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Quality of Life and Blood Counts in Cancer Patients Undergoing Chemotherapy - A Cross Sectional Study

Sneha Arya[1], Ubedul Hoda[2], Rizwana Parveen[2], Prabhat Raina[3], Nidhi B. Agarwal[1]

Centre for Translational and Clinical Research,
School of Chemical and Life Sciences[1]
Department of Pharmacology, School of Pharmaceutical Education and Research[2],
Jamia Hamdard (Hamdard University), New Delhi.
Formerly at Hamdard Institute of Medical Sciences and HAHC Hospital,
Jamia Hamdard University, New Delhi[3].

ABSTRACT

Aim: This study evaluates the assessment of Quality of Life (QoL) in cancer patients undergoing chemotherapy using widely accepted European Organization for Research and Treatment of Cancer (EORTC) Quality of Life Questionnaire Core-30 (QLQ-C30) and European QoL-5-Dimension 5-Level (EQ-5D-5L) questionnaires.

Purpose of the study: Cancer chemotherapy is associated with several co-morbid illnesses as well as side effects which ultimately affects the QoL of cancer patients. Blood count patterns are adversely affected in cancer patients undergoing chemotherapy. This condition is associated with symptoms like fatigue, dizziness, weakness, etc which in turn affects the quality of life of cancer patient. The present study evaluates the assessment of QoL in cancer patients undergoing chemotherapy using the EORTC QLQ-C30 and EQ-5D-5L questionnaires.

Study design: Prospective, cross sectional, observational study.

Results: The scores of EORTC QLQ C-30 show that there are no significant changes in the QoL scores with the exception of fatigue (i.e., patients reported statistically significant increased levels of fatigue before and after treatment) and pain (statistically

Correspondence : Dr. Nidhi B. Agarwal, Centre for Translational & Clinical Research, School of Chemical and Life Sciences, Jamia Hamdard Univerisy, Hamdard Nagar, New Delhi, India. Email: nidhi.bharal@gmail.com. Mob : 9818334770.

significant results). No significant results were observed in the scores of EQ-5D-5L questionnaire. There has been a significant change in the blood counts especially neutrophils, platelets and haemoglobin before and after 1st cycle of chemotherapy and during the subsequent cycles there is no significant change.

Conclusions: QoL has become an important endpoint in clinical research on cancer treatment. Even though perception of QoL varies from individual to individual but still it is an important criterion for measurement of the severity of disease and its treatment.

Keywords: Cancer, quality of life, chemotherapy.

Introduction

Cancer is a leading cause of death worldwide and it is the second most common disease in India responsible for maximum mortality with about 0.3 million deaths per year. This is owing to the poor availability of preventive, diagnostic and treatment modalities for the disease. Around 30% of death associated with cancer are due to the five leading behavioral and dietary risks: high body mass index, low fruit and vegetable intake, lack of physical activity, tobacco and alcohol usage (1). Although there are several modalities for cancer treatment, like chemotherapy, radiation therapy, immunotherapy and biologic therapy, are available but the most commonly used modality for cancer is chemotherapy. This treatment modality is employed to attenuate the cancer cell load as well as to improve the patient's Quality of Life (QoL) was found to be associated with several side effects. Chemotherapeutic regimens carry with them an entire spectrum of side effects like anaemia, nausea, vomiting, fatigue, anxiety, loss of appetite, cognitive impairment, alopecia, depression, chemotherapy-related amenorrhea and menopause in females and oligozoospermia, etc. in males. These side effects often affect patient's QoL (2).

