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Relationship between nutritional status and quality of life in patients with cancer

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ABSTRACT

Patients with cancer frequently suffer a deteriorated quality of life and this is an important factor in the therapeutic decision. The correlation between quality of life and malnutrition seems obvious and bidirectional. The aim of our study was to describe the global quality of life and its various dimensions in patients with cancer, as a function of the nutritional status.

A transversal observational study was performed in wards in hospitals in Clermont Ferrand and Saint Etienne on 907 patients. The EORTC questionnaire, QLQ-C30, was used to assess the quality of life.

The mean global quality of life score was 48.8 for patients who had a weight loss of more than 10% since the beginning of their illness, compared with 62.8 for the other patients ($p < 0.001$). A significant association with weight was observed for the main dimensions of the quality of life: physical, functional, cognitive, social, fatigue, nausea, pain, loss of appetite, constipation and diarrhoea. This strong relation between quality of life and weight loss shows the importance of dietary management in patients with cancer.

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1. Introduction

In patients with cancer, it is important to take into consideration the patients' general state of health and their quality of life in the therapeutic decision. The first tool for measuring the impact of cancer on the functional status and autonomy in patients undergoing chemotherapy was developed in 1947.¹ The concept of quality of life appeared about 20 years later.² Quality of life is a multidimensional concept reflecting the patients' physical capacity, their emotional, cognitive and social functions and the presence of symptoms due to the disease or the treatment.³

Patients with cancer often suffer from malnutrition due to several factors, related to the localisation of the tumour, the disease stage, the presence of symptoms (e.g. pain, vomiting, constipation,) and type of anti-cancer treatment.⁴ We previously reported that there were five factors predictive of malnutrition (gender (male), digestive or ENT localisation of the tumour, chemotherapy, depressive syndrome and socio-professional category).⁵ These factors can be identified as soon as the cancer has been diagnosed so as to identify patients at risk as early as possible. Malnutrition is also an independent factor for the deterioration of the quality of life.^{6,7} Although cancer stage is the major determinant of patients' quality of

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life globally, there were some diagnoses for which the impact of nutritional deterioration combined with deficiencies in nutritional intake may be more important than the stage of the disease process.⁸ Some reports have shown that the implementation of a nutritional intervention could have an impact on the quality of life and suggest that this should be integrated into the global management of the patient.^{9,10}

The objective of this study was to assess the global quality of life and its different dimensions as a function of the nutritional status of patients with cancer.

2. Patients and methods

A transversal observational epidemiological study was performed over 2 weeks in 23 departments and wards in six university-hospitals in Clermont Ferrand and Saint Etienne, France. The departments and wards included radiotherapy, oncology, pneumology, gynaecology, hepato-gastroenterology, ENT, urology, chest and digestive surgery, as well as day hospital and oncology outpatient departments.

The patients included in the study were 18 years old or more, with an evolving cancer at different management stages. Patients with a primary skin, ocular, or CNS tumour, or with a malignant haemopathy, and those who had not been treated in the last 2 years or who had not been informed about their diagnosis or were unable to answer the questionnaire, were not included.

Trained medical students spent 2 weeks in each department or ward collecting data from the patients' medical files, and questioning and examining the patients. The patients gave informed written consent. The protocol was approved by the local ethics committee.

The nutritional status was measured using several indicators: weight loss since the start of illness or onset of initial symptoms (primary outcome); weight loss over the last week, month and 6 months; body mass index (BMI = weight/height²); Nutrition Risk Index and subjective classification based on the categories defined in Worksheet 5 of the Patient-Generated Subjective Global Assessment (PG-SGA).^{11,12}

For each patient we collected the following socio-demographic data and information about the primary tumour and the clinical management: gender, age, profession, living conditions, localisation of the primary tumour, stage of the tumour at diagnosis, current episode, treatment (current or previously administered), functional capacity using the WHO Performance Status and other factors impacting the nutritional status (depression, diet, current infection...).

Quality of life was evaluated with the European Organisation for Research and Treatment of Cancer questionnaire (EORTC-QLQ C30).^{13,14} This is a questionnaire specifically developed for patients with cancer that is composed of 30 items assessing six functional areas (physical, activities, emotional, cognitive, social and the global quality of life) and scales for nine symptoms (tiredness, nausea and vomiting, pain, dyspnoea, sleeplessness, loss of appetite, constipation, diarrhoea and financial difficulties). A low score for the functional areas indicates impaired functional capacity and a low score for the symptom scales indicates absence of or low impact from the symptoms. A linear transformation was applied

to each score, as recommended by the EORTC, to obtain a value between 0 and 100.

