Correlation between loss of lean mass and quality of life in cancer patients

Relación entre la pérdida de masa magra y la calidad de vida en pacientes con cáncer

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ABSTRACT

Introduction: Weight loss and especially the loss of lean mass, can lead into losing own self-esteem, due to body changes suffered in the event of malnutrition and the progressive dependence of relatives and/or carers, making the oncological patient to perceive their health state in a negative way.

Objective: The aim of this study was to identify the relationship or association between the loss of lean mass and the quality of life in patients with cancer.

Methods: A longitudinal and prospective study was performed in 231 oncologic patients undergoing radiotherapy treatment. Sociodemographic, clinical, anthropometric and life-quality variables where measured, evaluated and collected by means of the Health-Related Quality of Life (EORTC-QLQ c30) questionnaire.

Results: Of the total sample only 197 ends with the study. The results revealed that there was a positive correlation in pre- and post-treatment, although this was not significant in most cases (rho <0.63). In addition, the results were obtained through the application of Chi-square approach, did not identify the relationship between mass loss and its effect on the quality of life of the patient, in addition to the differentiation between the categories in which the problem was subdivided P <0.05).

Conclusions: The loss of lean mass, without considering other health conditions or effects, did not prove to be detrimental to the quality of life of the patient. HRQoL is a multidimensional concept.

KEYWORDS

Quality of life, cancer, Loss of lean mass, radiotherapy.

RESUMEN

Introducción: El cáncer y sus tratamientos pueden dar lugar a la desnutrición, produciendo cambios metabólicos que pueden dar lugar a una disminución de la calidad de vida. Dentro de estos cambios se encuentra la pérdida de masa magra, que puede originar aumento de las comorbididades, dependencia y cambios corporales.

Objetivo: Evaluar si la pérdida de masa magra influye en la calidad de vida en pacientes con cáncer.

Métodos: Se ha realizado un estudio longitudinal y prospectivo, en una muestra de 231 pacientes que acudieron a tratamiento de radioterapia. Se recogen variables sociodemográficas, clínicas, antropométricas y de calidad de vida mediante el cuestionario Health-Related Quality of Life (EORTC-QLQ c30) antes de inicar el tratamiento y una vez finalizado el mismo.
Resultados: Del total de pacientes que se seleccionaron, se analizaron 197 de ellos (33 pérdidas y 1 exitus). Los resultados pre y postratamiento muestran que existe correlación positiva entre los dos momentos de corte, aunque esta no sea alta en la mayoría de las categorías (rho < 0,63). Además el resultado obtenido mediante el test Chi-cuadrado, no refleja relación existente entre la pérdida de masa magra y la disminución de la calidad de vida, así como en las diferentes categorías en las que se divide el cuestionario de manera significativamente estadística (p>0,05).

Conclusiones: La relación entre la pérdida de masa magra y la calidad de vida (CVRS) es un concepto multidimensional que no solo depende de un factor. Por ello, la pérdida de masa magra de forma aislada sin efectos derivados de la misma (aumento de las UPP, disminución de la dependencia, etc.) no conduce a una disminución de la percepción de calidad de vida.

PALABRAS CLAVE
Calidad de vida, cáncer pérdida de masa magra, radioterapia.

ABBREVIATIONS
EORTC: European Organization for Research and Treatment of Cancer.
HRQoL: Health-Related Quality of Life.
QLQ c30: Quality of Life Questionnaires C30.
WHO: World Health Organization.

INTRODUCTION
Health care evaluation involves structure indicators, processes and results. The last two items play an important role when comparing and measuring health interventions, focussed on relevant aspects that the patient is subjected to go through, such as complications, functional status and wellbeing.

The World Health Organization (WHO) definition of health is as follows “Health is a state of complete physical, cognitive and social well-being and not merely the absence of disease or infirmity”. The Health-Related Quality of Life (HRQoL) develops further from this definition. Further research carried out recently regarding the HRQoL, revealed that it has an incremental growth.

