Anxiety-Depression Affect on Quality of Life of Cancer patients during Chemotherapy and Radiotherapy Treatment

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Abstract

Background: Potentially every aspect of life in cancer patients is found to be accompanied by a mental illness of anxiety and depression that affects the Physical relationships, Psychological well-being, Social relationships and the Environmental domain thereby reducing the QOL of cancer patients significantly. The advancements in cancer treatment have led to marked improvement in the survival rates of cancer patients; however, distressing symptoms of anxiety and depression arising due to treatment modalities are yet to be endured. The proposed study is considered valuable since it emphasized on the quality of life of cancer patients during their treatment for cancer symptoms as one of the possible outcomes. Because patients are the best source of information for QOL data, therefore inpatients for chemotherapy treatment and outpatients for radiotherapy treatment were recruited in the study to obtain a unique perspective on how QOL is defined, assessed, and perceived with respect to anxiety and depression during the treatment sessions.

Objectives: The present study was conducted to assess the association and correlation of Anxiety and Depression with the domains of Quality of Life of cancer patients during inpatient Chemotherapy sessions or outpatient Radiotherapy sessions. The primary objective was to analyze the anxiety and depression levels (Recognition patterns) with their impact on QOL of cancer patients during chemotherapy or radiotherapy sessions.

Methods: It was a Psychological intervention, non-experimental, cross-sectional, descriptive, observational, hospital-based evaluation study. The Research study was conducted at Medical and Radiation Oncology department of Dr. B.L. Kapur Memorial Hospital, New Delhi, India with total duration of 5 months (December 2015- April 2016). A convenient sample of 60 patients undergoing cancer treatment was selected in which 30 cancer patients were on chemotherapy (CT Group) and the other 30 cancer patients were on radiotherapy (RT Group). Data collection was performed by using 3 validated Psychological interventional tools: WHOQOL-Bref Questionnaire, Zung Self-Rating Anxiety scale (ZSAS) and Zung Self-Rating Depression scale (ZSDS). Appropriate statistical tests by using SPSS v.17 software were utilized to determine the significant association of anxiety and depression with QOL domains.

Results: As a result, it was observed that 21(35%) males [6(20%) in Chemotherapy group and 15(50%) in Radiotherapy group] and 39(65%) females [24(80%) in Chemotherapy group and 15(50%) in Radiotherapy group] participated in the research study. Majority of the patients 32(53.34%) were found to be in the age range of 46-60 years. Out of the enrolled subjects, 33(55%) were undergoing Breast cancer treatment, 6(10%) were undergoing Head cancer treatment, and 21(35%) were undergoing Neck cancer treatment. Anxiety affected the Physical domain (p=0.007), and Environmental domain (p=0.036) in the Chemotherapy group; and Social domain (p=0.016) in the Radiotherapy group. On the other hand, Depression affected the Social domain (p=0.043) in Chemotherapy group; and Social domain (p=0.012) in the Radiotherapy group. Values of p < 0.05 were considered to be statistically significant.

Conclusion: It is evident from the research study that Cancer patients on chemotherapy were more badly affected in some domains of Quality of life due to anxiety and depression as compared to the patients on radiotherapy treatment regimen. Moreover, it was observed that with the increase in Anxiety and Depression symptomatic levels, there was a marked decline in respective domains of the

Quality of life of the cancer patients during Chemotherapy and Radiotherapy sessions. Thus, it was observed that levels of Anxiety and Depression were inversely (negatively) correlated with the domains of Quality of life of cancer patients during chemotherapy or radiotherapy.

Descriptors: WHOQOL-Bref Rating scale; Zung Self-Rating Anxiety scale (ZSAS); Zung Self-Rating Depression scale (ZSDS); Quality of Life; Sample study evaluation; Cancer patients; Chemotherapy treatment; Radiotherapy Treatment.

