

The role of nutrition on quality of life in cancer patients during radiotherapy

Kiriaki Pistevou-Gompaki¹, Christos Papaloukas¹, Ioannis Andronikidis¹,
Ioannis Tzitzikas¹, Vassilios Kouloulias²

¹Department of Radiation Oncology, Medical School, Aristotle University of Thessaloniki

²Department of Radiotherapy, Areteion Hospital, Medical School, University of Athens, Greece

ABSTRACT: *Goals of Work:* The goal of the present work was to evaluate the quality of life (QoL) in relation to nutritional status and nutrient intake in cancer patients during radiotherapy (RT), particularly whether nutrient intake might influence the patient's quality of life.

Patients and Methods: Cancer patients (n=87, 54 males, 33 females) referred for RT were induced into the study. Patients with tumours of the head and neck and gastrointestinal tract were classified as high risk for RT induced nutritional problems, while patients with breast or lung cancer were considered as low-risk. The QoL was evaluated before and after RT, using the European Organisation for Research and Treatment of Cancer Quality of Life Questionnaire (EORTC-QLQ C30), while patients received nutritional counselling.

Main Results: According to our results, the overall QoL pattern, before and after RT, was worse in the high-risk group patients. In the same group baseline malnutrition was associated with worse score of function scales, as well as with poor appetite or increased fatigue. These associations between malnutrition and function scales were also present at the end of RT. Improvement of nutritional intake during RT in high-risk patients was positively correlated with improvement of global QoL. In contrary, in low-risk patients nutritional parameters were not significantly associated with QoL dimensions.

Conclusions: Individualized nutritional counselling accounting for nutritional status was able to improve patients' quality of life in high-risk patients but not in the low risk. However, further studies are necessary.

Key Words: Cancer, Radiotherapy, Nutrition, Quality of life.

INTRODUCTION

Nutrition in cancer patients is one of the most prominent factors as far as the prolongation of patient's life and quality of life (QoL) concerns¹. Moreover, cancer location plays a major role on the nutritional status of the patient^{2,3}. Cancer patients referred for radiotherapy (RT), especially of the head and neck cancer (HN) or the gastrointestinal tract (GI) are at a higher risk of malnutrition⁴, because RT induced toxicity may further compromise nutrition and functional ability⁵.

The objective of the present study was to investigate whether individualized nutritional counseling

in cancer patients undergoing radiotherapy would improve their outcome and ameliorate the expected deterioration due to RT related side effects. Specific aims were to investigate patients' QoL, nutritional status and nutritional intake at the onset and at the end of radiotherapy and symptoms that may predict poorer QoL and/or reduced nutritional intake.

PATIENTS AND METHODS

Study Design

Between 1998 and 2003, all cancer patients referred to the outpatient Radiotherapy Department were eligible to participate in the study. Before the deci-

sion for Radiotherapy planning, patients' clinical variables, cancer location and TNM staging were recorded⁶. Exclusion criteria comprised: terminally ill patients, renal failure (creatinine >532 µmol/l) congestive heart failure and hepatic failure (bilirubin >21 µmol/l). No patients had distant metastases.

The cohort studied included 87 adult patients, 54 males and 33 females, age range 33-96 years, mean age 65± 13 years, proposed for primary RT, adjunctive to surgery or with palliative intent. Patients with tumours of the head and neck (nasopharyngeal, oropharyngeal or laryngeal cancer) and gastrointestinal tract (oesophageal, gastric or colorectal cancer) were classified as high risk (HR) patients, on the basis of the expected RT induced GI symptoms, while the remaining (patients with breast or lung cancer) were considered as low-risk (LR). For every patient, radiation induced symptoms, side effects and their severity were graded according to the recommended RTOG-EORT radiation morbidity scoring scheme⁷. Data were recorded in individual sheets specifically designed for statistical analysis.

