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Study on the impact of anemia on the Quality of Life (QoL) of cancer patients

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Summary. *Aim:* Anemia is considered a common symptom in cancer patients. Its prevalence is high and results in decreased functional capacity and quality of life (QoL). Our investigation focuses on the high impact of anemia on the QoL of anemic cancer patients, and finds an association of age, gender, type of cancer, severity of anemia and treatment status in relation to various QoL aspects. *Patients and Methods:* 80 patients were enrolled and asked to fill in a QoL questionnaire (QLQ-C30) validated by the European Organization for Research and Treatment of Cancer (EORTC). T-test, ANOVA, post Hoc test and linear regressions were performed using the QoL scores to find correlations and associations among the various factors. *Results:* Patients aged ≥60 years reported better QoL and social functioning. Healthier cognitive functioning was significant with gynecological malignancies. Global health status assessment showed poor QoL scores (32.8±15.6). Fatigue, pain and financial impact of the disease were found to be affecting the patients' overall QoL as seen from high symptom scores. Life-threatening anemic cases reported the worst QoL and least scores for physical, rôle, cognitive and emotional functioning compared to that of mild and severe cases, indicating a strong association between hemoglobin levels and QoL. *Conclusion:* It was evident from our observations that the low QoL of anemic cancer patients was largely due to disease burden, low hemoglobin levels and fatigue. Hence it is crucial to consider these and offer guidelines for management of low QoL and improve the anemic conditions for the wellbeing of the patient.

Key words: anemia, fatigue, cancer treatment, EORTC, Quality of Life

«Studio dell'impatto dell'anemia sulla qualità della vita (QoL) nei pazienti affetti da cancro»

Riassunto. *Scopo:* L'anemia è considerata un sintomo comune nei pazienti con cancro. La sua incidenza è alta e si traduce in una riduzione della capacità funzionale e della qualità della vita (QoL). Il nostro studio si concentra sul forte impatto dell'anemia sulla QoL dei pazienti anemici e si occupa di trovare un'associazione tra vari fattori: età, sesso, tipo di cancro, gravità dell'anemia e stato di trattamento in relazione a vari aspetti della QoL. *Pazienti e metodi:* 80 pazienti sono stati arruolati ed è stato loro chiesto di compilare il questionario QoL (QLQ-C30) convalidato dall'organizzazione europea per la ricerca e il trattamento del cancro (EORTC). T-test, ANOVA, post Hoc test e regressioni lineari sono state eseguite utilizzando i punteggi di QoL per trovare correlazioni e associazioni tra i vari fattori. *Risultati* Pazienti di età ≥60 hanno mostrato una migliore QoL e stato sociale. Uno stato cognitivo più sano si è riscontrato in modo significativo con neoplasie ginecologiche. La valutazione dello stato di salute globale ha mostrato un punteggio di scarsa QoL (32.8±15.6). Fatica, dolore e impatto finanziario della malattia incidono sulla QoL complessiva dei pazienti come visto da punteggi di chi aveva sintomi forti. I casi di anemici in pericolo di vita hanno riferito la peggiore QoL e più bassi punteggi almeno per fisico, ruolo, funzionamento cognitivo ed emotivo rispetto a quelli dei casi lievi e gravi, ciò sta ad indicare la forte associazione tra livelli di emoglobina e di QoL. *Conclusione:* dalla

nostra osservazione si è evidenziato che la bassa QoL dei pazienti anemici oncologici è dovuta in gran parte al carico di malattia, ai livelli di emoglobina bassa, alla modalità di trattamento impiegata e alla fatica. Quindi è fondamentale considerare questi risultati ed indicare linee guida per la gestione della bassa QoL e migliorare così le condizioni di anemia per il benessere dei pazienti.

Parole chiave: anemia, affaticamento, trattamento del cancro, EORTC, qualità della vita (QoL)

Introduction

Anemia is a condition commonly seen in more than 40% of cancer cases and varies in frequency between 30-90% (1).The adverse effects of anemia not only result in delayed tumor response and response to therapies but also affect virtually every patient diagnosed with a malignant condition by causing fatigue and thus impairing QoL.

Although fatigue is a symptom associated with anemia it can also result from other etiologies in patients with cancer. Patients rarely describe this feeling as "fatigue". They know it as exhaustion, inability to concentrate, a "heavy" feeling, and most of all, feeling more tired than they have ever felt. Studies have reported that 17 to 89% of patients experience fatigue at some time during their treatment and when more pervasive it may reach as high as 96% (2).

