were diagnosed as Acute Lymphoblastic Leukemia were selected for the study. Oral cavity of the children was examined after getting informed written consent from the parents. Dental health status was recorded with the help of a sterile mouth mirror. A torch was used as a light source and data were recorded in a modified WHO format.⁵ A 12 item questionnaire was given to all the parents of the ALL children and data were collected regarding their knowledge about their children's oral hygiene. Patients were categorized mainly in to two Groups.

Group I - 68 ALL patients who were receiving chemoradiation therapy.

Group II - 36 ALL patients where chemoradiation therapy was yet to start.

Oral cavity was examined for dental caries, enamel hypoplasia, oral mucositis in different regions according to WHO Oral Toxicity Scale.⁶ As probing could have induced bleeding, no probes were used and Modified Gingival Index (MGI)⁷ was used to record the Gingival Status. Statistical analysis was done by Chi-square (χ^2) test and Kruskal-Wallis Test.

RESULTS

On gingival examination a moderate gingival inflammation was prevailed in most of the samples irrespective of treatment which was statistically significant (Table 1). Enamel hypoplasia was observed in a smaller percentage of children which was not statistically significant (Table 2). Tenderness of temporo mandibular joint was present in small number of children who were undergoing treatment (Table 3). Oral mucositis prevailed in children who were under treatment. The most common areas of mucositis were mainly on the buccal mucosa, lips, dorsum of tongue (Table 4). Signs and severity of oral mucositis was higher in children with chemoradiation therapy

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Table 1: Gingival condition.

Gingival Status Grading (MGI - Index)	Frequency		
	Group I	Group II	Total
Mild Inflammation	13(19.1%)	8(22.2%)	21(20.2%)
Moderate Inflammation	35(51.5%)	20(55.6%)	55(52.88%)
Severe Inflammation	20(29.4%)	8(22.2%)	28(26.92%)

Table 2: Presence of Enamel Hypoplasia.

Enamel Hypoplasia	Frequency		
	Group I	Group II	Total
Present	8(11.8%)	7(19.4%)	15(14.4%)
Absent	60(88.2%)	29(80.6%)	89(85.6%)

Table 3: Tenderness of temporo mandibular joint.

Tender TMJ	Frequency		
	Group I	Group II	Total
Present	9(13.2%)	0	9(8.7%)
Absent	59(86.8%)	36(100%)	95(91.3%)

Table 4: Oral mucositis prevalence.

Oral Mucositis	Frequency		
	Group I	Group II	Total
Present	53 (77.4%)	14 (38.9%)	67(64.4%)
Absent	15 (22.1%)	22(61.1%)	37(35.6%)

Table 5 : Oral mucositis vs WHO Grading of Oral Mucositis.

Oral Mucositis	Frequency		
	Group I	Group II	Total
Grade 0	15(22.1%)	22(61.1%)	37(35.6%)
Grade 1	24(35.3%)	8(22.2%)	32(30.8%)
Grade 2	14(20.6%)	4(11.1%)	18(17.3%)
Grade 3	15(22.1%)	2(5.6%)	17(16.3%)

Table 6: Dental caries experience in GROUP I.

Age	Mean DMFT	Mean dft
Less than 6 years	0.11 ±0.55	3.2 ±3.4
6 years to 12 years	2.0±1.5	1.9±1.9
Above 12 years	3.2±2.6	0

Table 7: Dental caries experience in GROUP II.

Age	Mean DMFT	Mean dft
Less than 6 years	0.07±0.37	2.8±4.4
6 years to 12 years	1.0±2.4	1.3±2.4
Above 12 years	0	0

Table 8 : Results of questionnaire answered by parents.

Questions Answered by Parents	Answers			
	A	B	C	D
Method of cleaning the child's teeth	Tooth paste & Tooth brush – 88.5%	Tooth Powder – 1.5%		
Frequency of cleaning.	Once 59.6%	Twice 34.6%	Thrice 5.8%	
Bleeding gums before diagnosing	Yes – 23.1%	No – 76.9%		
Child is comfortable when asked to do brushing.	Yes – 76.9%	No – 23.1%		
Parents helped in cleaning the mouth.	Yes – 57.7%	No – 42.3%		
Method used for brushing the teeth.	Vertical – 5.8%	Horizontal – 71.2%	Both – 19.2%	Circular – 3.8%
Bad breath before diagnosing the disease.	Yes – 58.7%	No – 41.3%		
Duration of bad breath before diagnosis.	1-3 Weeks 49.2%	1 Months 42.6%	1-3 Months 3.3%	4 and above 4.9%
Any dental decay noticed in child before.	Yes – 36.5%	No – 63.5%		
Consulted Pediatric dentist for the treatment of the same.	Yes – 73.7%	No – 26.3%		
Following two additional questions were answered by the parents whose children already started with the treatment.				
Any soft tissue lesion noticed in the child's oral cavity after starting the treatment.	Yes – 32.4%	No – 67.6%		
Child complained of pain in the oral cavity after starting the treatment.	Yes – 32.4%	No – 67.6%		