Study measures

Assessment of nutritional status as described, food intake and dietary advice were performed by a research dietician at the onset, after 2 weeks and at the end of RT. QoL was evaluated at the onset and at the end of RT.

Nutritional assessment

Nutritional status was assessed by Ottery's Subjective Global Assessment (SGA), a patient-generated assessment tool validated for cancer patients⁸. The first four sections address weight changes, symptoms (anorexia, nausea, constipation, mucositis, vomiting, diarrhea, xerostomia, pain, dyspnoea, sleep disturbance), alteration in food intake and functional capacity. Components of metabolic stress: sepsis, neutropenic or tumor fever, use of corticosteroids and physical examination, are also evaluated. As a result, nutritional status is categorized in three degrees: normal, moderate and severe malnutrition.

QoL instruments

QoL was evaluated in every patient using the European Organization for Research and Treatment of Cancer Quality of Life Questionnaire (EORTC-

QoL C30, version 3-Q). This is a 30-item cancer specific questionnaire including five functional scales (physical, emotional, cognitive, social and role), three symptom scales (fatigue, pain, nausea/vomiting), a global health/QoL scale and six single items assessing symptoms and financial impact of disease⁹. The raw scores were linearly transformed to give standard scores in the range of 0-100 for each of the scales and single items. Higher scores on the functional and global health scales indicated better functioning, whereas higher scores on the symptom scales represent more symptomatology.

Statistical analysis

All data recorded were imported in specifically designed spreadsheet. In order to increase statistical power, patients were grouped as high (HR) or low-risk (LR).

Changes in the QoL dimensions pre and post RT were determined using unpaired and paired t-tests. To simplify graphical presentation, the mean values for each field pre RT was subtracted from that of the post RT visit. Data points below the abscissa corresponded to a decrease in value for the field, whereas those above the abscissa corresponded to an increase. Statistically significant differences were determined at p=0.05 for each of the recorded fields of the questionnaire (SPSS 10.0 Chicago, USA).

RESULTS

Patients' diagnosis, tumor staging and RT treatment protocol are shown in table 1.

QoL

The average rates of self-reported QoL parameters, assessed by the EORTC QLQ C30 instrument at the onset and at the end of RT, were shown in table 2. According to these results, the overall QoL pattern, at both evaluation time points (before and after RT), was worse in the high-risk group patients. Furthermore, the worse scores of QoL parameters, were reported in patients with oesophageal, stomach and head/neck cancer.

In the high-risk group, function scales were improved after RT, while deterioration was reported for fatigue, pain, nausea/vomiting and appetite. In the low-risk group, only the global QoL was improved at the end of RT.

Table 1. Patients groups and treatment protocols.

a	LOCATION	N	Staging (n)	Dose/Fractionation (Gray)
HIGH RISK		66		
GI tract (GI)		41		
	Esophagus (OES)	2	III (2)	45/25
	Stomach (STO)	3	III (3)	45/25
	Colorectal (CR)	36	I(5), III(25), IV(6)	50/25
HEAD and NECK (HN)		25		
	Nasopharynx	9	III(9)	70/35
	Oropharynx	5	II(2),IV(3)	70/35
	Larynx	11	I(1), III(7), IV(3)	70/35
LOW RISK		21		
	Breast	11	II(5), III(4), IV(2)	50/25
	Lung	10	II(2), III(8)	50/25

n: number of patients

In the high-risk group of patients baseline malnutrition was associated with worse score of function scales; global, physical, cognitive, emotional and social, as well as with worse score of symptoms - poor appetite or increased fatigue. These associations between malnutrition and function scales were also present at the end of RT.

Improvement of nutritional intake during RT in high-risk patients was positively correlated with improvement of global QoL (increase in score of function scales), which indicated that the patient that improved their energy intake also had enhanced QoL dimensions. In contrary, in low-risk patients nutritional parameters were not significantly associated with QoL dimensions.

