

## ACTIVITY SALIVARY BACTERIA OF ACUTE LYMPHOBLASTIC LEUKEMIA CHILDREN IN CHEMOTHERAPY PHASE

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### ABSTRACT

**Objective:** The objective of this study was to investigate the differences activity of salivary *Streptococcus mutans* bacteria in children suffer acute lymphoblastic leukemia (ALL) in phase of chemotherapy, induction, intensification/consolidation, and maintenance.

**Methods:** This study was a laboratory observational, and cross-sectional method, conducted 19 ALL children in phase of chemotherapy, induction, intensification/consolidation, and maintenance. 2 mm of dental plaque was collected from mesiobuccal first permanent molar and incubated for 48 h at 37°C, and the bacterial activity of *S. mutans* measured by Cariostat.

**Results:** Odds ratio analysis among chemotherapy phase of induction, intensification/consolidation, and maintenance is not significant ( $p>0.05$ ) differences.

**Conclusion:** The highest activity bacteria of *S. mutans* were found in the induction phase.

**Keywords:** Activity bacteria, *Streptococcus mutans*, ALL, Chemotherapy phase.

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### INTRODUCTION

Acute lymphoblastic leukemia (ALL) is a heterogeneous hematologic disease of malignancy characterized by the proliferation of immature lymphoid cells in bone marrow, peripheral blood, and other organs [1-3].

The main therapy or standard of management of ALL is chemotherapy. Chemotherapy treatments are divided into three phases, namely, the induction, the intensification/consolidation, and the maintenance. One of the side effects of chemotherapy treatment can affect the balance of the body in general and the oral health such as dry mouth, aphthae, gingivitis, and dental caries [4-7].

Data on caries bacterial activity of *Streptococcus mutans* in children with ALL in Indonesia does not yet exist. Therefore, a study is needed to determine the activity of *S. mutans* bacteria in children suffering from ALL. Early detection with known *S. mutans* high bacterial activity in children with ALL can reduce morbidity and other complications that interfere with dental and oral health when undergoing anticancer therapy [8-10]. This fact has fascinated the writer to delve more deeply into the investigation of the activity of *S. mutans* bacteria in ALL children who undergoing chemotherapy phase.

### METHODS

Examination of *S. mutans* bacteria activity using Cariostat media from Sankin Company, Japan. Plaque sampling was conducted at around

10:00–12:00 pm with the method of swab. The swab is done by applying a sterile swab cotton available on Cariostat packaging. The swab is applied to the cervical region of the first molars of the left upper jaw to the right upper right molar teeth, in children with ALL. Then, the cotton swab is inserted into the Cariostat ampoule that has been labeled demographic data and closed tightly. Cariostat is then inserted in a media transportation container for transport to the laboratory. Furthermore, incubation of Cariostat ampoule was done in incubator with temperature 37°C for 48 h.

Cariostat classification results are grouped according to chemotherapy, induction, intensification/consolidation, and maintenance phases. Then, the data were analyzed using Chi-square test with  $p<0.05$  significance. This analysis also continued with odds ratio (OR) test to see the proportion of each phase of chemotherapy.

### RESULTS

The research has been done at Dharmais Hospital, Jakarta. From 40 patients of ALL were obtained this following result: From the cross-tabulation data show *S. mutans* bacteria activity in induction, intensification/consolidation, and maintenance phase are 54.5%, 45.4%, and 44.4%, respectively. The result of analysis using Chi-square statistic test indicates the insignificant difference between each chemotherapy phases of ALL children with classification of bacterial activity of *S. mutans* Cariostat,  $p=0.304$  ( $p>0.05$ ) (Table 1).