Identifiers: Anxiety (ZSAS), Depression (ZSDS), & WHOQOL-Bref Profile of cancer patients during Chemotherapy & Radiotherapy

Population: AdultCancer Patients undergoing either Chemotherapy or Radiotherapy sessions

Independent variables: Anxiety, Depression, Socio-demographic & Clinical characteristics

Dependent variables: Physical health, Psychological well-being, Social relationships, Environment domain

Outcome measure: Quality of Life of cancer patients during Chemotherapy & Radiotherapy

Domain: QOL as a characteristic function of Anxiety and Depression

Type of Measure: Subject-reported, Care-giver-reported, Investigator reported

Keywords: *Cancer, Chemotherapy, Radiotherapy, Quality of Life, WHOQOL-Bref Questionnaire, Zung Self-Rating Anxiety scale, Zung Self-Rating Depression scale, Physical domain, Psychological domain, Social domain, Environmental domain.*

Abbreviations

QOL	:	Quality of life
QLQ	:	Quality life Questionnaire
WHOQOL-Bref	:	World Health Organization Quality of life assessment-a short brief version
ZSAS	:	Zung Self-Rating Anxiety scale
ZSDS	:	Zung Self-Rating Depression scale
CT	:	Chemotherapy Treatment
RT	:	Radiotherapy Treatment
DOM	:	Domain
TPA	:	Third Party Administrator
FNAC	:	Fine needle aspiration cytology
SD	:	Standard deviation.

Introduction

Cancer is defined as a generic term for a large group of chronic diseases that is known to be pathologically characterized by abnormal rapid growth of cells thereby affecting any part of the human body of both genders, and thus have become a major cause of mortality and morbidity worldwide [2, 10]. According to the World Cancer Report, it is expected that Cancer rates would increase by 50% new cases for the year 2020 [8]. According to GLOBOCAN report, it was estimated that about 14.1 million new cancer cases and 8.2 million deaths occurred in 2012 worldwide that included approximately 300,400 new cases and 145,400 of deaths from oral cavity cancer (including lip cancer), and approximately 86,700 new cases and 50,800 deaths from Nasopharyngeal cancer with more prevalence in males as compared to females [21]. The incidence of cancer in Delhi is the fourth highest among the Asian registries [6]. According to National Cancer Registry Program (NCRP) 2013 report, cancer is a threatening problem in India with an estimated 2.5 million people living with the disease with 19746 cases (29.8 % of all cancer in men and 10.6 % of all cancer in women) in Delhi alone [7, 16]. Clinically, there are 3 available methods to treat and manage cancer-related symptoms that are namely, surgery, chemotherapy and radiotherapy which is being planned according to the patient's condition, site and stage of tumor followed by current guided protocol [2, 10]. Chemotherapy is defined as a concentrated and repeated treatment drug regimen for the management of cancer and its related

symptoms, which is found to be associated with adverse reactions such as, hair loss, nausea, vomiting, and diarrhea, thereby leading to extended periods of treatment and repeated admissions to the hospital eventually affecting the QOL of cancer patients [14]. On the other hand, Radiation therapy which is often the final step in the multimodal treatment regimen for cancer might cause side-effects such as, skin pigmentation, destruction of salivary glands, severe problems related to eating, swallowing and speech, causing xerostomia, oral infections, dental caries, pain and discomfort [3, 9]. Many aspects of QOL related to chemotherapy or radiotherapy treatment have been studied [1, 22]. Patients often experience treatment-related (Chemotherapy or Radiotherapy) adverse effects (fatigue, anxiety, pain, lymphedema, neuropathy, cardiotoxicity, concern for the future and the family, difficulties to meet basic demands and changes in body image, sleep disturbances, and cognitive problems) that negatively affects physical, psychological, social, and environmental aspects or domains of quality of life ultimately leading to negative health consequences [1, 22]. Therefore, this whole routine of chemotherapy and radiotherapy to "take care of cancer" could change dramatically the patients' everyday life, interfering with their quality of life [5, 15]. Thus, Quality of Life is a general term integrating several aspects of life such as patients' physical (movement, physical activities, ability to succeed in work and in family responsibilities), psychological (life satisfaction), social (social activities, being beneficial, body image, anxiety and depression, social support need and role function), economic, spiritual, cognitional &environmental dimensions for well-being during the diseased and respective-treatment stage[4, 20]. Disturbance in any one of these aspects could in turn affect the other domains and this influences the overall Quality of Life [20].

Importance of QOL measurement for clinical practice in cancer:

a. It could help patients in overviewing their treatment related side-effects and recovery trajcetory. On the other hand, it could help clinicians to make treatment decisions and evaluate therapeutic interventions. On the whole, it could give an accurate picture of the patient's overall benefit from the whole service [11].

b. It could help to identify the individual patient's needs for additional supportive interventions such as perceived social support, employment creative interventions, introduction of psychotherapy as integral part of the treatment in order to, manage the symptoms of the disease as well as, treatment[11].

