Oral hygiene and salivary immunoglobulin among acute lymphocytic leukemic patients undergoing chemotherapy courses

Nadia A. Al-Rawi B.D.S., M.Sc., Ph.D (1)

ABSTRACT

Background: Chemotherapy impaired the normal function of the human immune system. The patients’ ability to accomplish adequate oral hygiene may be limited. When chemotherapy is indicated, it is imperative that health of the oral cavity be assessed initially as well as throughout therapy. This study was conducted to evaluate the oral hygiene and salivary immunoglobulin in patients undergoing chemotherapy courses.

Subjects and methods: The study groups included 30 acute lymphatic patients, they were under chemotherapy. The control group includes 30 subjects matching with study group in age and gender. Plaque status was evaluated according to the Silness &Loe Index, dental calculus according to Ramfjord index, while gingival condition was assessed according to Loe & Silness. After oral examination, stimulated saliva samples were collected from the subjects and performed under standard condition following instruction cited by Tenovuo & Lagerlof, and chemically analyzed for the detection of salivary immunoglobulin (IgA & IgG).

Results: Higher plaque, calculus and gingival index were recorded among acute lymphatic patients compare to the control group, statistically significant difference with calculus index between groups. A low level of IgA, and IgG were seen among the study group compared to the control groups in both genders. A non-significant correlation was found between salivary immunoglobulin and oral cleanliness among acute lymphatic patients.

Conclusions: Salivary immunoglobulin levels affect severally by chemotherapy. Salivary IgA, and IgG defect seem to play a role in the development of poor oral hygiene among acute lymphatic patients.

Key words: Oral health, salivary immunoglobulin, chemotherapy. (J Bagh Coll Dentistry 2011;23(3): 120-123).

INTRODUCTION

Approximately one million people develop invasive cancer each year. Of these, 40% receive curative benefit from surgery, radiation, chemotherapy, or a combination modality (1). In dealing with patients with cancer a team approach is required for effective management (2). When chemotherapy is indicated, it is imperative that health of the oral cavity be assessed initially as well as throughout therapy. Oral complications can affect the patient’s tolerance to chemotherapy and quality of life. Pre therapy dental evaluation can decrease the incidence and severity of these complications (3). Chemotherapy may permanently alter the quality and quantity of saliva. Saliva plays an important role in the maintenance of oral health. One of the major functions of saliva is to protect the oral tissues against pathogens by immunologic means. The most important immunoglobulin in saliva are IgA and IgG. The mean source of IgG in salivary is the crevicular pocket fluid. Secretary IgA is mostly synthesized in the minor salivary glands (4,5).

Immunoglobulin can inactivate bacteria through the inhibition of bacterial metabolism and attachment to oral tissues as well as aggregation of microorganisms. Gingival inflammation can cause an increase of salivary immunoglobulin (6,7). Correlation between IgA levels and dental diseases has been studied with conflicting results (8-14).

Chemotherapy impaired the normal function of the human immune system (15). It can cause major alteration in the oral defense mechanisms that are likely to play a role in the increased susceptibility to oral diseases in human (16-18).

The patients’ ability to accomplish adequate oral hygiene may be limited. When chemotherapy is indicated, it is imperative that health of the oral cavity be assessed initially as well as throughout therapy (19-21). This study aimed to evaluate the oral hygiene and salivary immunoglobulin (IgA & IgG), in acute lymphocytic leukemic patients undergoing chemotherapy courses, in comparison to control group matching with age and gender.

PATIENTS AND METHODS

The study groups included 30 patients, they were under chemotherapy, (clinically examined at the National Centre of Hematology and Scientific Research of Al – Yarmook Hospital) aged 25-35 years old of both gender, the patients were selected according to the duration of the treatment with chemotherapy (from 6 month – 2 years) and

(1) Department of Pedodontics and Preventive Dentistry, College of Dentistry, University of Baghdad

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according to the type of the disease (acute lymphocytic leukemia (ALL)). Sample collection started at beginning of March 2011 till beginning of April 2011. The control group includes 30 subjects, they have no history of any systemic problem from questionnaire, matching with study group by age and gender, and they were selected from the same geographical area of the center. Plaque status was evaluated according to the Silness &Loe Index (22), dental calculus according to Ramfjord index (23), while gingival condition was assessed according to Loe & Silness (24). After oral examination, stimulated saliva samples were collected from the subjects (study & control groups) and performed under standard condition following instruction cited by Tenovuo & Lagerlof (25), and chemically analyzed for the detection of salivary immunoglobulin (IgA & IgG) (26). Data processing and analysis were carried out using SPSS (version 12).

RESULTS

Table 1 show that oral health variables Plaque Index (PII), Calculus Index (CalI) and Gingival Index (GI), among acute lymphatic group and control group. It is clear from the table, which illustrate the wide differences between both study and control groups in the levels of all oral hygiene indices. It was found that mean of Plaque index (PI) higher and record double value among acute lymphatic group compare to the control group, but statistically difference failed to reach significance between both groups p=0.050

In regarding to calculus index (CalI) data analysis show that also more than twice in the index has been recorded among acute lymphatic group compare to the control group, and statically significant difference between groups p=0.012.

Concerning mean of gingival index (GI) the same table show that high index among group who were under chemotherapy treatment compare to the control group, with no significant difference.

Table 2 illustrates salivary immunoglobulin levels among study and control groups. Low levels were illustrated of both IgA & IgG among acute lymphocytic leukemic patients compare to the control subject. Differences were statistically highly significant between both groups.