Table 1: Differences of *S. mutans* bacterial activity between chemotherapy phases induction, intensification/consolidation phase

| Phase                         | Activity bacteria <i>S. mutans</i> n (%) |          |             |       | p |
|-------------------------------|--|----------|-------------|-------|---|
|                               | Less active                              | Active   | Very active | Total |   |
| Phase                         |  |          |             |       |   |
| Induction                     | 4 (36.3)                                 | 1 (9.1)  | 6 (54.5)    | 11    |   |
| Intensification/Consolidation | 3 (27.2)                                 | 5 (45.4) | 3 (27.2)    | 11    |   |
| Maintenance                   | 8 (44.4)                                 | 5 (27.8) | 5 (27.8)    | 18    |   |

$\chi^2=4.844$ . *S. mutans*: *Streptococcus mutans*

**Table 2: Analysis OR between activity bacteria *S. mutans* in induction, intensification/consolidation, and maintenance phase**

| Phase                     |    | Bacteria activity of <i>S. mutans</i> |                         |                    |
|---------------------------|----|---------------------------------------|-------------------------|--------------------|
| Phase                     |    | Less active-active                    | Less active-very active | Active-very active |
| Induction-consolidation   | OR | 6.667                                 | 0.667                   | 0.001              |
|                           | p  | 0.155                                 | 0.697                   | 0.077              |
| Consolidation-maintenance | OR | 0.375                                 | 1.667                   | 0.625              |
|                           | p  | 0.290                                 | 0.597                   | 0.637              |
| Induction-maintenance     | OR | 2.500                                 | 0.417                   | 0.417              |
|                           | p  | 0.465                                 | 0.309                   | 0.152              |

OR: Odds ratio, p<0.05: Significant. *S. mutans*: *Streptococcus mutans*

From OR analysis between Cariostat classification with chemotherapy phase of induction, intensification/consolidation, and maintenance is not significant (p>0.05) (Table 2).

## DISCUSSION

ALL is a cancer that begins as a child and is a malignant disease that can lower the immune system even can cause death [4-6]. The severity of cancer is not only caused by the disease itself but can also be aggravated in the presence of secondary disease due to disease elsewhere. Treatment of ALL disease there are several stages according to the operation procedure of treatment, namely: Induction phase, intensification/consolidation phase, and maintenance phase [7-9].

Result of research of *Streptococcus mutans* bacteria activity has been done on child of Acute Lymphoblastic Leukemia in chemotherapy phase shows that bacterial activity of *Streptococcus mutans* is high on induction phase. While in the other classification of the findings of research results of *S. mutans* bacteria activity in the phase of induction seen the highest highly classified very active (54.5%). In the phase of intensification/consolidation of the highest *S. mutans* actively classified activity (45.4%), and at the highest maintenance phase of *S. mutans* was classified actively (44.4%). Hence, in this study seen a decrease in the classification of bacterial activity from the onset of chemotherapy in the phase of induction and continued into the phase of intensification/consolidation, and the maintenance phase [9,10].

From the OR analysis table, no significance was found, but from the analysis of each chemotherapy phase with *S. mutans* bacterial activity can be concluded the OR induction/consolidation phase with activity *S. mutans* active and highest active. This means induced induction/consolidation of *S. mutans* bacteria activity is highest when compared to the phase of induction and maintenance, followed by the phase of intensification/consolidation and maintenance.

The ability of adhesion of *S. mutans* on tooth surfaces when forming biofilms is directly related to some antigens. The result of glucose metabolism is lactic acid which is the main end product of glycolysis process with pH which is low [11-13]. The results of the research have found high activity of *S. mutans* bacteria, especially in the induction phase, so the possibility of caries in the future will increase [14-17].

The sensitivity of the bacterial *S. mutans* to detect dental caries test in children is reported to be 98% [18,19]. This method can be applied to small children or difficult to treat patients and does not require specialized knowledge and tools. Use of Cariostat can be done both in private practice and as a screening tool in the wider community. In the case of patients suffering from ALL, it is beneficial because this method can be seen both directly by both the doctor and the patient and can also be prevented immediately [20,21]. With the knowledge of *S. mutans* bacteria activity is high, then prevention can be done such as cleaning the oral cavity is better and controlled, especially in the phase of induction [20,21].

## CONCLUSION

From the results of research on *S. mutans* bacteria activity that has been done, it can be concluded, the need for special attention in patients

with ALL, since dental and mouth health is very important, especially the possibility of secondary occurrence of infection. However, due to the lack of protocol equivalent for leukemia patients who will and are undergoing treatment, then maintaining oral hygiene becomes one of the reasons that need attention. Therefore, it is necessary to provide an appeal and cooperation between pediatric and blood dentist specialist doctors to include oral and dental health protocols as an integrated cancer treatment countermeasures.

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## CONFLICT OF INTEREST

There is no conflict of interest.

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