Anxiety and Depression can be defined asuneasiness, nervousness, worry, or fear (not knowing what to expect or knowing what to expect), is a disturbed feeling often experienced during chemotherapy or radiotherapy sessions thereby affecting the QOL of cancer patients in daily activities[4, 5, 11, 15, 20].

Aims

The main objective of the present study was:
i. To determine the association and relationship of anxiety and depression with different domains of quality of life in cancer patients during chemotherapy treatment or radiotherapy treatment.
ii. To evaluate anxiety and depressive symptoms by the use of WHOQOL-Bref, Zung Self-rating Anxiety Scale (ZSAS) and Zung Self Rating Depression Scale (ZSDS) questionnaire in cancer patients receiving either Chemotherapy or Radiotherapy treatment regimen.

Problem statement

To conduct a evaluation and observation-based research study to determine the association of Anxiety & Depression symptoms with Physical, Psychological, Social, and Environment domains of QOL of cancer patients during Chemotherapy and Radiotherapy by the Psychological intervention tool of WHOQOL-Bref, ZSAS & ZSDS.

Patients and methods

The proposed study was conducted in accordance and adherence to the Ethical Guidelines and Procedures. Special care of the potential risks due to emotional distress was taken care of so that the dignity of the subject was not harmed. The authorized Ethical approval from the IRB and Ethical