Cancer-related fatigue was accepted as a diagnosis in the International Classification of Diseases 10th Revision- Clinical Modification and was characterized as a multidimensional phenomenon that develops over time, diminishing energy, mental capacity, and the psychological condition of cancer patients. It is also related to lethargy, depression, and asthenia in the revised National Cancer Institute Common Toxicity Criteria. These classifications may enhance awareness of fatigue and make for better reporting of the condition (3).

Several reports (4, 5) have shown a strong association between low hemoglobin levels and fatigue and QoL. Indeed, fatigue was considered intensely debilitating; some patients felt their QoL was so reduced that they did not wish to continue living (6). Recognition of variations in patient experience is essential to improve QoL (7). Despite the high prevalence of depression in the cancer population, it is often underdiagnosed and consequently undertreated (3). It was well said that those who live beyond cancer are more likely to experience a better QoL when they have access to useful information and support in dealing with post-treatment effects. Culturally and linguistically appropriate communication helps people make decisions that are compatible with patient values and beliefs (8).

It is important to comprehend the phenomena of cancer-related fatigue and the various reasons associated with it if we are to treat the root causes of the problem. To develop a therapeutic strategy, assessment of various aspects of QoL is needed to understand the factors that most affect QoL in cancer patients. Hemoglobin levels/anemic grade, age, type of cancer, gender, treatment modalities and psychological strength of the patient seem to be some of the major factors that affect QoL in cancer patients. We have a particular interest in this area, as quite a number of patients present with fatigue (often, long-standing) for which no specific cause is to be found. So, before looking into the biochemical and molecular aspects of this problem, we collected and analyzed QoL data from anemic patients suffering from various types of cancers.

Objectives of the study

The primary objective of the study was to scrutinize the association between major factors like gender, age, type of cancer, treatment status and various aspects of QoL in cancer patients. We also studied the interference and impact of different grades of anemia on patient function and QoL. As an addendum to this, we explored the possibility of developing an instrument, for clinicians to evaluate the patient QoL status as quickly as possible and decide the relative priority among the various factors.

Patients and methods

The study group consisted of 80 anemic cancer patients of both sexes diagnosed with neoplasia of various kinds by the oncologists. The enrollment of anemic cancer patients in this investigation was in accordance with the ethical standards of the committee of the hospital. The clinical history of all the patients was recorded at the time of QoL data collection. The patient characteristics recorded were age, gender, occupation, type of cancer they were suffering from, hemoglobin levels, treatment status and other QoL parameters.

Instrument

In this academic study, the EORTC QoL questionnaire (QLQ- C30), a reliable and valid instrument (9, 10), was used to assess QoL in cancer patients suffering from anemia. EORTC QLQ is an integrated system for assessing the health-related QoL of cancer patients. The content areas covered by the questionnaire are multi-dimensional. QLQ-C30 version-1.0 incorporates 5 functional scales (physical, rôle, cognitive, emotional, and social), 3 symptom scales (fatigue, pain, and nausea and vomiting), a global health status/QoL scale, and a number of single items assessing additional symptoms commonly reported by cancer patients (dyspnoea, loss of appetite, insomnia, constipation and diarrhea) and perceived financial impact of the disease. Each of these scales represents a different aspect of QoL. The patients were clearly informed about the work and were asked to fill in the QLQ in person with the help of a trained interviewer.

Scoring and statistics

QLQ-C30 is composed of both multi-item scales and single-item measures. These include 5 functional scales, 3 symptom scales, a global health status/QoL scale, and 6 single items. Each of the multi-item scales includes a different set of items - no item occurs in more than one scale. The range is the difference between the maximum possible Raw score (RS) and the minimum possible value. Most items are scored 1 to 4, giving a range=3. The exceptions are the items contributing to the global health status/QoL, which are 7-point questions with range=6. The individual questions on QLQ-C30 are called items (11).

The raw QLQ-C30 scores from the questionnaires were transformed linearly to scores ranging from 0 to 100. The method adopted for scoring is as per the EORTC QLQ-C30 Scoring Manual (11). A high scale score represents a higher response level. Thus a high score for a functional scale represents a healthy level of functioning; a high score for the global health status/QoL represents a high QoL, but a high score for a symptom scale/item represents a high level of symptomatology/problems.