Table 3 shows correlation between PII, CalI, and GI with salivary immunoglobulin IgA concentration. Positive correlations were obtained between salivary IgA and all oral variables among group who were under chemotherapy treatment, but no significant statistically, while negative significant correlation among control group in relation to gingival index.

Table 4 shows correlation between PII, CalI, and GI with immunoglobulin IgG concentration in saliva. Among acute lymphocytic group, positive correlations were recorded in this study between IgG in saliva with plaque and calculus index, while negative correlation with gingival index. These correlations statistically failed to be significant.

In regarding to control group, no significant correlations could be found among them with all oral variables.

DISCUSSION

Saliva plays an important role in the maintenance of oral health. One of the major functions of saliva is to protect the oral tissues against pathogens by immunologic means. The most important immunoglobulins in saliva are IgA and IgG. The main source of IgG in saliva is the crevicular pocket fluid (4,5). Gingival inflammation can cause an increase of salivary immunoglobulins (6,7). In this study it was shown that patient who received chemotherapy have a low level of IgA compared with healthy group, this could be the result of degenerative changes of the minor salivary glands (decrease in flow rate), or an inhibitory effect on the cells that produce the immunoglobulins or on the transport mechanism (27). Serum-derived molecules, such as IgG, have been found in saliva in this study in low level among patient under chemotherapy courses, in spite of the fact that IgG increase with gingival inflammation as a result of leakage of these components into the oral cavity because of the loss of the barrier function of the epithelium (16), this low level among acute lymphatic patient as a result of impairing the normal function of the human immune system by chemotherapy which can cause major alterations in the oral defense mechanisms that are likely to play a role in the decrease of salivary contents of immunoglobulins (5).

Although the relationship was clearly positive between salivary IgA and all oral variables among group who were under chemotherapy treatment, but statistically with no significant, this result may be related to the wide variation in this salivary immunoglobulin which illustrated from a high standard deviation among them. Also positive correlations were recorded in this study between IgG in saliva with both plaque and calculus index among acute lymphocytic group, but statistically failed to reach significance, while negative correlation with gingival index among the same group. This negative relationship with GI indicate that the high effect of
Chemotherapy can inactivate the normal function of human immune system among this type of patients. Early dental intervention may significantly reduce oral complications associated with lymphocytic leukemic patients. It is therefore crucial to evaluate the oral health surveys and to eliminate potential sources of infection in mouth among these patients concurrent with their medical therapy.

REFERENCES

6. Rantonen P. Salivary flow and composition in healthy and diseased adult, Academic dissertation, Faculty of Medicine, University of Helsinki, Finland 2003; 67-70.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Acute lymphatic group (M±SD)</th>
<th>Control group (M±SD)</th>
<th>Statistical difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>PI</td>
<td>30  2.09±.64</td>
<td>30  1.18±.50</td>
<td>t-test: 6.113, df: 58, p-value: .050</td>
</tr>
<tr>
<td>CalI</td>
<td>30  2.11±.96</td>
<td>30  1.04±.60</td>
<td>t-test: 5.141, df: 58, p-value: .012*</td>
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<tr>
<td>GI</td>
<td>30  2.50±.68</td>
<td>30  1.21±.68</td>
<td>t-test: 7.735, df: 58, p-value: .782</td>
</tr>
</tbody>
</table>

*Significant
Table 2: Salivary immunoglobulin levels (IgA and IgG), mean and standard deviation (M±SD) among acute lymphocytic leukemic group and control groups

<table>
<thead>
<tr>
<th>Variable</th>
<th>Acute lymphatic group</th>
<th>Control group</th>
<th>Statistical difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. (M±SD)</td>
<td>No. (M±SD)</td>
<td>t-test</td>
</tr>
<tr>
<td>IgA</td>
<td>30 60.85±46.11</td>
<td>30 194.92±86.30</td>
<td>-7.505</td>
</tr>
<tr>
<td>IgG</td>
<td>30 236.78±130.05</td>
<td>30 784.16±380.78</td>
<td>-7.451</td>
</tr>
</tbody>
</table>

** Highly significant

Table 3: Correlation between Plaque Index (PlI), Calculus Index (CalI) and Gingival Index (GI), with IgA among acute lymphatic leukemic group and control groups

<table>
<thead>
<tr>
<th>Groups</th>
<th>PlI</th>
<th>p-value</th>
<th>CalI</th>
<th>p-value</th>
<th>GI</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute lymphocytic leukemia</td>
<td>.076</td>
<td>.689</td>
<td>.097</td>
<td>.610</td>
<td>.122</td>
<td>.520</td>
</tr>
<tr>
<td>Control</td>
<td>-.165</td>
<td>.383</td>
<td>-.104</td>
<td>.583</td>
<td>-.409</td>
<td>.025*</td>
</tr>
</tbody>
</table>

*Significant

Table 4: Correlation between Plaque Index (PlI), Calculus Index (CalI) and Gingival Index (GI) with IgG among acute lymphatic leukemic group and control groups

<table>
<thead>
<tr>
<th>Groups</th>
<th>PlI</th>
<th>p-value</th>
<th>CalI</th>
<th>p-value</th>
<th>GI</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute lymphocytic leukemia</td>
<td>.247</td>
<td>.188</td>
<td>.338</td>
<td>.050</td>
<td>-.009</td>
<td>.962</td>
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<tr>
<td>Control</td>
<td>.088</td>
<td>.642</td>
<td>-.044</td>
<td>.819</td>
<td>-.258</td>
<td>.169</td>
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