Clinical evaluation of dental and periodontal status in a group of oncological patients before chemotherapy

Mónica Paula López Galindo 1, José V. Bagán 2, Yolanda Jiménez Soriano 3, Francisco Alpiste 4, Carlos Camps 5

(1) Dentist. University of Valencia.
(2) Chairman of Oral Medicine, Valencia University Medical and Dental School. Head of the Service of Odontology, Valencia University General Hospital.
(3) Associate Professor of Oral Medicine, Valencia University Medical and Dental School. Valencia.
(4) Associate Professor of Periodontology, Valencia University.
(5) Head of the Service of Oncology, Valencia University General Hospital. (Spain)

Correspondence:
Dr. José Vicente Bagán Sebastián
Hospital General Universitario de Valencia
Servicio de Estomatología
Av/ Tres Cruces s/n
46.014 Valencia
E-mail: bagan@uv.es

ABSTRACT

Objective: To evaluate the dental status of 88 cancer patients before chemotherapy.
Material and methods: Eighty-eight patients with cancer in different body locations were studied and compared with a control group. Dental plaque was assessed by means of the Silness and Löe index, dental status with the DMFT index, and periodontal status with the modified CPI index.

Results: In the oncological patients the mean Silness and Löe index was 1.28±0.11. Patients showed multiple missing teeth (mean number 7.55±0.80); the mean number of decayed teeth was 2.10±0.36; and the mean number of filled teeth was 2.27±0.37. As to periodontal status, the mean modified CPI index was 1.45±0.11.

In the control group, the mean Silness and Löe index was 0.94±0.00. The mean number of decayed teeth was 1.21±0.25; the mean number of missing teeth was 4.97±0.67; and the mean number of filled teeth was 4.82±0.44. The mean modified CPI index was 1.29±0.10.

Conclusions: Oncological patients in our study showed more dental plaque versus healthy patients and more decayed and missing teeth. However, patients in the control group showed more filled teeth than cancer patients. Periodontal status as determined by the modified CPI index was similar in both patient groups.

Key words: Chemotherapy, dental and periodontal status.
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The present study explores oral and dental status in a group of patients with cancer before chemotherapy, with the evaluation of possible prior dental intervention, taking into account aspects such as tumor stage and location, and patient dental hygiene and motivation.

INTRODUCTION
Antineoplastic therapy includes surgery, radiotherapy and chemotherapy alone or in combination, depending on the nature and extent of the tumor (1).

The problem of these treatments is that in most cases their action is not selectively target to tumor cells. In effect, anticancer drugs affect not only neoplastic cells but also other similarly rapidly dividing normal cells such as bone marrow, hair follicle cells and the orodigestive epithelium (2). Chemotherapy is characterized by a narrow borderline between its antitumor effects and toxicity (which may even prove fatal) (3). Due to the side effects upon the oral cavity, patient oral status prior to chemotherapy is important for the quality of life of these patients, because the possibilities for intervention after chemotherapy are limited.

The present study explores oral and dental status in a group of patients with cancer before chemotherapy, with the evaluation of possible prior dental intervention, taking into account aspects such as tumor stage and location, and patient dental hygiene and motivation.

MATERIAL AND METHODS
Oral and dental status was explored in 88 patients in the Service of Odontology (Valencia University General Hospital; Valencia, Spain), between October 2000 and January 2004.

Inclusion criteria were:
1. A diagnosis of cancer in any location, except oral cancer.
2. Patients programmed for systemic chemotherapy.
3. Presence of teeth to allow the evaluation of dental and periodontal status. Edentulous patients were excluded from the study.

The mean patient age was 56.75 years (standard deviation (SD) = 14.16 years). There were 38 males (43.2%) and 50 females (56.8%). The patients were examined in the mentioned Service of Odontology prior to chemotherapy. A clinical history was compiled, and certain data were recorded, such as: toxic habits (smoking, alcohol abuse) and tumor diagnosis, location and stage. Depending on their oral hygiene status, the patients were classified into three groups: excellent oral hygiene (tooth brushing 3 times a day); good oral hygiene (brushing 1-2 times a day); poor oral hygiene (failure to brush daily).

To conduct a comparative study versus healthy individuals, 90 controls were included, based on the following inclusion criteria: absence of systemic disorders; absence of medication of any kind at the time of the study.

The mean patient age was 55.51 years (SD = 15.18). There were 41 males (45.6%) and 49 females (54.4%).

After compiling the clinical history, the following explorations were performed in both groups:
(a) Evaluation of dental plaque. Buccal and lingual/palatal examination of the dental arches was performed with a plane mouth mirror (number 5) and a dental probe (number 23).