The statistical analyses were performed using SPSS® version 12 software. The qualitative data were summarised as frequencies and percentages. Binary data were compared using a Chi² or Fisher exact test. Quantitative data were summarised as means, standard deviations, medians and minimums and maximums. Independent t-test was used to compare the means. The threshold of statistical significance was set at 5%.

3. Results

A total of 907 patients were included: 459 women (51.0%) and 441 men (49.0%). The mean age was 62.3 years ± 11.6 years (range: 18 to 90 years) (Table 1). We observed that, overall, 8.6% of the patients had a BMI under 18.5, and among those aged over 75 years, the BMI was 21. The weight loss occurred over the 2 weeks prior to the study for 21.9%. A weight loss of more than 5% of their usual weight in the month preceding the study or more than 10% in the 6 months preceding the

Table 1 – Study population characteristics (n = 907)

Characteristic	n	%
Gender (n = 900)		
Male	441	49.0
Female	459	51.0
Age (in groups) (n = 906)		
≤50 years	129	14.2
[50–60] years	269	29.7
[60–70] years	252	27.8
>70 years	256	28.3
Living conditions (n = 883)		
With a family	702	79.5
Alone	181	20.5
Profession (n = 891)		
Blue or white collar worker	578	64.9
Manager	313	35.1
Tumour localisation (n = 889)		
Breast	197	22.2
Colorectal	164	18.5
Lung	138	15.5
Tumour localisation in males (n = 434)		
Lung	105	24.2
Colorectal	84	19.4
Prostate	67	15.4
Tumour localisation in women (n = 449)		
Breast	194	42.2
Colorectal	79	17.6
Ovary	33	7.4
Digestive tumour (colorectal, stomach, liver, oesophageal, pancreas) or ENT (n = 889)		
Yes	344	61.3
No	545	38.7
Tumour stage at diagnosis (n = 888)		
Local	327	36.8
Locoregional	314	35.4
Metastatic	247	27.8
Delay since diagnosis (n = 828)		
≤1 year	517	62.4
>1 year	311	37.6

Table 2 – Quality of life scores (EORTC QLQ-C30 questionnaire)

	Mean	Standard Deviation	Min-Max
Global quality of life (n = 883 ^a)	58.6	22.1	0–100
Functional aspects			
Physical functions (n = 883)	72.3	23.4	0–100
Functional handicap (n = 864)	66.0	33.6	0–100
Emotional functions (n = 873)	70.8	23.8	0–100
Cognitive functions (n = 881)	78.2	22.8	0–100
Social functions (n = 870)	72.0	30.4	0–100
Symptoms			
Fatigue (n = 875)	42.2	29.6	0–100
Nausea, Vomiting (n = 888)	13.4	23.6	0–100
Pain (n = 877)	25.5	29.8	0–100
Dyspnoea (n = 882)	25.8	31.3	0–100
Insomnia (n = 888)	30.5	33.1	0–100
Loss of appetite (n = 883)	25.8	34.7	0–100
Constipation (n = 885)	20.1	30.4	0–100
Diarrhoea (n = 886)	13.8	13.8	0–100
Financial problems (n = 884)	10.9	10.9	0–100

a Total number of valid questionnaires.

study was reported for 23.7% of the patients. A weight loss of at least 10% since the start of the illness was reported for 29.7% of the patients. A diagnosis of moderate or severe malnutrition, using the subjective classification of categories on Worksheet 5 of PG-SGA, was made for 43.4% of the patients. The NRI (Nutritional Risk Index) was not analysed because only a few patients had an albuminaemia (4.6%).

The mean quality of life score, on a scale of 1 to 100, was 58.6. The mean scores for the various functional areas and symptoms are presented in Table 2. The distribution of the quality of life scores as a function of weight loss is summarised in Table 3. Patients who had lost less than 10% weight since the

start of their illness had a significantly higher quality of life score compared with those who had lost more than 10% (62.8 versus 48.8; $p < 0.001$). The scores for physical, functional, emotional, cognitive and social functions were significantly higher for those patients who had not lost weight. For these patients the symptom scores were lower (less intense) compared with patients who had lost weight: fatigue, nausea, vomiting, pain, dyspnoea, loss of appetite, constipation and diarrhoea.