An independent sample t-test and linear regression were performed to find any significant associations between gender and various aspects of QoL, whereas for other categories like age, type of cancer, severity of anemia and treatment status where more than two variables are involved, one-way analysis of variance (ANOVA) and correlations were found. To overcome the problems related to data mining, post hoc analysis was done with Bonferroni adjustments. This is to identify differences between subgroups. $p<0.05$ was considered significant in all the analyses performed. For these objectives the statistical analysis was carried out through statistical package for social sciences (SPSS) software version 20 V.

Results

In this study on the impact of anemia on the QoL of anemic cancer patients, the mean age of the participants involved in the study proved to be 46.91. Eighteen men and 62 women volunteered to fill in the questionnaire. Of the 80 cases recorded, when the patients were grouped according to the type of cancer they were suffering from, 10 patients were found to be suffering from Hematological Malignancies, 41 from Gynecological Malignancies, 11 with Gastro Intestinal cancers, 8 with Head and Neck cancers, 7 from Lung cancers and 3 cases with other cancers such as the anal canal, pancreas and liver. There were varying degrees of severity of anemia, typically based on hemoglobin levels. We used the National Comprehensive Cancer Network (NCCN) anemia classifications to rate the severity of anemia. In our patient group hemoglobin

levels ranged from as low as 3.3-11 ng/dl as shown in Table 1.

As per the EORTC QLQ classification, QoL can be visualized or determined by 15 variables. When the Global health status was evaluated by EORTC QLQ C-30 in our study group of anemic cancer patients, poor QoL was reflected (32.8±15.6). Fatigue, pain and financial burden were found to be the three aspects affecting the patients' overall QoL as seen from high symptom scores (Table 2).

Table 1. Medical characteristics of the patient group.

Severity of anemia as per NCCN standards	Hemoglobin levels	Treatment status		
		NUC/NURT n= 44	UC n=24	URT n=12
12-MILD anemia cases	10.2 to 11 ng/dl	8	2	2
32-Moderate anemia cases	6.2-10 ng/dl	19	8	5
18- severe anemia cases	6.5-7.9 ng/dl	9	6	3
18-life threatening anemic cases	3.3-6.4 ng/dl	8	8	2

NCCT: National Comprehensive Cancer Network; NUC/NURT-not under chemo or radiotherapy; UC-under chemotherapy; URT-under radiotherapy

Table 2. The association between EORTC function and symptom scales, and gender

Aspects of Quality of Life (QoL)	Scale	Number of items	Range	n=80	Gender	
					Male n=18	Female n=62
				Mean (SD)	Mean	Mean
Global health status/QoL[a]	QL	2	6	32.8 (15.6)	33.79	32.52
Functional scales[b]						
Physical functioning	PF	5	3	60.6 (21.8)	65.55	59.24
Role functioning	RF	2	3	51.4 (24.4)	50.92	51.61
Cognitive functioning	CF	2	3	84.3 (14.8)	84.25	84.40
Emotional functioning	EF	4	3	59.4 (18.7)	58.33	59.81
Social functioning*	SF	2	3	62.2 (28.7)	50.00	65.86
Symptom scales[c]						
Fatigue	FA	3	3	62.2 (23.6)	59.87	62.90
Nausea and vomiting	NV	2	3	20.0 (23.9)	15.74	21.23
Pain	PA	2	3	62.2 (24.2)	54.62	64.51
Symptom scales - single items[c]						
Dyspnoea**	DY	1	3	17.0 (23.7)	25.92	14.51
Insomnia	SL	1	3	40.8 (22.4)	46.29	39.24
Appetite loss	AP	1	3	31.2 (23.9)	29.62	31.72
Constipation	CO	1	3	24.5 (24.7)	24.07	24.73
Diarrhea	DI	1	3	13.3 (21.6)	14.81	12.90
Financial impact	FI	1	3	65.0 (26.9)	70.37	63.44

All of the scales and single-item measurements range in score from 0 to 100. A high scale score represents a higher response level.
[a] Global health status/QoL- high score represents a *high QoL*,
[b] Functional scale - high score represents a *high/healthy level of functioning*,
[c] Symptom scale/single items – high score represents a *high level of symptomatology/problems*
* significance with t-test ($p<0.05$) ; ** significance with linear regression across sub groups ($p<0.05$)

Association of gender with various aspects of QoL

When the QoL scores were analyzed according to gender, employing an independent sample t-test and linear regression, women reported significant higher social functioning scores reflecting higher QoL (p=0.039). By contrast, men showed significance with dyspnoea scores representing difficulty through shortness of breath (t=-2.3, p=.022) (Table 2).