(b) Evaluation of the DMFT index (4). Using a plane mouth mirror (number 5) and a dental probe (number 23), we recorded the number of decayed (D), missing (M) and filled (F) permanent teeth. The sum of these three values yielded the corresponding DMFT index (T = permanent teeth). The carries criteria used were those of the World Health Organization (WHO), which defines carries when “... a lesion in a pit or fissure, or on a smooth tooth surface, has an unmistakable cavity, undetermined enamel, or a detectably softened floor or wall” (5). A crown was considered filled, with decay, when it had one or more permanent restorations and one or more areas that were seen to be decayed. Third molars were excluded from the study.

(c) Evaluation of the modified Community Periodontal Index (modified CPI)(4,6-8). Instead of dividing the mouth into sextants, we took the following tooth numbers: 1.7 or 1.6, 1.1, 2.6 or 2.7, 3.6 or 3.7, 3.1 and 4.6 or 4.7. Periodontal probing was carried out with a plane mouth mirror (number 5) and a dental probe. Each tooth was examined in the buccal and lingual/palatal surfaces at three points (mesial, medial and distal); the greatest probe depth was registered in mm. The mean value of the pocket depth was obtained by calculating the arithmetic mean of the greatest values obtained in the explored teeth. Periodontal status was scored as follows: 0 = health; 1 = bleeding; 2 = supra- or subgingival calculus, excessive fillings; 3 = pocket depth 4-5 mm; 4 = pocket depth 6 mm or more; X = excluded sextant.

The data obtained were subjected to descriptive and comparative statistical analysis. The Student t-test was used for comparing the means of quantitative variables, while analysis of variance (ANOVA) was performed to compare the means of more than two groups of quantitative variables. Statistical significance was considered for p ≤ 0.05.

Palabras clave: Quimioterapia, estado dental y periodontal.
RESULTS
Thirty-six patients (40.9%) were diagnosed with adenocarcinoma, 22 (25.0%) with infiltrating ductal carcinoma, 8 (9.1%) squamous cell carcinoma, and 22 patients (25.0%) with some other type of cancer (Table 1).
The distribution of tumor location was as follows: 27 patients (30.7%) had intestinal cancer, 26 (29.5%) had breast cancer, 12 patients (13.6%) had lung cancer, and 23 (26.1%) presented multiple locations (Table 2).
Tumor staging according to the TNM classification showed 13 patients (14.8%) to be in stage I, 19 (21.6%) in stage II, 22 (25.0%) in stage III, and 34 (38.6%) in stage IV. The data relating to oral hygiene on both groups are reported in Table 3.
The results relating to dental and periodontal evaluation (including plaque index, mean carious decayed and filled teeth, DMFT index and modified CPI index) are described in Table 4.

Table 1. Number and percentage of patients, according to tumor diagnosis in the oncological group.

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>No. of cases</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adenocarcinoma</td>
<td>36</td>
<td>40.9</td>
</tr>
<tr>
<td>Ductal infiltrating carcinoma</td>
<td>22</td>
<td>25.0</td>
</tr>
<tr>
<td>Squamous cell carcinoma</td>
<td>8</td>
<td>9.1</td>
</tr>
<tr>
<td>Others</td>
<td>22</td>
<td>25.0</td>
</tr>
</tbody>
</table>

Table 2. Number and percentage of patients, according to tumor location in the oncological group.

<table>
<thead>
<tr>
<th>Tumor location</th>
<th>No. of cases</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intestine</td>
<td>27</td>
<td>30.7</td>
</tr>
<tr>
<td>Breast</td>
<td>26</td>
<td>29.5</td>
</tr>
<tr>
<td>Lung</td>
<td>12</td>
<td>13.6</td>
</tr>
<tr>
<td>Others</td>
<td>23</td>
<td>26.1</td>
</tr>
</tbody>
</table>

Table 3. Oral hygiene in both groups of patients (oncological and control), with corresponding statistical significance.

<table>
<thead>
<tr>
<th>Oral hygiene</th>
<th>Oncological patients (n, %)</th>
<th>Controls (n, %)</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excellent</td>
<td>8 (9.1 %)</td>
<td>16 (17.8 %)</td>
<td></td>
</tr>
<tr>
<td>Good</td>
<td>60 (68.2 %)</td>
<td>71 (78.9 %)</td>
<td></td>
</tr>
<tr>
<td>Poor</td>
<td>20 (22.7 %)</td>
<td>3 (3.3 %)</td>
<td></td>
</tr>
</tbody>
</table>

Table 4. Mean, standard deviation and statistical significance in both groups of patients.