A significant difference in the overall quality of life score was observed between patients who had and those who had not modified their diet at the time of the study (65.3 versus 52.5; $p < 0.001$). The mean quality of life scores, as a function of weight loss or not, are presented in Table 4 for gender, age, lifestyle, professional status, tumour localisation, stage at diagnosis, chemotherapy, time since diagnosis and the presence of a depressive syndrome. Patients treated for a localised digestive or ENT tumour who had not lost weight had a higher quality of life score compared with those who had lost weight (61.6 versus 50.7; $p < 0.001$).

We observed a significant association between the Performance Status score and percentage weight loss, ($p < 0.001$) (Table 5). The various dimensions assessed by the EORTC-QLQ C30 questionnaire were found to be correlated with the PS score, except for insomnia.

4. Discussion

This transversal study assessed the nutritional status and quality of life in patients with any cancer, at all stages, and shows a significant association between impaired quality of life and malnutrition. We used the percentage weight loss since the start of the illness as the primary outcome. This outcome is relatively objective, although the usual weight is often only known approximately. However, it does not take into account the kinetics of weight loss, presence of oedemas,

Table 3 – Mean quality of life scores (QLQC-30) as a function of weight loss

	Mean quality life score				p ^a
	Weight loss <10%		Weight loss ≥10%		
	n	Mean	n	Mean	
Global quality of life (n = 883)	622	62.8	261	48.8	<0.001
Functional aspects					
Physical functions (n = 883)	621	76.7	262	61.9	<0.001
Functional handicap (n = 864)	610	71.3	254	53.3	<0.001
Emotional functions (n = 873)	612	72.3	261	67.2	0.004
Cognitive functions (n = 881)	617	79.9	264	74.2	<0.001
Social functions (n = 870)	613	76.5	257	61.3	<0.001
Symptoms					
Fatigue (n = 875)	614	36.6	261	55.4	<0.001
Nausea, Vomiting (n = 888)	624	10.1	264	21.3	<0.001
Pain (n = 877)	621	22.4	256	32.9	<0.001
Dyspnoea (n = 882)	620	23.4	262	31.4	0.001
Insomnia (n = 888)	625	30.3	263	30.9	0.812
Loss of appetite (n = 883)	622	17.3	261	46	<0.001
Constipation (n = 884)	623	16.9	262	27.6	<0.001
Diarrhoea (n = 886)	623	12.4	263	17.2	0.018
Financial problems (n = 884)	625	10.3	259	12.2	0.272

a t-test.

Table 4 – Mean global quality of life as a function of tumour localisation and weight loss

	Mean quality of life scores				
	Weight loss <10%		Weight loss ≥10%		<i>p</i> ^a
	<i>n</i>	mean	<i>n</i>	mean	
Gender					
Male (<i>n</i> = 435)	273	63.6	162	48.5	<0.001
Female (<i>n</i> = 442)	345	62.3	97	49.4	<0.001
Age (in groups)					
≤50 years (<i>n</i> = 127)	92	63.4	35	47.4	<0.001
[50–60] years (<i>n</i> = 260)	197	63.2	63	47.9	<0.001
[60–70] years (<i>n</i> = 247)	159	61.6	88	49.7	<0.001
>70 years (<i>n</i> = 249)	174	62.9	75	49.0	<0.001
Living conditions					
With a family (<i>n</i> = 685)	491	64.0	194	49.9	<0.001
Alone (<i>n</i> = 175)	122	58.5	53	43.2	<0.001
Profession (<i>n</i> = 891)					
Blue or white collar worker	386	62.5	175	49.4	<0.001
Manager	225	63.8	83	47.7	<0.001
Tumour localisation					
Colorectal (<i>n</i> = 158)	103	61.8	55	54.8	0.047
Stomach (<i>n</i> = 22)	5	61.7	17	49.5	0.197
Liver (<i>n</i> = 14)	9	57.4	5	50.0	0.541
Oesophageal (<i>n</i> = 22)	6	62.5	16	53.6	0.327
ENT (<i>n</i> = 77)	49	59.9	28	45.0	0.008
Ovary (<i>n</i> = 31)	23	60.9	8	57.3	0.702
Pancreas (<i>n</i> = 42)	18	67.6	24	47.2	0.001
Lung (<i>n</i> = 135)	90	58.0	45	38.5	0.001
Prostate (<i>n</i> = 66)	61	68.8	5	33.3	0.002
Beast (<i>n</i> = 191)	174	64.8	17	50.0	0.004
Cervical (<i>n</i> = 30)	20	56.2	10	48.3	0.3
Bladder (<i>n</i> = 26)	19	67.1	7	54.7	0.249
Tumour stage at diagnosis					
Local (<i>n</i> = 321)	256	64.2	65	49.0	<0.001
Locoregional (<i>n</i> = 309)	212	63.8	97	49.0	<0.001
Metastatic (<i>n</i> = 237)	142	58.2	95	48.9	0.002
Delay since diagnosis					
≤1 year (<i>n</i> = 507)	355	62.5	152	48.6	<0.001
>1 year (<i>n</i> = 300)	220	63.2	80	47.8	<0.001
Chemotherapy					
Yes (<i>n</i> = 655)	435	61.8	220	49.0	<0.001
No (<i>n</i> = 88)	76	61.8	12	52.1	0.155
Depression					
Yes (<i>n</i> = 91)	60	57.5	31	45.1	0.009
No (<i>n</i> = 785)	559	63.1	226	49.2	<0.001