HRQoL is subjected to various definitions. The most common and accepted was the proposed by Naughton et al, where HRQoL is defined as “people's subjective evaluations the influences of their current health status, health care, and health promoting activities on their ability to achieve and maintain a level of overall functioning that allows them to pursue valued life goals and that is reflected in their general well-being”. The difference between both concepts is due to the fact that health is based on psychosocial aspects whether these are quantitative and/or qualitative on subjective and social wellbeing. However, HRQoL evaluates the subjective perception that the individual has about the physical, cognitive and social limitations caused by the disease.

HRQoL deemed to be the outcome between expectation and reality, involving development through time and health status. As an example, when patients suffered from a severe health problem, their expectations are kept as they were at the beginning. Whereas, if the patients suffered from a chronic health problem, the discrepancy in between expectations and reality becomes noticeable, and as a result of that, HRQoL deteriorates. The patients adjust their expectations, reducing the difference in between the reality and the expectations themselves, causing the HRQoL to vary over time (Figure 1).

HRQoL also comprises the patient's illness perception, in relation with the health care received, this being a much ampler concept, not only allowing for the health status, but also other parameters such as the health system, the legislation and the subject expectations. HRQoL should assess the physical, cognitive dimensions and social interaction. HRQoL entailed of three concepts: health, health status and quality of life, connecting the factors of the individual, as external factors interact with it.

Malnutrition is a frequent problem in cancer patients, with a prevalence of 15-20% at the diagnosis stage and 80-90% in patients with advanced stages of the disease. One of the consequences of malnutrition is the loss of lean mass, which would decrease the life quality of the patient and would develop causing detrimental muscle strength, increasing the sensation of weakness and asthenia, also affecting the physical sphere, inducing or even intensifying feeling of depression and helplessness.

Malnutrition also affects the patient's general condition, decreasing the “performance status” and extending hospital stays. It increases the toxicity of antineoplastic therapies and the appearance of secondary complications to these treatments or therapies. Altogether, it is perceived by the patient as a stressor, which affects their wellbeing.

Furthermore, the weight loss and especially the loss of lean mass, can lead into losing own self-esteem, due to body changes suffered in the event of malnutrition and the progressive dependence of relatives and/or carers, making the oncological patient to perceive their health state in a negative way.

The objective of this study was to evaluate wether the loss of lean mass influences HRQoL.

METHODS
A prospective longitudinal-observational study was conducted in a sample of 231 oncology patients who were given radiotherapy treatment. This took place at the Oncology and Radiotherapy Unit at Punta Europa Hospital, Algeciras (Cadiz, Spain).

NUTRICIÓN CLÍNICA Y DIETÉTICA HOSPITALARIA
The candidate selection was carried out through non-probabilistic and continuous sampling, meaning that patients who receive treatment and meet the inclusion criteria (over 18 years old, treatment with curative intent and no edema or ascites presence) and accepted by verbal and written consent. Once the patients have been selected, specific and individual information was provided, based on the objectives of the performance of the impedanciometry. Then, the interview was ready to be performed. Patient signing off for informed consent was required, prior any test or trial commences.

The quality of life register was carried out using the EORTC-QLQ-c30 questionnaire, validated for oncological patients. The questionnaire was developed by the European Organization for Research and Treatment of Cancer (EORTC). It consists of 30 items, allowing to score from 1 to 4 (1: very low, 2: low, 3: high, 4: very high) for the first 28 items, and scoring from 1 to 7 (1: lousy, 7: excellent) for items 29 and 30. High marks in the scales for items indicate a lower quality of life or wellbeing.\textsuperscript{12-13}

The QLQ-c30 questionnaire has been divided into 6 categories (comprised of several items): physical sphere, items 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 18 and 19; digestive symptoms, items 13, 14, 15, 16 and 17; cognitive sphere, items 20, 21, 22, 23, 24 and 25, social sphere, items 26, 27 and 28; global health, item 29; quality of life, item 30.

To allow for obtaining the percentage (%) loss of lean mass, the TANITATBF-300 analyzer was used. In addition to this, other variables were measured: gender, age and tumor locations.

For variable collection, two measuring moments were chosen – first consultation day at nursing office (initial), previous to radiotherapy treatment, and last treatment day or discharge day (final).