<table>
<thead>
<tr>
<th></th>
<th>Oncological patients (n = 88) (mean±SD)</th>
<th>Controls (n = 90) (mean±SD)</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Silness and Löe plaque index</td>
<td>1.28±0.97</td>
<td>0.94±0.79</td>
<td>t=2.58 p=0.01</td>
</tr>
<tr>
<td>Carious teeth</td>
<td>2.06±3.36</td>
<td>1.21±2.37</td>
<td>t=1.95 p=0.05</td>
</tr>
<tr>
<td>Decayed teeth</td>
<td>7.55±7.52</td>
<td>4.97±6.34</td>
<td>t=2.48 p=0.01</td>
</tr>
<tr>
<td>Filled teeth</td>
<td>2.27±3.48</td>
<td>4.82±4.22</td>
<td>t=4.39 p=0.00</td>
</tr>
<tr>
<td>DMFT index</td>
<td>11.89±8.26</td>
<td>10.97±6.74</td>
<td>t=0.81 p=0.42</td>
</tr>
<tr>
<td>Modified CPI index</td>
<td>1.45±1.04</td>
<td>1.29±0.98</td>
<td>t=1.08 p=0.28</td>
</tr>
</tbody>
</table>
DISCUSSION

While chemotherapy offers important positive results in the management of cancer, it also has a series of undesirable effects. In this context, the creation of healthy oral conditions before chemotherapy is administered can afford patient benefits, since the negative effects of chemotherapy upon the oral cavity are less pronounced in the presence of a healthy mouth without dental or periodontal disorders (4-9, 12). To assess oral hygiene, the Silness and Löe index was measured – yielding a mean score of 1.28±0.11 in the 88 oncological patients, and 0.94±0.00 in the control group. The study similar to our own found in the literature was published by Jankovic et al. (13). In this study, 20 healthy patients were compared with 30 oncological patients before the administration of chemotherapy; in both groups the age and sex distributions were similar to our own. Based on the Silness and Löe index, the authors recorded a value of 1.39±0.65 in the 20 healthy subjects and 1.57±0.90 in the 30 oncological patients. The study failed to mention whether the intergroup differences were statistically significant, however. The values recorded in both groups were slightly greater than our own.

Our study reflects a high DMFT index in the oncological group, with a mean value of 1.89±0.88. The magnitude of this score was not due to the decayed (mean 2.10±0.36) or filled teeth (mean 2.27±0.37), but to the missing teeth (mean 7.55±0.80). The mean DMFT index for the control group was 10.97±0.71, and was largely attributable to missing and filled teeth.

In a study of 736 healthy adults aged between 19-64 years, Athanassouli et al (14) in 1990 reported a DMFT index of 8.99±5.98 for the 19-24 years age interval, versus 17.05±6.58 for the 55-64 years interval. These values are slightly greater than our own.

As regards periodontal status assessed by the modified CPI index, the mean value was found to be higher among the oncological patients (mean 1.45±0.11) than in the healthy group (mean 1.29±0.10) – though the difference failed to reach statistical significance (t=1.08; p=0.28). Diamanti-Kipioti et al. (15), in 169 healthy Athenian farmers aged 25-64 years, found the CPITN (Community Periodontal Index of Treatment Needs) to be 1±1.4 (i.e., similar to the score recorded in our groups of patients).

On relating different parameters to periodontal status, statistically significant correlations were observed. In effect, a positive relation was found between the Silness and Löe plaque index and the modified CPI periodontal index (R=0.55; p=0.00) i.e., the higher the plaque index, the higher the periodontal index. The presence of dental plaque is related to poorer periodontal status (16, 17).

A positive relationship was found between carious teeth and the modified CPI index (R=0.24; p=0.03). Patients initially presenting a poor periodontal and/or carious status who are treated before chemotherapy and receive intense oral care during treatment show a significant reduction in the frequency of the oral complications associated with chemotherapy (18-20). Many authors consider it necessary to provide dental treatment before chemotherapy, eliminating any possible foci of dental disease with the aim of minimizing or eradicating the effects of chemotherapy upon the oral cavity (21-33). Moderate dental plaque levels may contribute to local infection in immunocompromised patients (18).

Trauma-inducing prostheses, and sharp-edged or broken teeth imply an increased risk of ulcerations and mucositis (34). Hence the importance of correcting these possible alterations before chemotherapy is administered.

In conclusion, our oncological patients showed more dental plaque, and more decayed and missing teeth than the controls. However, no differences in modified CPI periodontal index were observed between the two groups.

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