Age and QoL association

The patients were categorized into three age groups. 35% of the patients were ≤40 years, 41.25% were between 41-59 years and 23.75% of the patients were aged ≥60 years. ANOVA and linear regression were performed to find the significant differences and correlation between various aspects of QoL and the different age groups (Table 3).

When the QoL scores were analyzed, it was observed that the oldest age group not only reported better social functioning but was also associated with healthier emotional, social functioning and appetite loss scores (Table 4). Significant correlation was seen with global, physical and social functioning scores (Table 5). When the mean values of the QoL scores were considered, middle-aged patients reported better physical and cognitive functioning than younger or older patients. Fatigue and pain were found to be affecting the younger patients (Table 3).

Types of cancer and various aspects of QoL

Though a 10 point difference was seen between the means of all the cancer groups considered for each variable of QoL, except emotional functioning as in Table 3, statistical significance was observed only for Cognitive functioning, dyspnea, constipation and diarrhea scores (p=0.007, p=0.003, p=0.004, p=0.000). Patients suffering from gynecological malignancies reported better cognitive functioning. Lung cancer followed by head and neck cancer patients reported higher significant scores for dyspnea, indicating higher suffering from shortness of breath. Patients suffering from head and neck and gastrointestinal cancers reported more symptoms of constipation whereas, as expected, diarrhea was reported to be more troublesome and affected QoL of patients suffering from gastrointestinal cancers (Table 3). A significant correlation was observed between patients suffering from lung cancer and dyspnoea and gastrointestinal cancers with appetite loss (Table 3).

Severity of anemia and its impact on QoL aspects

In our study group a statistically significant association was observed between the baseline global QoL score and severity of anemia. ANOVA and Post Hoc test results from table 3 strongly suggest that hemoglobin levels have a major impact on global health status. Patients with hemoglobin <6.5 g/dl reported the worst global health status scores and least scores for all functional scales like physical, rôle, cognitive and emotional functioning. Of the symptom scales, fatigue and pain affected the QoL of patients suffering from life-threatening or grade 4 anemia as significant from scores in Table 3. Significant differences were observed between severity of anemia and all functional scales of QoL and fatigue except social functioning (Table 4). By contrast, a significant correlation of anemic grades was observed with the physical, emotional, fatigue, nausea/vomiting and pain scales (Table 5).

As is evident from Table 3, better QoL and functional scores and lower symptom scores were observed in patients suffering from mild anemia compared to those suffering from severe to life-threatening anemia, indicating the strong association between the hemoglobin levels and QoL in cancer patients. No correlation was seen between the severity of anemia and social functioning or other single item symptom scales like dyspnea, insomnia, appetite loss, constipation and diarrhea (Table 3).

Treatment status vs. QoL aspects

To find the association between treatment status and QoL, patients were classified into three groups: namely, those not under chemo- or radiotherapy, those under chemotherapy and those under radiotherapy.

Analysis of QoL scores according to treatment status at the time of data collection showed a direct effect on the financial impact of the disease, social func-

Table 3. The mean values of EORTC functional and symptom scales.