committee ofDr. B.L. Kapur Memorial Hospital, New Delhi, with **Ref. No.: IRB/AARCE/5/DEC/2015/1**, *dated December 7th, 2015*,was obtained to carry out the research study. Thereafter, the patients and their caregivers were approached in the inpatient as well as, outpatient clinic, where the purpose of the study was explained and they were invited to participate. Patients who agreed to participate were asked to sign an Informed Consent Form followed by the implementation of the Structured and Validatedinstrumental tool of WHOQOL-Bref, Zung Self-Rating Anxiety Scale (ZSAS), and Zung Self-Rating Depression Scale (ZSDS) in the form of questionnaire which lasted for approximately 25-60 minutes. The RESEARCH DESIGN of the proposed approved study protocol included 30n cancer patients undergoing Chemotherapy Treatment and 30n cancer patients undergoing Radiotherapy Treatment session. The *inclusion criteria* for the approved study were the patients with Breast cancer, sub-sites of head and neck tumors (e.g., nasopharyngeal, thyroid cancer, and parotid tumors), aged 18years or older, Clinically diagnosed and confirmed by biopsy or FNAC, Undergoing/during the treatment sessions (≥ 2 cycles and ≤ 6 for Chemotherapy treatment, and ≥ 10 cycles and ≤ 30 cycles for Radiotherapy treatment, Voluntarily agreed to join the study, and aware of diagnosis and predicted prognosis. However, the study excluded patients with Inadequate clinical condition (ambulatory and terminally ill patients) who were unable to respond to an interview, had difficulty in understanding the questionnaire or communicating, were serious and didn't give consent, had a history of psychiatric disorder. Moreover, the study did not include the dosage of chemotherapy drugs and irradiation treatment. Eligible patients were identified through an institutional database or by referring physicians and were approached at their simulation appointment.
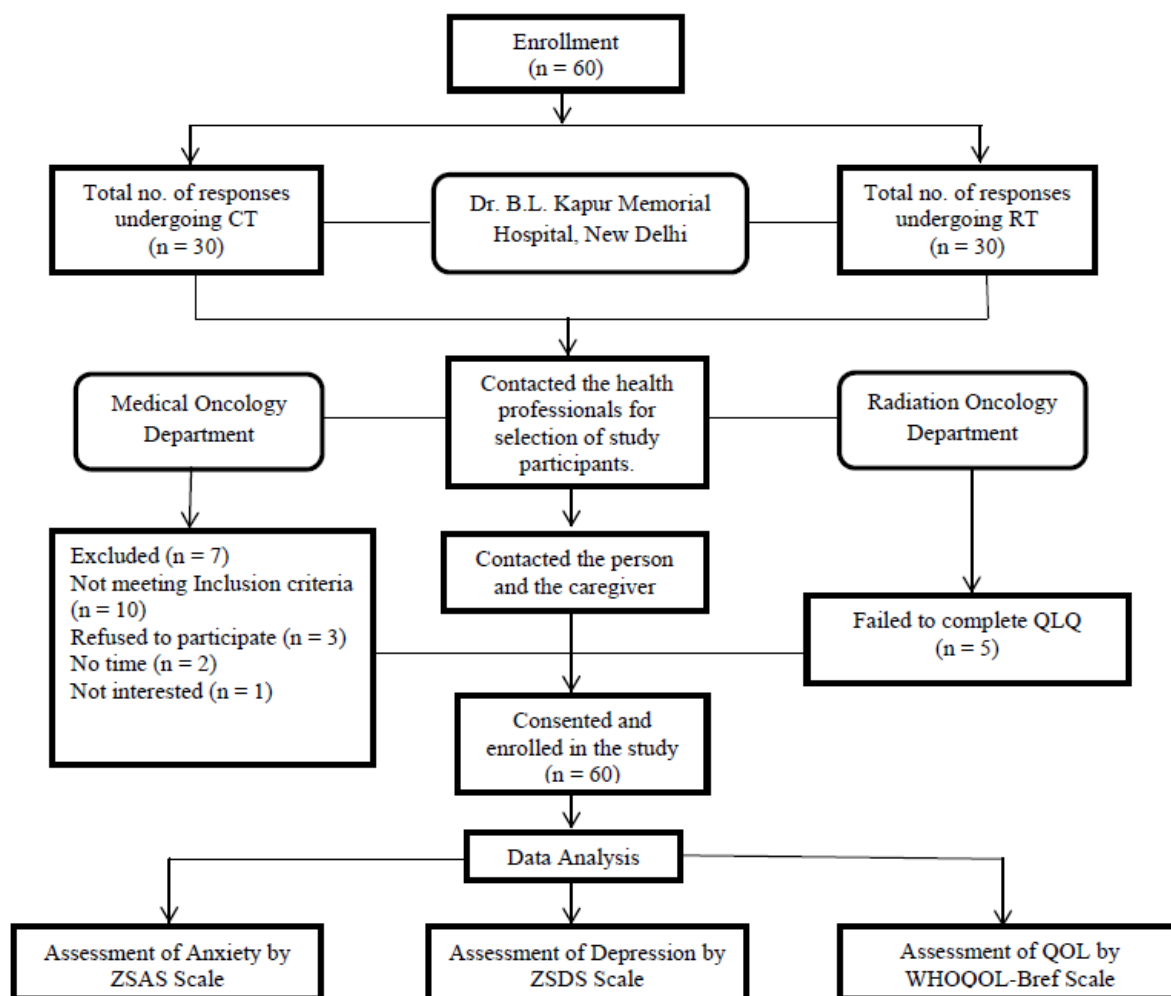
Flowchart of the Research Study

Fig.1: Flowchart of the research study after IRB and ethical approval

Results

(a) Data collection

Treatment-related symptoms were assessed by using a series of interviews through standard questionnaires of WHOQOL-Bref, the core questionnaire, followed by Zung Self-Rating Anxiety Scale (ZSAS) and Zung Self Rating Depression Scale (ZSDS) Questionnaires. These questionnaires have been proven to have good validity and reliability properties, cross-culturally accepted instrument to measure Quality of Life in cancer patients and are publicly available for scholar research purposes [23, 24, 25]. The questionnaire was provided in a language that the patient could understand easily (English / Hindi) followed by face-to-face interview of the patient who was either undergoing chemotherapy or radiotherapy treatment sessions.

Parts of the Record Card:

i. Personal information form:This first part contained patient information. The form was prepared, based on the literature. It contained age, gender, qualification, marital status, family type, Occupation, data on financial income and site of tumor location [23].

ii. WHOQOL-Bref Questionnaire: This is an abbreviated version of the instrument WHOQOL-100. It consisted of 26 questions, being two about quality of life in general and other 24 representing

each of the facets that made up the original instrument [23]. The questions were organized in 4 domains:

a. **Physical domain (DOM1)**: It included7 questions pertaining to sleep, energy, mobility, the extent to which pain prevents performance of necessary tasks, the need for medical treatment to function in daily life, level of satisfaction with their capacity for work [23].

b. **Psychological domain (DOM2)**: It included6 questions pertaining to the ability to concentrate, self-esteem, body image, spirituality i.e. the extent to which they feel their life is meaningful, the frequency of positive or negative feelings i.e. blue mood, despair, anxiety, depression [23].

c. **Social domain (DOM3)**: It included 3 questions pertaining to satisfaction with personal relationships, social support systems and sexual satisfaction [23].

d. **Environmental domain (DOM4)**: It included 8 questions related to safety and security, home and physical environment satisfaction, finance i.e. does the respondent have enough money to meet their needs, health/social care availability, information and leisure activity accessibility and transportation satisfaction [23].