^a *t*-test.**Table 5 – WHO Performance Status Score as a function of the percentage weight loss since the start of the illness**

Performance Status score (<i>n</i> = 898)	Percentage weight loss			
	<10%		≥10%	
	<i>n</i>	%	<i>n</i>	%
0 (<i>n</i> = 218)	189	29.9	29	10.9
1 (<i>n</i> = 367)	275	43.5	92	34.6
2 (<i>n</i> = 213)	127	20.1	86	32.3
3 (<i>n</i> = 81)	33	5.2	48	18.1
4 (<i>n</i> = 19)	8	1.3	11	4.1

water retention and clinical-biological effects. We were unable to use the whole Destky index, or SGA or PG-SGA, because of implementation difficulties, particularly for the

clinical part. Anthropometric measurements are rarely performed daily and are subject to wide inter- and intra-examiner variability.

The body mass index is often used in making decisions about nutritional management. Only 10% of the patients in our study had a BMI lower than normal, which suggests that in this population it is not a sufficiently sensitive indicator of malnutrition.

The EORTC QLQ-C30 questionnaire was selected because it is a validated instrument for assessing the quality of life in patients with cancer.^{13,14} The relationship between malnutrition and impaired quality of life would seem obvious, but other factors play a role of variable importance (tumour localisation, tumour stage, treatments etc.).^{6–8} There are currently few studies that assess the consequences of malnutrition on quality of life. In one study on 1555 patients treated for

oesophageal, stomach, pancreatic and colorectal cancers, Andreyev et al. observed that patients who had lost weight had a significantly impaired quality of life score compared with those who had not lost weight.¹⁵ This association was also studied in a series of 48 patients with head and neck cancers, and the mean global quality of life score for patients suffering from malnutrition was 46 compared with 58 in patients not suffering from malnutrition.^{16,17} In patients with digestive tumours, weight loss and tumour localisation have the greatest impact on their quality of life. In a series of 58 patients treated for colorectal cancer, Gupta et al. also showed that patients with malnutrition had a significantly impaired global quality of life compared with patients who did not have malnutrition (58.3 versus 66.6; $p = 0.003$).¹⁸

In another series of 271 patients receiving radiotherapy for head and neck, oesophageal, stomach or colorectal cancer, Ravasco et al. showed that malnutrition was significantly associated with a poorer quality of life.⁸

In this study we examined the relationship between the loss of weight and the quality of life as a function of the tumour localisation, stage at diagnosis and the type of treatment. We observed an association between malnutrition and impaired quality of life in all sub-groups of patients, but we did not examine the role of other factors. With the study design used, a transversal study, it is not possible to identify which is the cause and which is the consequence: the weight loss or the quality of life.

The Performance Status tool, developed by the WHO, is a scale that evaluates the functional capacity and autonomy which gives an indication of the physical and functional functions and the quality of life.¹⁹ This tool is frequently used in current practice in oncology, and in our study we found its score was, statistically, significantly associated with weight loss. As it is difficult to evaluate the quality of life in routine practice, the Performance Status score is a good indicator for therapeutic management, and in particular, nutritional management, for patients with cancer.

5. Conclusion

The association between weight loss and impaired quality of life, in all areas, was confirmed by our study. To improve the quality of life in patients with cancer, a nutritional intervention should be implemented as soon as cancer is diagnosed. The nutritional therapy should form part of the integral oncological support.

Conflict of interest statement

None declared.

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