		QoL[a]	Functional scales[b]						Symptom scales/single items[c]							
Age (years)	n	QL[d]	PF[d]	RF	CF	EF[e]	SF[e,d]	FA	NV	PA	DY	SL	AP[e]	CO	DI	FI
<=40	28	30.65	58.80	44.04	79.76	**52.38***	**48.21***	67.85	28.57	70.23	16.66	46.42	34.52	25	20.23	64.28
41-59	33	31.56	62.22	53.53	87.37	61.36	**61.11***	62.28	16.66	59.09	18.18	39.39	35.35	28.28	12.12	64.64
>=60	19	38.15	60.70	58.77	85.96	**66.66***	**85.08***	53.80	13.15	56.14	15.78	35.08	19.29	17.54	5.26	66.66
Type of cancers	***n***	**QL**	**PF**	**RF**	**CF[e]**	**EF**	**SF**	**FA**	**NV**	**PA**	**DY[e,d]**	**SL**	**AP[d]**	**CO[e]**	**DI[e]**	**FI**
Hematological Malignancies	10	26.67	54.67	38.33	78.33	54.17	46.67	70.00	20.00	**48.33***	26.67	53.33	40.00	23.33	**6.67***	63.33
Gynecological Malignancies	41	35.16	60.81	52.44	**88.62***	61.59	67.48	59.62	18.70	61.38	**10.57***	39.02	31.71	**17.89***	**8.13***	63.41
GastroIntestinal cancers	11	34.85	72.73	57.58	81.82	62.12	60.61	62.63	33.33	68.18	**6.06***	33.33	42.42	33.33	**42.42***	63.64
Head&Neck cancers	8	21.88	55.00	52.08	**68.75***	54.17	56.25	68.06	12.50	**83.33***	33.33	50.00	16.67	**54.17***	**12.50***	70.83
Lung cancers	7	33.33	59.05	50.00	88.10	55.95	57.14	61.90	19.05	54.76	**38.10***	38.10	23.81	19.05	**9.52***	76.19
Others	3	41.67	53.33	61.11	88.89	61.11	77.78	55.56	11.11	61.11	22.22	33.33	11.11	22.22	11.11	55.56
Severity of anemia	***n***	**QL[e]**	**PF[e]**	**RF[e,d]**	**CF[e]**	**EF[e,d]**	**SF**	**FA[e,d]**	**NV[d]**	**PA[d]**	**DY**	**SL**	**AP**	**CO**	**DI**	**FI**
Mild	12	**46.53***	**75.00***	**68.06***	90.28	**70.14***	69.44	**48.15***	11.11	51.39	13.89	44.44	22.22	19.44	2.78	58.33
Moderate	32	**33.07***	59.38	54.69	88.02	**61.98***	61.98	**59.72***	25.00	64.06	16.67	36.46	35.42	20.83	14.58	65.63
Severe	18	**35.65***	62.22	48.15	78.70	**61.57***	72.22	**56.17***	23.15	57.41	12.96	44.44	27.78	29.63	18.52	61.11
Life threatening	18	**20.37***	**51.85***	**37.96***	79.63	**45.83***	48.15	**82.10***	13.89	71.30	24.07	42.59	33.33	29.63	12.96	72.22
Treatment status	***n***	**QL**	**PF**	**RF**	**CF**	**EF[b]**	**SF**	**FA**	**NV**	**PA**	**DY**	**SL**	**AP**	**CO**	**DI**	**FI**
NUC/NURT	44	34.09	59.24	53.41	86.36	58.33	67.42	58.84	15.91	62.88	18.94	43.18	29.55	23.48	10.61	62.12
UC	24	29.86	62.50	47.92	83.33	57.29	52.78	69.44	26.39	62.50	16.67	37.50	34.72	22.22	16.67	65.28
URT	12	34.03	62.22	51.39	79.17	68.06	62.50	60.19	22.22	59.72	11.11	38.89	30.56	33.33	16.67	75.00

[a] Global health status/QoL- high score represents a *high QoL*; [b] Functioning (PF=physical, RF=role, CF=cognitive, EF=emotional, SF=social) - high score represents a *high/healthy level of functioning*; [c] Symptom scale/single items (FA=fatigue, NV=nausea/vomiting, PA=pain, DY=dyspnea, SL=insomnia, AP=appetite loss, CO=constipation, DI=diarrhea FI=financial impact) – high score represents a *high level of symptomatology/problems;* [d] significant linear trend across sub groups was found ($p<0.05$); [e] the differences in scores were statistically significant (ANOVA, $p<0.05$). Post Hoc tests (Bonferroni) showed significant differences between * marked groups. * The mean difference is significant at the 0.05 level. *n*= number of cases.