DISCUSSION

Nutrition is key in oncology; nutritional decline ensues from the disease course and its treatment(s)^{4,10}. Although clinical manifestations of radiation injury and its nutritional consequences have been well described⁶ to date there are no data on the role of routine adjuvant oral nutritional support in cancer patients' outcome e.g. nutritional status and intake or QoL. This prospective study provides evidence that

early individualized nutritional counseling improves patients' nutritional parameters and QoL.

Malnutrition was prevalent amongst high risk patients, oesophageal, gastric and HN cancer, and rare in low risk patients, in whom severe malnutrition was never observed, thus stressing the major role of cancer location on nutritional status, as previously reported^{2,3}.

Furthermore, the severity and extent of RT related side effects depends on the tumor/treatment site, total radiation dose, fractionation, volume of irradiated organ and injury repair mechanisms, high turnover cells, e.g. gastrointestinal (GI) tract, are the most susceptible to acute radiation damage¹¹. In the present study, RT induced symptoms affecting nutrient intake, such as dysphagia, mucositis, xerostomia, taste changes, diarrhoea, anorexia and nausea became evident only in HR patients.

The results shown in table 2, corroborate that anorexia and nausea occur as a manifestation of the systemic tumor effect but their incidence increase dramatically as a consequence of RT, which is in agreement to other studies¹². Although baseline nutritional intake in high-risk patients was significantly lower than in low-risk, it did increase significantly in

Table 2. Evaluation of QoL using the EORTC QLQ-C30 Questionnaire at the onset and at the end of radiotherapy.

ITEMS	High Risk (HR)								Low Risk (LR)	
	OES n=2		STO n=3		CR n=36		HN n = 25		n=21	
	onset	end	onset	End	onset	end	onset	end	onset	end
Function scales										
Global QoL	50	65	48	57	59	70	40	62	72	81
Physical	39	55	35	50	43	75	45	70	73	70
Role	35	60	37	43	40	66	35	55	79	79
Emotional	45	55	33	40	22	22	64	64	81	81
Social	50	63	30	55	68	68	55	85	82	82
Cognitive	45	60	39	50	50	35	52	70	70	70
Symptom scales										
Fatigue	42	53	25	15	25	25	58	50	30	30
Pain	20	45	25	45	20	45	15	58	15	15
Nausea/vomiting	15	30	23	75	45	55	43	13	2	2
Symptom single items										
Dyspnoea	40	50	1	1	5	5	33	33	2	2
Sleep disturbance	30	45	23	30	35	35	45	45	19	19
Appetite	35	65	15	20	60	60	70	17	6	6
Constipation	2	2	1	1	14	3	5	5	13	13
Diarrhoea	2	2	0	0	5	73	9	9	5	5
Finance	3	3	1	1	1	7	28	28	4	4

high risk group as a result of the individualized nutritional counseling, hence overcoming the previous energy deficit.

Our results clearly showed that individualized nutritional counseling based on each patient clinical condition, reported symptoms and nutritional status, could be able to overcome the predicted deterioration subsequent to radiotherapy induced side effects, yet only high-risk patients appear to benefit. Besides the site-specific radiotherapy effects patients experience fatigue, anorexia and emotional stress, which may influence nutritional intake and QoL³. QoL assessment measuring the patient's experiences of the impact of disease/therapy expectations and satisfaction should be the gold standard as an independent end-point in most clinical trials¹¹.

We have shown that in high risk patients poorer

nutritional status and intake were associated with worse mobility, limited usual activities and increased anxiety/depression. The improvement of the patient's nutritional intake was correlated with the reported improvement of QoL dimensions throughout RT. On the other hand, QoL dimensions scores were always much better in low-risk patients, likewise nutritional aspects were better, and not just different, at both evaluation set points.