Quantitative variables were indicated descriptively, using the mean and standard deviation. Qualitative variables as percentages. To assess for whether there is a correlation between the results of the dependent variable at the beginning and at end of the treatment or not, two different approach have been performed: Spearman’s rank correlation coefficient (rho), where the sample has not experienced a normal distribution; Pearson correlation test, where the distribution is normal.

Subsequently, and through the Chi-squared test, it has been studied whether there was any relationship between the patient’s loss of lean mass and their life quality. The statistical process has been carried out by using the R-Commander software.

\textbf{RESULTS}

Of the total number of oncology patients selected, 197 of them were surveyed (33 quit and 1 exitus). 49.2% were women (n = 97) and 50.7% men (n = 100), the distribution was very similar. The average age was 62.4 ± 12.5 years.

Breast cancer was the most frequent (35.2%), followed by the prostate (21.6%), colorectal (10.5%), head and neck (10.5%), lung (8.3%), gynecological (4.8%), gastric (2.6%), non-Hodgkin’s lymphomas (1.7%), tumors of the central nervous system (1.3%), bladder (1.3%) and others areas (2.2%).

The loss of lean mass measures recorded on the day patient’s discharge of radiotherapy treatment, showed that 51.2% (n = 100) of the sample studied, did not display any type of loss. 29.4% (n = 59) presented a loss > 2%, 11.1% (n = 21) a loss between 2% -5% and 8.1% (n = 17) showed a loss > 5%.
The results obtained for each category of the QLQ C-30 questionnaire and the existence of correlation between the pre- and post-treatment results, were calculated using the Spearman's rank correlation coefficient (rho) and a confidence interval of 95%, since the Shapiro-Wilk test showed that the data did not follow a normal distribution (P<0.05).

The results displayed that there was positive correlation between the two stages of the analysis, although this was not significant in most cases (rho <0.63), (Table 1). The outcome of the results in the different categories were near to the lower ones, meaning that the changes produced by the treatment did not influence the perception of quality of life, where the digestive symptoms and the social sphere experience minor influence. In the other hand, there was a slight increase in post-treatment for the other items investigated, with the exception of the physical sphere. Also, the global health and the quality of life were increased slightly.

To allow for assessing whether the loss of lean mass influenced the perception of global health status and wellbeing, it has been studied if the results were lower, equal or higher than the initial, taking as a reference a confidence interval of 95% (Table 2). The results obtained by the Chi-squared test did not reflect the existing correlation between the loss of lean mass and the detrimental perception of the individual global health and quality of life, besides the different categories in which the questionnaire was subdivided statistically significant (P>0.05).

It could be verified, graphically and by calculating the frequencies for each item in patients with loss of lean mass, that there was a higher percentage in patients with loss of lean mass who perceived their quality of life to be equal to or greater than it was at the beginning of the treatment, being more prevalent those who maintained their perception without changes (Figure 2). The results were similar to those patients who did not present loss of lean mass during the treatment (Figure 3).

By performing a superimposition of both graphs it could be observed that there were no differences between both groups as it was already registered in the previously applied statistical model.

**DISCUSSION**

Scientific investigations, regarding the study of life quality and, in the oncological patients, have increased in the recent years (more than 20,000 articles on quality of life and cancer in the last 10 years). In these, the perception of life quality is studied according to the age, type of tumor, antineoplastic treatments, nutritional status or nutritional interventions. The study conducted by Casals et al. concluded that as older are the patients, the perception of life quality is worse. According to Cruz et al. lymphoma, colon cancer and thyroid