Evaluation of QoL has been important nowadays especially for chronic diseases like cancer because it is considered to be indicative of health care quality (3). QoL is a multidimensional and

subjective perception of the positive and negative aspects of cancer symptoms including physical, emotional, social and cognitive function and importantly, disease symptoms and side effects (4). There is as such no gold standard for measuring the QoL; however, researchers have designed certain tools to measure it as accurately as possible. One of such widely used questionnaire is European Organization for Research and Treatment of Cancer (EORTC) Quality of Life Questionnaire Core-30 (QLQ-C30) collectively called EORTC QLQ C-30, which is used to assess the QoL in cancer patients. This questionnaire has been validated in several languages (5). It has been used to assess the QoL in different types of cancers like breast, colorectal, lung and ovarian cancer (6-14). EQ-5D-5L, i.e. European QoL-5-Dimension 5-Level Questionnaire is one of the latest questionnaires measuring the QoL in patients with bladder, prostate and breast cancer (15-18).

Since chemotherapy acts by suppressing fast dividing cells like cancer cells, the physiologically fast dividing cells of the bone marrow that are responsible for the first line of immune defense such as neutrophils and other white cells, are also not spared and can also be negatively affected which thereby cause neutropenia or thrombocytopenia in cancer patients undergoing chemotherapy and can in turn affect the QoL adversely (19-22). The aim of the present study was to evaluate QoL in cancer patients at different cycles of chemotherapy and to find its association with blood counts.

Materials and Methods

This prospective cross-sectional study was performed at the HAH Centenary Hospital, Hamdard University, New Delhi, which provides outpatient treatment to cancer patients using the modality of anticancer chemotherapy. Thirty patients of both the genders were enrolled in the study. All the patients were screened and recruited on the basis of pre-defined Inclusion/Exclusion Criteria. Written Informed Consent was obtained from eligible patients willing to participate in the study. The study protocol was approved by Jamia Hamdard Institutional Review Board.

We included patients who : 1) had histologically confirmed cancer; 2) were receiving chemotherapy for the

treatment of cancer; 3) were capable of giving informed consent; 4) were of 18 years and above; 5) can understand and fill out QoL questionnaires, and agree to provide information to be included.

We excluded patients who : 1) had serious, unstable medical or mental illness; 2) had medical contraindication to any study procedure; 3) had been suffering from alcohol or other substance use disorders (esp. cannabis and opioids); 4) have not read and signed informed consent, or do not understand its contents; 5) had psychological, familial, sociological, or geographical conditions that do not permit treatment or medical follow-up and /or prohibit compliance with the study protocol.

EORTC QLQ-C30 is one of the widely used instruments in various cancer populations to measure their QoL. This has been translated and validated in 81 languages and is used in more than 3,000 studies worldwide. It consists of 30 items rated on a 1 to 4 scale (two questions are rated between 1 and 7). The items comprise of 15 domains many of which address physical symptoms: general health status, physical functioning, emotional functioning, cognitive functioning, social functioning, fatigue, nausea/ vomiting, pain, dyspnea, insomnia, lack of appetite, constipation, diarrhea and financial problems. The EuroQol EQ-5D-5L is a generic preference-based measure of health-related QoL. It is a standardized non-disease-specific (generic) instrument for assessing self-reported health status, allowing for comparisons across disease groups. The EQ-5D-5L consists of a general health descriptive system-based on five dimensions and a 100-point visual analogue scale (VAS). The dimensions cover mobility, self care, usual activities, pain/discomfort, and anxiety/depression and are characterized by five levels. The patients answered both the questionnaires initially at baseline and then after each cycle of chemotherapy. Blood counts were assessed using blood test reports before and after each cycle of chemotherapy.

Results

Baseline characteristics of patients enrolled

Thirty patients were chosen on the basis of inclusion and exclusion criteria. These patients followed-up upto at least one

cycle of chemotherapy. The mean ages (in year) of the patients were 51.16±9.35. Out of the 30 patients 50% were male and 50% were female. The most common type of cancer observed in these patients was gastrointestinal (30%) followed by breast cancer (23.33%) and then oral cancer (20%). The most widely used chemotherapeutic regimen given to such patients included Paclitaxel/Docetaxel, Cisplatin/Carboplatin (accounting for about 33.33%) and 5 FU, Cisplatin/ Carboplatin (accounting for about 13.33%). Most of the patients in the study who were enrolled had completed their I cycle (about 46.66%) (Table 1).