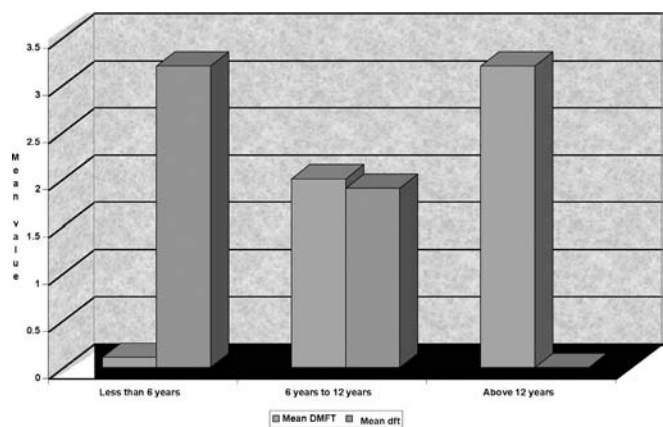


FIGURE 1: Dental caries experience in Group 1

(77.4%) as compared to children where treatment was yet to start (38.9%) which was highly statistically significant (Table 5). Dental caries experience in children who were undergoing chemoradiation has shown very highly significant values, as compared to children where treatment was yet to start (Table 6 & 7), (Figure 1 & 2). Majority of the children who were undergoing treatment has shown active carious lesions.

When the questionnaire was answered by the parents of children regarding their oral hygiene practices, it was observed that; 88.5% of the children used tooth paste and tooth brush regularly. Only 34.6% of the children brushed twice daily. Parental help was taken by 57.7% of children for the maintenance of their oral hygiene. Presence of halitosis one to four weeks before the diagnosis of ALL was a predominant feature in more than half of the children. Pain in the oral cavity after starting the treatment was observed in many children (32.4%) (Table 8).

DISCUSSION

Children treated with radiation and chemotherapy exhibit acute complications in the oral cavity and long term complications in the dental and craniofacial development. With increasing survival rate of children after childhood malignancy, the potential clinical impact on orofacial and dental development is considerable. Numerous factors have been suggested as affecting the growth and development of children under treatment for hematological malignancies. In Acute Lymphoblastic leukemia the characteristic oral findings are gingival hyperplasia, oral mucositis, dental caries, delayed exfoliation, delayed eruption and long term effects like hypodontia, microdontia, and enamel hypoplasia.⁸

The gingival hyperplasia, which may be one of the most constant features of the disease except in edentulous patients, is usually generalized and varies in severity. In severe cases the teeth may be almost completely hidden. The gingiva is boggy, edematous and deep red, they bleed easily. The gingival swelling is due to the leukemic infiltration in areas of mild chronic irritation.⁸ In our study sample, 7th nerve palsy was seen in one patient among the total study population.

According to the institutional (Regional Cancer Centre) protocol the patients were refrained from brushing while in the hospital. The oral hygiene was maintained by Povidone - Iodine (Betadine®) mouth rinse and topical application of Clotrimazole (Candid B®) gum paint, which might be one of the reasons for the gingival

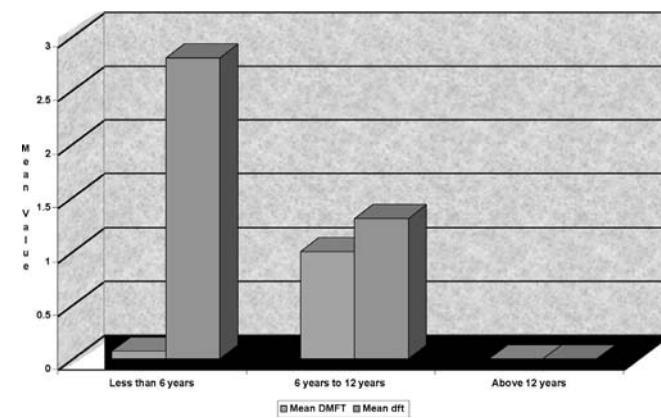


FIGURE 2: Dental caries experience in Group 2

inflammation observed in most of the children.

A significant deterioration of the gingival condition was observed in the patients who were undergoing chemoradiation therapy, which was in accordance to the findings by Elizabeth (1994).¹⁰

In our study group 77.4% had oral mucositis after starting the treatment but surprisingly only 32.4% parents noted about the oral mucositis which may be due to lack of oral health awareness. Another interesting factor observed in the present study was the presence of halitosis among 58.7% of the children. Halitosis was observed between 1 to 4 weeks prior ALL diagnosis. No supporting literature is found on the same matter. Halitosis can present if bleeding is present in the mouth; and only 23.1% had bleeding gums before diagnosing. So further research on the same topic is needful.

Tenderness on temporomandibular joint was observed in 8.7% of children who were undergoing treatment, which may be one of the complications due to radiation therapy.¹¹

It was observed that caries experience was higher among the Group I who were undergoing treatment as compared to Group II. This is in accordance with Dodan et al¹² and Vissink A13 et al. All these factors might be aggravated by the chemotherapeutic agents and poor oral hygiene which was due to the institutional protocol. However a long term follow up study is required to come to any definitive conclusion.

CONCLUSIONS

A moderate gingival inflammation prevailed in all the leukemic children.

Oral mucositis and dental caries experience prevailed among the children with ALL which increased in children who were undergoing treatment.

History of halitosis before diagnosis of ALL was a predominant feature in a statistically significant number of children.

Ignorance prevailed among parents which led to the detrimental effect of the child’s dental health.

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