The EORTC instrument⁹ disclosed overall similar QoL results: high-risk patients self-reported worse QoL, more evident in oesophageal, stomach and HN cancer, when compared with low-risk patients. At baseline, only in the high-risk group nutritional parameters did affect QoL components: malnutrition was associated with worse function scales as well as poor appetite and increased fatigue. Poorer scores in

the latter two, along with worse global QoL, physical and emotional function scales were associated with low energy intake. At the end of RT, high-risk patients reported significantly higher QoL improvement for all function scales, whilst low-risk patients only reported an increase in their global QoL, without changes in any QoL dimension.

The EORTC QLQ C-30 instrument covers more items and scales, identifies more domain and specific complaints, and hence is more comprehensive and time consuming. The EORTC QLQ C-30 is sensible since it covers more domains and assesses cancer and RT-specific symptoms. Time permitting it should be

used in routine clinical practice. The QoL instrument to use must be decided within the context of each clinical study/practice. Cancer patients are at nutritional risk to be evaluated by a health care professional with nutrition expertise⁹.

The results of the present study showed that in patients prone to develop nutritional problems and to report the worst QoL, individualized nutritional counseling during RT is feasible and does improve nutritional intake that is identified as central to a better QoL. Early intervention and sensible partnership with patients are also keys to success.

Ο ρόλος της διατροφής στην ποιότητα ζωής ασθενών που υποβάλλονται σε ακτινοθεραπεία

Κυριακή Πιστεύου-Γομπάκη¹, Χρήστος Παπαλουκάς¹, Ιωάννης Ανδρονικίδης¹,
Ιωάννης Τζιτζίκας¹, Βασίλειος Κουλουλίας²

¹Εργαστήριο Ακτινοθεραπευτικής Ογκολογίας Α.Π.Θ., Π.Γ.Ν.Θ. ΑΧΕΠΑ

²Τμήμα Ακτινοθεραπευτικής Ογκολογίας, Αρεταίειο Νοσοκομείο, Πανεπιστήμιο Αθηνών

ΠΕΡΙΛΗΨΗ: Σε 87 ασθενείς με καρκίνο (54 άνδρες, 33 γυναίκες), που παρεπέμφθησαν για ακτινοθεραπεία (ΑΚΘ) αξιολογήθηκε η ποιότητα της ζωής (ΠτΖ) σε συνάρτηση με την κατάσταση θρέψης τους και συγκεκριμένα εκτιμήθηκε ο βαθμός επίδρασης της διατροφικής πρόσληψης στην ποιότητα της ζωής. Οι ασθενείς με καρκίνο κεφαλής-τραχήλου και γαστρεντερικού ταξινομήθηκαν ως υψηλού κινδύνου για πρόκληση σχετιζόμενων με την ΑΚΘ διαταραχών της θρέψης, ενώ οι ασθενείς με καρκίνο του μαστού ή των πνευμόνων χαρακτηρίστηκαν ως χαμηλού κινδύνου. Μετά την χορήγηση αναλυτικών διαιτητικών οδηγιών αξιολογήθηκε η ΠτΖ, πριν και μετά από την ΑΚΘ, με τη βοήθεια του ερωτηματολογίου αξιολόγησης της ΠτΖ της Ευρωπαϊκής Οργάνωσης για την Έρευνα και τη Θεραπεία του Καρκίνου (EORTC-QLQ C30). Σύμφωνα με τα αποτελέσματα της μελέτης, η εξατομικευμένη και συνυφασμένη με την κατάσταση θρέψης διατροφική καθοδήγηση ήταν σε θέση να βελτιώσει την ποιότητα ζωής στην ομάδα των ασθενών υψηλού κινδύνου, σε αντίθεση με την αντίστοιχη των ασθενών χαμηλού κινδύνου η οποία δεν φάνηκε να σχετίζεται σημαντικά με τις διατροφικές παραμέτρους.

Λέξεις Κλειδιά: Καρκίνος, Ακτινοθεραπεία, Διατροφή, Ποιότητα Ζωής.

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