Changes in QoL over a cycle of chemotherapy

An overall change in aspects of QoL before and after a cycle of chemotherapy using the EORTC QLQ C-30 questionnaire was observed. The scores of EORTC QLQ C-30 included both the global QoL and the symptom scale. There was no significant change in the QoL scale with the exception of fatigue (i.e., patients reported statistically significant increased levels of fatigue before and after treatment) and pain (patients reported statistically significant pain) (Table 2). There was an overall change in aspects of QoL before and after a cycle of chemotherapy using an EQ-5D-5L questionnaire. The scores included five broad domains (mobility, self care, usual activities, pain and anxiety/depression). No significant changes were observed in this questionnaire scores (Table 3). There was no significant change observed in QoL items according to sex, except for pain which was significant in both males and females (Table 4). Although there have been changes in the mean cognitive functioning in patients of age above 56 years from 77.27 to 66.67 but the change is not significant. For patients above 56 years, significant changes have occurred in the physical functioning and fatigue (Table 5).

Changes in blood counts over a cycle of chemotherapy

As per Table 6, there has been a significant change in the blood counts especially neutrophils, platelets and haemoglobin before and after 1st cycle of chemotherapy. There is no significant change in the subsequent cycles.

Table 1. Baseline characteristics of patients enrolled

Characteristic	Categories	Number (%)
Age	Mean	51.16
	S.D	9.35
Gender	Male	15(50)
	Female	15(50)
Type of Cancer	Gastrointestinal	9(30)
	Breast	7(23.33)
	Neck	1(3.33)
	Oral	6(20)
	Sarcoma	1(3.33)
	Non Hodgkin lymphoma	2(6.66)
	Ovary	1(3.33)
	Lung	2(6.66)
	Brain	1(3.33)
Chemotherapeutic Regimen	FOLFOX(5 FU, Leucovorin Calcium Oxaplatin)	4(13.33)
	5 FU, Cisplatin/Carboplatin	6(20)
	Adriamcycin, Cyclophosphamide	3(10)
	Rituximab/Transtuzumab	4(13.33)
	Gemcitabine,Cisplatin	3(10)
	Paclitaxel/Docetaxel, Cisplatin/Carboplatin	10(33.33)
Cycle of Chemotherapy	1	14(46.66)
	2	4(13.33)
	3	4(13.33)
	≥4	8(26.66)
Patient demographics expressed as Number and Percentage		

Table 2: Changes in QoL score of EORTC QLQ C-30 over a cycle of chemotherapy

Questionnaire	Before Chemo-therapy (SEM)	After Chemo-therapy (SEM)	Mean difference	p-value
Global QoL	80±52.5	75.00±46.68	5.000	0.573
Physical Functioning	67.33±26.34	63.33 ± 13.98	4.000	0.323
Role Functioning	63.33 ± 39.97	75.56 ± 23.46	-12.222	0.108
Emotional Functioning	57.78± 33.90	51.94 ±30.30	5.833	0.272
Cognitive Functioning	67.22 ± 32.01	70.00 ± 26.77	-2.778	0.538
Social Functioning	80.00 ± 27.47	75.00 ±29.28	5.000	0.248
Symptom Scale				
Fatigue	47.41 ± 32.22	73.70 ± 27.136	-26.296	0.003
Nausea and Vomiting	30.00 ± 32.28	19.44 ± 22.78	10.556	0.149
Pain	47.78 ± 33.83	37.78 ± 21.41	10.000	0.080
Dyspnoea	14.44 ± 25.80	6.67 ±16.14	7.778	0.090
Insomnia	40.00 ± 41.43	41.11± 36.81	-1.111	0.845
Appetite Loss	43.33 ± 39.29	43.33±38.31	0.00	1.00
Constipation	33.33 ± 41.06	36.67± 36.46	-3.333	0.698
Diarrhoea	13.33± 29.81	10.00 ± 27.89	3.333	0.476
Financial Difficulties	45.56± 38.64	52.22 ± 39.81	-6.667	0.312
Results expressed as Mean ± S.D p- value < 0.05 considered as significant				