### Table 1. Quality of life scores according to QLQ-C30.

<table>
<thead>
<tr>
<th>Score range</th>
<th>Admission day</th>
<th>Discharge day</th>
<th>rho</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Absolutely</td>
<td>A lot</td>
<td>X</td>
<td>SD</td>
</tr>
<tr>
<td>Physical sphere</td>
<td>14</td>
<td>56</td>
<td>16.95</td>
<td>4.91</td>
</tr>
<tr>
<td>Digestive symptoms</td>
<td>5</td>
<td>20</td>
<td>5.74</td>
<td>1.43</td>
</tr>
<tr>
<td>Cognitive sphere</td>
<td>6</td>
<td>24</td>
<td>9.38</td>
<td>2.93</td>
</tr>
<tr>
<td>Social sphere</td>
<td>3</td>
<td>12</td>
<td>3.47</td>
<td>1.40</td>
</tr>
<tr>
<td>Low</td>
<td>High</td>
<td>X</td>
<td>SD</td>
<td>X</td>
</tr>
<tr>
<td>Global health</td>
<td>1</td>
<td>7</td>
<td>5.27</td>
<td>1.29</td>
</tr>
<tr>
<td>Quality of life</td>
<td>1</td>
<td>7</td>
<td>5.23</td>
<td>1.36</td>
</tr>
</tbody>
</table>

X: mean, SD: standard deviation, rho: Spearman correlation.

### Table 2. Correlation between loss of lean mass and quality of life.

<table>
<thead>
<tr>
<th></th>
<th>X²</th>
<th>df</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical sphere</td>
<td>1.41</td>
<td>1</td>
<td>0.23</td>
</tr>
<tr>
<td>Digestive symptoms</td>
<td>0.32</td>
<td>1</td>
<td>0.56</td>
</tr>
<tr>
<td>Cognitive sphere</td>
<td>1.24</td>
<td>1</td>
<td>0.26</td>
</tr>
<tr>
<td>Social sphere</td>
<td>1.26</td>
<td>1</td>
<td>0.26</td>
</tr>
<tr>
<td>Global health</td>
<td>0.35</td>
<td>1</td>
<td>0.55</td>
</tr>
<tr>
<td>Quality of life</td>
<td>0.17</td>
<td>1</td>
<td>0.68</td>
</tr>
</tbody>
</table>

X²: Chi-squared test, df: degree of freedom.
cancer are the affected areas that present a perception of inferior life quality. In patients receiving treatment with tyrosine kinase inhibitors, the body condition was negatively the lowest scored, as well as digestive symptoms. Another study concluded that the second factor that influenced the life quality the most was the nutritional status, meaning that patients with a good nutritional status reported a better wellbeing. The nutritional intervention through the use of enteral nutrition, in malnourished patients, increases the life quality, due to the improvement of nutritional status.

The nutritional status and weight loss negatively influence the life quality. However, it has not been investigated whether it is due to weight loss in general (i.e. body water release, reduction of body fat, etc.) or loss of lean mass, as indicated other authors. The individuals who form part of this study and whom had loss of lean mass did not report any wellbeing detrimental, having no difference with those patients who did not experienced this loss. The data within the survey, showed that this group of patients perceived that life quality were the same or improved in comparison with the first day of treatment, being higher the number of patients that maintain their perception without changes.

The life quality not only depends on a specific factor, but depends on the set of several. The HRQoL can be altered,
not only by the loss of lean mass, but also by the tumor location, presence of digestive symptoms, age, etc. HRQoL depends on the expectations of the patient in relation to reality. In case of the patient presenting a problem with your global health, and if the expectations were very high, it will be difficult to reach an optimal perception quality of life, but if the expectations were low, the quality of life would be higher. When a patient is ready to receive the treatment, there exists already an altered perception, due to the connotations presented by the diagnosis of the disease and the possible antineoplastic treatments. At this moment in time. In this moment, the quality of life is diminished as the expectations were higher before disease. When the patient received some treatment such as radiotherapy, their expectations got modified accepting their new global health, so that the quality of life remained constant or increases.

There are areas and potential opportunities that require further investigation and development regarding the HRQoL in oncological patients, with the aim of improving the health care activity and be able to provide specific health care according to the life quality perceived.

CONCLUSIONS

HRQoL is a multidimensional concept, not following or depending on a single factor, such as the loss of lean mass, but depends on several ones, with the physical sphere being one that could influence the most regarding the oncological patient. Therefore, the loss of lean mass in isolation, without considering any other side effects, derived from it (increase in pressure ulcers, decreased dependence, etc.), does not provide enough prove to admit that the patient’s quality of life suffered any detrimental effect.

The assessment of patient’s quality of life should be considered and proposed in the health care activity to improve adherence to treatments.

REFERENCES