Table 4. Significance between Age group, Type of cancer, Severity of anemia, Treatment status and various aspects of QoL

	Outcome variable	Age group		Type of cancer		Severity of anemia		Treatment status	
		F[a]	*P*[b]	F[a]	*P*[b]	F[a]	*P*[b]	F[a]	*P*[b]
	Global health status/QoL	1.497	.230	1.559	.182	9.285	**.000***	.604	.549
Functional scales	Physical functioning	.181	.835	1.004	.422	2.970	**.037***	.204	.816
	Role functioning	2.326	.105	.815	.543	4.482	**.006***	.385	.682
	Cognitive functioning	2.198	.118	3.443	**.007***	2.971	**.037***	1.198	.307
	Emotional functioning	3.829	**.026***	.474	.794	5.562	**.002***	1.522	.225
	Social functioning	11.924	**.000***	1.165	.335	2.555	.062	2.066	.134
Symptom scales	Fatigue	2.057	.135	.446	.815	7.766	**.000***	1.644	.200
	Nausea and vomiting	3.044	.053	.947	.456	1.545	.210	1.573	.214
	Pain	2.489	.090	2.321	.051	2.007	.120	.079	.924
Single items	Dyspnoea	.066	.936	3.906	**.003***	.772	.513	.513	.601
	Insomnia	1.577	.213	1.293	.276	.690	.561	.542	.584
	Appetite loss	3.301	**.042***	2.030	.084	1.068	.368	.364	.696
	Constipation	1.147	.323	3.828	**.004***	.915	.438	.902	.410
	Diarrhea	2.944	.059	6.277	**.000***	1.355	.263	.774	.465
	Financial difficulties	.048	.953	.414	.837	.798	.499	1.077	.346

[a] Analysis of variance ; [b]Probability value ; **p*<0.05

tioning, fatigue and nausea/vomiting scales as observed from the >10 point difference between the mean values. A significant correlation was only observed between treatment status and emotional functioning of the patient (p=.033). Patients under radiotherapy showed better emotional functioning scores than patients not under treatment or under chemotherapy (Table 3).

Discussion

From this investigation, it was evident that women were more prone to anemia with 77.5% of cases against 22.5% in men and 51.25% of gynecological cases recorded compared to the rest of the malignancies. Hemoglobin levels ranged from 3.3-11 ng/dl giving scope for analysis of QoL at various anemic stages.

Observation of ANOVA, Bonferroni results and mean scores of severity of anemia, indicates a strong association between hemoglobin levels and QoL and suggests that low hemoglobin levels and the treatment modalities employed were the major causes of fatigue in anemic cancer patients. Though it has been known to the world for decades that low hemoglobin levels, fatigue and QoL are associated, it was sad to realize from this recent study that it is still a persistent problem in society today and decreased hemoglobin makes the patient's condition worse by significantly impacting on the global health status, physical and symptom scales.

Consistently with previous studies, patients with hemoglobin values >12 g/dL reported significantly less fatigue, fewer non-fatigue anemia symptoms, better physical and functional well-being and a higher overall QoL than those with hemoglobin values <12 g/dL (5). Prevalence of anemia was linked to poor performance status. This effect has been widely studied by other investigations too, showing that there is a close link between increase in hemoglobin levels and improvement in QoL scores (5, 12-16).

The better emotional, social functioning and global health status observed in older age groups compared to younger patients in our study indicates that the younger generation are more susceptible to psychological stress when stricken by cancer fatigue. This could also be due to the fact that the older age groups have experienced life, more than the younger generation and have already adapted to the decline in their

Table 5: Outcome of entered linear regression (correlation coefficients) for the various categories studied.