Table 3: Changes in Qol scores in EQ-5D-5L over a cycle of chemotherapy

Questionnaire	Before Chemo-therapy (SEM)	After Chemo-therapy (SEM)	Mean difference	p-value
Mobility	1.87 ±1.07	2.03 ± 1.03	-0.167	0.344
Self Care	1.57 ± 0.90	1.53 ± 0.63	0.033	0.845
Usual Activities	2.03 ± 1.22	2.07 ± 1.05	-0.033	0.891
Pain/Discomfort	2.07 ± 1.17	1.83 ± 0.99	0.233	0.199
Anxiety/Depression	2.00 ± 1.20	1.97 ± 0.96	0.033	0.865
Visual Analogue Scale	56.17 ± 23.73	55.50 ±20.69	0.667	0.865
Results expressed as Mean ± S.D p- value < 0.05 considered as significant				

Association of blood count parameters and QoL

Changes in the blood counts adversely affect the QoL. The results show that there was a significant correlation between nausea and vomiting and neutrophil count. The results also demonstrate that there is no significant correlation between platelet and QoL parameters but there was a significant correlation between haemoglobin and social functioning as well as cognitive functioning (Table 7).

Discussion

An important issue in cancer care and research is QoL. The QoL refers to 'global wellbeing' including physical, emotional, mental, social and behavioral components. In the recent past, a number of QoL tools have become available to measure health-related QoL. The most widely used applicable instrument to measure the QoL in cancer patients is EORTC QLQ C-30. EQ-5D-5L has been the latest questionnaire used to measure QoL in cancer patients. The present study assessed the QoL in cancer patients

Table 4: Changes in Qol scores in EORTC QLQ C30 over a cycle of chemotherapy according to sex

Questionnaire	Before Chemotherapy (SEM)	After Chemotherapy (SEM)	Mean difference	p-value	Before Chemotherapy (SEM)	After Chemotherapy (SEM)	Mean Difference	p-value
EORTC QLQ C30	Males				Females			
Global QoL	92.22 ±62	71.11±57.55	21.111	0.189	67.78±38.04	78.89±34.20	0.889	0.126
Physical Functioning	69.78±29.69	62.67±13.52	7.111	0.282	64.89±23.29	64.00±14.86	-10.000	0.858
Role Functioning	64.44± 42.2	78.89±27.07	14.444	0.246	62.22±39.07	72.22±19.59	0.556	0.287
Emotional Functioning	63.89±33.28	52.78±27.03	11.111	0.248	51.67±34.53	51.11±34.20	0.556	0.910
Cognitive Functioning	77.78±29.32	84.44±11.73	-6.667	0.334	56.67±32.00	55.56±29.99	1.111	0.855
Social Functioning	86.67±24.56	85.56±23.46	1.111	0.865	73.33±29.41	64.44±31.41	8.889	0.135
Symptom Scale								
Fatigue	60.00±31.37	73.33±21.33	13.333	0.147	68.89±32.58	62.96±28.69	5.926	0.488
Nausea and Vomiting	27.78±34.88	20.00±21.08	7.778	0.517	32.22±30.52	18.89±25.09	13.333	0.138
Pain	44.44±33.73	44.44±24.12	0.000*	1.000	51.11±34.77	31.11±16.51	20.000	0.012*
Dyspnoea	13.33±27.60	11.11±20.57	2.222	0.719	15.56±24.77	2.22±8.61	13.333	.054
Insomnia	35.56±40.76	40.00±33.81	-4.444	0.634	44.44±43.03	42.22±40.76	2.222	0.751
Appetite loss	44.44±37.09	42.22±34.43	2.222	0.818	42.22±42.66	44.44±43.03	-2.222	0.843
Constipation	26.67±36.08	42.22±38.76	15.556	0.150	40.00±45.77	31.11±34.43	8.889	0.512
Diarrhoea	13.33±30.34	6.67±18.69	6.667	0.458	13.33±30.34	13.33±35.19	0.000	1.000
Financial difficulties	44.44±39.17	46.67±41.40	-2.222	0.806	46.67±39.44	57.78±38.76	-11.111	0.265
Results expressed as Mean ± S.D, p- value < 0.05 considered as significant								