Equations for computing domain raw scores:

Domain 1 (Physical) score = (6- Q3) + (6-Q4) + Q5 + Q6 + Q7 + Q8 + Q9

Domain 2 (Psychological) score = Q10 + Q11 + Q12 + Q13 + Q14 + (6-Q15)

Domain 3 (Social) score = Q16 + Q17 + Q18

Domain 4 (Environmental) score = Q19 + Q20 + Q21 + Q22 + Q23 + Q24 + Q25 + Q26 [23].

In addition to the 4 domains, the WHOQOL-Bref included two stand-alone questions, one pertaining to the respondents' rated QOL, and one related to their Satisfaction with Health were analyzed separately [23]. The score of each question ranged from 1 to 5 on a 5 point likert scale and higher scores indicated a better evaluation. Raw scores of the respective domains were then transformed from 0-100 with the lowest score of zero and the highest score of 100according to the accepted guidelines.

iii. ZSAS: Zung Self-Rating Anxiety scale quality life questionnaire is a likert scale format (scoring on 1 to 4 scale) that was built by a psychiatrist, William W. K. Zung to measure the rate of anxiety. The scale consisted of 20 self-reported items with 15 questions of increasing anxiety level and 5 questions of decreasing anxiety level (Q. no. 5, 9, 13, 17, 19) [24]. Scores for each question ranged from 1 to 4 and higher scores indicated severe anxiety level. The raw scores were counted up and multiplied by 1.25 to reach a standardized score, according to the instructions that accompanied the scale[24]. The ZSAS Index score followed the crierion: Normal Range (20-44); Mild to Moderate Anxiety level (45-59); Marked to Severe Anxiety level (60-74); Extreme Anxiety level (75-80)[24].

iv. ZSDS: Zung Self-Rating Depression scale quality life questionnaire is also a 20 items short self-administered survey that was designed by William W. K. Zung to assess the level of four common characteristics of depression for patients: the pervasive effect, the physiological equivalents, other disturbances, and psychomotor activities. There were ten positively worded and ten negatively worded questions. Each question was scored on a scale of 1-4 (a little of the time, some of the time, good part of the time, most of the time) [25]. The higher scores indicated severe depression level. The raw scores were counted up and multiplied by 1.25 to reach a standardized score, according to the instructions that accompanied the scale[25]. The ZSDS Index score followed the crierion: Normal Range (<50); Mild Depression level (<60); Moderate Depression level (<70); Extreme Depression level (>70) [25].

(b) Statistical analyses

The database and statistical analysis was performed by using SPSS v.17 software. The independent variables analyzed were Socio-demographic characteristics (sex/gender, age, education level, marital status, employment type, income level (per annum), job background, local residence), Clinical characteristics (smoking habit, drinking habit, tobacco use, health insurance, tumor type & location,

metastasis involved, corresponding cycle number for both chemotherapy and radiotherapy treatment); Anxiety and Depression of the patients as assessed by ZSAS and ZSDS respectively. The dependent variables included: subscale and overall QOL scores, and Health satisfaction as measured by WHOQOL-Bref Questionnaire (Tool/instrument). Descriptive statistics computation techniques were applied to the discrete and continuous data. Measures such as mean, standard deviation, minimum and maximum range were developed from the continuous data. Relative frequency was calculated for discrete data. Mean with Standard deviation (SD) was used to summarize the age of patients. Chi-square test was performed to assess the effect of different sociodemographic factors and clinical characteristics on the QOL of the cancer patients. Student's t-test was used to compare sample means for study variables (anxiety, depression and QOL). Bivariate analysis was performed to assess the predictors of QOL. Based on the survey/ research, Pearson Correlation coefficient test denoted by r was calculatedto assess the particular characteristic symptomatic function of anxiety and depression instrument that significantly affected the QOL domains, i.e., either positively or negatively. Paired t-test was used to compare difference between score means of different domains. A p-value < 0.05 was considered as statistical significant.