Outcome variable	Gender			Age group			Type of cancer			Severity of anemia			Treatment status		
	β [a]	t	*p* [b]	β [a]	t	*p* [b]	β [a]	t	*p* [b]	β [a]	t	*p* [b]	β [a]	t	*p* [b]
Global health status/QoL	-.183	-.842	.403	-.383	-2.01	**.048***	.312	1.454	.151	-.312	-1.67	.098	-.067	-.305	.762
Functional scales															
Physical functioning	-.306	-1.63	.107	-.399	-2.43	**.018***	.018	.096	.924	.234	1.46	.149	.098	.516	.608
Role functioning	.190	1.23	.223	.263	1.94	.056	.098	.641	.524	-.287	-2.16	**.034***	-.113	-.725	.471
Cognitive functioning	-.077	-.526	.600	-.042	-.324	.747	-.034	-.236	.814	-.010	-.079	.937	-.122	-.825	.412
Emotional functioning	.007	.041	.968	.184	1.28	.205	-.098	-.601	.550	-.295	-2.09	**.040***	.361	2.17	**.033***
Social functioning	.248	1.67	.099	.415	3.19	**.002***	-.001	-.009	.993	.149	1.17	.243	-.277	-1.85	.069
Symptom scales															
Fatigue	-.195	-.949	.346	-.341	-1.89	.062	.021	.102	.919	.453	2.57	**.012***	.214	1.03	.306
Nausea and vomiting	.071	.525	.601	-.111	-.931	.356	.079	.592	.556	-.258	-2.21	**.030***	.104	.759	.451
Pain	.306	1.88	.064	-.109	-.768	.445	.188	1.167	.248	-.381	-2.73	**.008***	-.164	-.997	.322
Single items															
Dyspnoea	-.296	-2.35	**.022***	.001	.011	.991	.319	2.572	**.012***	.019	.181	.857	-.084	-.665	.508
Insomnia	-.148	-1.14	.258	-.039	-.343	.733	-.102	-.797	.429	-.211	-1.90	.061	-.201	-1.54	.128
Appetite loss	.134	.955	.343	.013	.102	.919	-.333	-2.401	**.019***	.078	.646	.520	-.053	-.378	.707
Constipation	-.106	-.788	.434	-.084	-.706	.483	.234	1.753	.084	.181	1.55	.124	.064	.466	.643
Diarrhea	-.152	-1.13	.260	-.173	-1.476	.145	.094	.707	.482	.225	1.965	.054	.091	.672	.504
Financial difficulties	-.035	-.281	.780	.151	1.400	.166	.022	.183	.855	-.095	-.899	.372	.113	.910	.366

[a] regression coefficient; [b]probability value; *$p<0.05$

functions. Unlike previous studies (17), the middle-aged and younger groups reported higher appetite loss scores than the old age group. None of the categories studied showed any significant association with insomnia and financial impact.

Of note, women reported better cognitive functioning in our investigation. Lung cancer patients reported more dyspnoea. This was in line with other studies made in advanced cancer patients (17). As is common in the normal population with intestinal disturbances and so to be expected in cancer cases, patients suffering from gastrointestinal cancers reported higher scores for nausea/vomiting, appetite loss and diarrhea.

In contrast to previous studies (18-20), cancer treatment did not affect the overall QoL significantly in our study group but emotional functioning was affected in cancer patients under chemotherapy and also in patients who were not under any treatment at the time of data collection.

Poor management of anemia and the dearth of supportive care extended to anemic cancer patients might be the result of three reasons: failure by many clinicians to recognize the impact of anemia on the QoL of cancer patients , restricted treatment options available and affordability of the latest erythropoietic agents for patients in need. Though lots of research is being carried out to evaluate the QoL status of cancer patients, it is often difficult for clinicians to interpret the clinical importance of statistically significant QoL scores. To overcome this problem and make it easy for the clinicians and health care providers to understand, the EORTC-QLQ instrument can be used bearing in mind that, after linear transformation of the raw data and allotment of scores, ≥10 points (of 100) difference in the mean values has been defined as a clinically meaningful difference. Not only is this an easy guideline to remember, but also confirms the idea that a clinically meaningful difference in global QoL score (≥10 points) translates into different outcomes that are clinically relevant (21).

One constraint of this academic study was that it included a fairly limited group of patients though significant predictability was observed in the QoL scores. As confirmed by Ganz et al, this result suggests that QoL is a sensitive and powerful predictor of outcome (22). The EORTC C-30 questionnaire was found to be a useful and appropriate tool for analyzing the QoL data of anemic cancer patients. The results could be related to the psychological status of anemic cancer patients. Though a ≥10 point difference in mean values was observed for various factors, statistical significance was not seen for all variables but only for a few.

Conclusions

The rationale for treatment of anemia cannot depend exclusively on the decreasing need for blood transfusion, although this is certainly vital. The issue is improvement in QoL. Besides personalized care and allotment of time for understanding life at a basic level, the severity of anemia in patients, the type of cancer they are suffering from and their age should be taken into account to decide the relative priority amongst the various aspects of QoL. These are crucial points for optimizing the questionnaire so that clinicians may evaluate and improve the patient QoL status in the shortest time possible. We conclude from our investigations that clinicians and health care providers should look into the pathophysiology of anemia in cances and offer guidelines for management to improvise the anemic state, not just as a study, but by way of supportive care, as well as the contentment and relief that a patient gains when the QoL is improved. This can be achieved only when we characterize the factors that affect the QoL in anemic cancer patients.

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