Table 5: Changes in QoL according to Age

	Global QoL			Physical Functioning			Role Functioning		
Age	**Before Chemo-therapy**	**After Chemo-therapy**	**p-value**	**Before Chemo-therapy**	**After Chemo-therapy**	**p-value**	**Before Chemo-therapy**	**After Chemo-therapy**	**p-value**
25-35	88.89±49.92	87.50±29.41	0.908	64.44±32.82	63.33±18.96	0.894	66.67±35.53	83.33±21.32	0.097
46-55	61.90±52.45	69.05±51.31	0.802	59.05±29.17	63.81±14.33	0.550	71.43±36.91	78.57±12.60	0.689
Above 56 years	81.82±56.00	65.15±58.90	0.184	75.76±13.42	63.03±6.90	0.003*	54.55±47.78	65.15±28.34	0.485
	Emotional Functioning			**Cognitive Functioning**			**Social Functioning**		
25-35	60.42±34.29	60.42±31.81	1.00	63.89±73.61	73.61±31.35	0.067	86.11±29.16	81.94±30.53	0.191
46-55	55.95±33.23	58.33±25.46	0.863	57.14±33.13	69.05±17.82	0.394	80.95±26.23	78.57±31.50	0.859
Above 56 years	56.06±36.91	38.64±29.17	0.126	77.27±25.03	66.67±27.89	0.111	72.73±27.15	65.15±26.30	0.378
Symptm Scale	**Fatigue**			**Nausea and Vomiting**			**Pain**		
25-35	59.26±34.27	58.33±24.22	0.926	19.44±22.29	9.72±16.60	0.206	47.22±39.46	29.17±25.75	0.053
46-55	61.90±35.53	61.90±27.11	1.00	38.10±41.63	19.05±22.42	0.364	54.76±31.50	42.86±21.21	0.283
Above 56 years	25±11.50	98.61±3.92	0.00*	36.36±34.82	30.30±25.62	0.668	43.94±30.98	43.94±13.48	1.00
	Dyspnoea			**Insomnia**			**Appetite loss**		
25-35	8.33±15.08	5.56±19.25	0.586	30.56±41.34	27.78±39.78	0.723	38.89±39.78	52.78±50.17	0.210
46-55	4.76±12.60	00.00±00.00	0.356	28.57±29.99	47.62±37.80	0.231	47.62±46.58	38.10±35.63	0.631
Above 56 years	27.17±35.96	12.12±16.82	0.176	57.58±44.95	51.52±31.14	0.506	45.45±37.34	36.36±23.35	0.506
	Constipation			**Diarrhoea**			**Financial Difficulties**		
25-35	47.22±48.11	27.78±39.78	0.152	2.78±9.62	0.00±0.00	0.339	36.11±41.34	38.89±42.24	0.754
46-55	28.57±35.63	52.38±42.41	0.253	23.81±41.79	0.00±0.00	0.182	28.57±29.99	42.86±46.00	0.510
Above 56 years	21.21±34.23	36.36±27.71	0.242	18.18±34.52	36.36±27.71	0.082	66.67±33.33	72.73±25.03	0.506

Results expressed as Mean ± S.D
P value < 0.05 considered as significant

Table 6: Changes in blood counts according to cycle of chemotherapy

Blood Counts	Before Chemo-therapy (SEM)	After Chemo-therapy (SEM)	Mean difference	p-value
1st cycle				
Neutrophils	69±17	57±17	13	0.0006*
Platelets	2.47 ± 0.786	2.19±1.02	0.28	0.0241*
Haemoglobin	12.57±1.54	10.92±1.15	1.65	0.000431*
2nd Cycle				
Neutrophils	63±7	56±20	6	0.201185
Platelets	2.62±0.55	2.67±0.74	0.05	0.392606
Haemoglobin	12±1.63	11.65±1.65	0.35	0.16843
≥ 3 Cycle				
Neutrophils	61±0.15	64±0.11	3	0.213759
Platelets	2.63±1.13	2.57±1.02	0.06	0.205854
Haemoglobin	11.64±1.71	11.40±1.55	0.24	0.08715
Results expressed as Mean ± S.D p- value < 0.05 considered as significant, p- value = 0.000 is highly significant				

Table 7: Correlation between Neutrophils, platelet count and haemoglobin with Quality of Life parameters after chemotherapy

Quality of Life Parameters	Neutrophils Counts		Platelet Counts		Haemoglobin Count	
	Pearson Correlation	P-value	Pearson Correlation	P-value	Pearson Correlation	P-value
Physical Functioning	0.015	0.938	-0.309	0.097	-0.069	0.717
Role Functioning	0.186	0.326	-0.019	0.922	0.242	0.198
Emotional Functioning	0.116	0.543	-0.191	0.311	0.117	0.539
Cognitive Functioning	0.139	0.463	-0.207	0.272	0.399	0.029*
Social Functioning	-0.009	0.962	-0.116	0.543	0.393	0.032*
Fatigue	-0.077	0.685	0.095	0.618	0.015	0.939

Nausea and Vomiting	-0.437	0.016*	0.083	0.663	-0.044	0.818
Pain	0.051	0.788	-0.126	0.508	-0.200	0.289
Dyspnoea	0.048	0.802	0.143	0.452	0.177	0.351
Insomnia	0.008	0.965	0.087	0.648	-0.155	0.413
Appetite Loss	-0.136	0.473	0.135	0.475	0.167	0.377
Constipation	0.013	0.944	-0.012	0.951	0.013	0.947
Diarrhoea	-0.101	0.594	-0.117	0.540	0.011	0.956
Financial Difficulties	0.154	0.418	-0.093	0.626	-0.174	0.357
Global Health Status/QoL	0.110	0.564	0.195	0.302	0.090	0.635

using both EORTC QLQ C-30 and EQ-5D-5L questionnaires in cancer patients undergoing anticancer chemotherapy.

The present study is a prospective cross-sectional study designed to investigate the QoL in patients suffering from cancer and receiving chemotherapy using validated EORTC QLQ C-30 and EQ-5D-5L and also to find the association between blood count parameters and QoL. Furthermore this study also aimed at evaluation of changes in different parameters such as physical role, cognition, emotional, social, fatigue, pain, nausea/vomiting, dyspnoea, insomnia, loss of appetite, constipation, diarrhea and financial problems in accordance with gender, age, cycle of chemotherapy, different stages of cancer and different chemotherapeutic regimen.

In this study, majority of QoL parameters in the EORTC QLQ C-30 did not change considerably over a cycle of chemotherapy with the exception of fatigue which is in agreement with literature (23). There are no changes in QoL scores according to age and gender, in our study which is similar to previous studies.

There was not much change in the parameters of QoL as measured by scores obtained by EQ-5D-5L questionnaire. According to the VAS of the EQ-5D-5L, there was no significant improvement over the cycle of chemotherapy. This observation is inconsistent with the conclusion drawn in an earlier study (17), where a significant improvement in VAS scores was observed.

Chemotherapeutic regimen used in this study (Platinum compounds and taxanes) have been reported in previous studies to lower the QoL of cancer patients (18). These two classes of agents carry with them entire spectrum of side effects that often significantly affect a patient's QoL. Patients, who received first-line carboplatin-based chemotherapy reported to possess a higher global QoL and fewer symptoms of nausea and vomiting, appetite loss and constipation in comparison to those who received cisplatin-based chemotherapy. Outcomes of majority of studies showed fewer symptoms of nausea and vomiting from carboplatin-based chemotherapy. In the present study, difference in QoL due to nausea and vomiting among the various age groups was found to be statistically insignificant due to small sample size of the study population.

Fatigue is "a persistent, subjective sense of tiredness-related to cancer or cancer treatment that interferes with the usual functioning" (24, 25). It is one of the most common symptom found in all patients irrespective of stage of cancer, type of cancer and chemotherapeutic regimen. It has been found in our study as well. Consistent with previous studies (24, 26) fatigue and pain was largely associated with HRQoL. The symptom distress including increased severity of nausea at the time of treatment and at midpoints of chemotherapy cycle has been noted to intensify fatigue level. It has been reported that during cancer chemotherapy treatments, fatigue level was moderately intense, compromising HRQoL levels. It has been found that fatigue increases with age in patients. This has been found in our study as well. Patients above 56 years had a statistically significant change in fatigue scores. The reason for such change may be natural changes, co-morbidities associated with ageing, etc. Some factors identified as contributing factors to cancer fatigue include immobility, de-conditioning, sleep disorders, use of centrally acting drugs, anaemia and decline in functional reserve of organ systems.

Blood counts are measured throughout the cycles of chemotherapy. It is a pre-requisite investigation done on all cancer patients before surgery, use of chemotherapy and/or radiotherapy. The most common blood count parameters adversely affected by chemotherapy were platelets, neutrophils and haemoglobin (20). In our study we have found that

there was a statistically significant change in the blood counts especially haemoglobin, neutrophils and platelets before and after a cycle of chemotherapy. Changes in blood counts can be correlated to change in QoL parameters. Changes in haemoglobin levels cause anaemia leading to deleterious effect on QoL (19, 26). In the present study, a positive correlation between the social and cognitive functioning and haemoglobin levels has been found. Even though fatigue has been strongly correlated with anaemia in other studies (17, 19), but this was not evident in our study. Anaemia is the single most powerful independent determinant of fatigue. It may develop as a result of the malignant disease process itself; from bleeding, nutritional deficiencies, bone marrow damage, tumour infiltration of the bone marrow, or immunologic impairment of the haematopoietic response (27).

Neutropenia is a common toxicity in patients undergoing anticancer chemotherapy. Most cancer chemotherapies work by suppressing fast dividing cancer cells, however, the physiologically fast dividing cells of the bone marrow, which are responsible for producing the cells involved in the first line immune defense such as neutrophils and other white cells may also get affected (22). Hence, an impaired immune system leads to a poor QoL. In our study, neutrophil count has been positively correlated with QoL parameters.

Conclusion

The results of this study have important implications in both clinical and research practice. It suggests that QoL should be considered while prescribing anticancer chemotherapeutic interventions to patients. Regular QoL assessment should be done throughout the course of treatment. QoL monitoring coupled with treatment to improve appetite loss, global health and function scale may enhance the quality survival of the patients. Blood counts should also be monitored throughout the treatment and proper need-based palliative care should be provided to patients.

The study had certain limitations. Firstly, the small sample size which could be one of the important reasons of not finding statistically significant associations among demographical variables such as age, gender, type of cancer and anticancer chemotherapeutic regimens. Another limitation was that we took patients from different treatment

cycles which vary in relation to different variables and that cannot be commented upon with surety. It could be informative to prospectively follow-up these patients in order to assess the time course of the symptoms and outcomes.

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