Socio-demographic characteristics of the patients

Table 4.1. Socio-demographic characteristics in the form of Frequency and percentage of variables of the patients and correlation in the two groups, i.e., Chemotherapy and Radiotherapy

S.No.	Variables	Parameters	Chemotherapy		Radiotherapy	
			Frequency (n)	Percentage (%)	Frequency (n)	Percentage (%)
1.	Gender	a. Male	6	20.0%	15	50.0%
		b. Female	24	80.0%	15	50.0%
2.	Age	a. 18-30 years				
		b. 30	5	16.7%	6	20.0%
		c. 46	17	56.7%	15	50.0%
		d. 60	8	26.7%	9	30.0%
3.	Marital status	a. Unmarried	30		1	3.3%
		b. Married	30	100.0%	28	93.3%
		c. Widow			1	3.3%
		d. Divorced/ Legally separated				
		e. Others				
4.	Educational status	a. Illiterate	1	3.3%	2	6.7%
		b. Literate				
		i. Primary	4	13.3%	5	16.7%
		ii. Secondary	10	33.3%	11	36.7%
		iii. Tertiary	15	50.0%	12	40.0%
5.	Occupation	a. Service	3	10.0%	10	33.3%
		b. Business	3	10.0%	2	6.7%
		c. Housewife	21	70.0%	11	36.7%

		d. Freelancers			1	3.3%
		e. Pensioners	3	10.0%	4	13.3%
		f. Domestic duties			1	3.3%
		g. Cultivation			1	3.3%
6.	Type of family	a. Nuclear	16	53.3%	9	30.0%
		b. Joint	14	46.7%	21	70.0%
7.	Cohabitants	a. Living alone				
		b. Living with partner	15	50.0%	4	13.3%
		c. Living with partner and children	1	3.3%	5	16.67%
		d. Living with children	14	46.7%	21	70.0%
8.	Annual income	a. NA	22	73.3%	11	36.7%
		b. ≤ 20	8	26.7%	19	63.3%
		c. 20				
		d. 30				
		e. 41				
		f. 84				
9.	Place of residence	a. Small town	1	3.3%	8	26.7%
		b. Big town	29	96.7%	22	73.3%

The mean age (SD) of the patients in Chemotherapy group: 54.37 (11.08) [Range: 32-75].
The mean age (SD) of the patients in Radiotherapy group: 54.21 (11.07) [Range: 32-75].
(All tests were performed using Pearson $\chi2$ test for association analysis)

Clinical characteristics of the patients

Table 4.2. Clinicalcharacteristics in the form of Frequency and percentage of variables of the

S.No.	Variables	Parameters	Chemotherapy		Radiotherapy	
			Frequency (n)	Percentage (%)	Frequency (n)	Percentage (%)
1.	Smoking habit	a. Non-smoker	27	90.0%	27	90.0%
		b. Ex-smoker	3	10.0%	4	10.0%
2.	Drinking habit	a. Non-drinker	30	100.0%	26	86.7%
		b. Ex-drinker			4	13.3%
3.	Tobacco use	a. Yes	1	3.3%	7	23.3%
		b. No	29	96.7%	23	76.7%
4.	Health insurance	a. Yes	23	76.7%	19	63.3%
		b. No	7	23.3%	11	36.7%
5.	Type of health insurance	a. Government medically insured	10	33.3%	12	40.0%

		b. TPA	13	43.3%	7	23.3%
		c. Cash	7	23.3%	11	36.7%
6.	Support by NGO	a. Yes			0	
		b. No	30	100.0%	30	100%
7.	Cancer tumor location	a. Ca Breast	23	76.7%	10	33.3%
		b. Ca Head	1	3.3%	5	16.7%
		c. Ca Neck	6	20.0%	15	50.0%
8.	Disease acceptance	a. Yes	23	76.7%	15	50.0%
		b. No	7	23.3%	15	50.0%
9.	Reproductive age of women	a. Pre-menopausal	10	33.3%	9	30.0%
		b. Menopausal	14	46.7%	6	20.0%
10.	Cancer type	a. Primary cancer b. Recurrent cancer	30	100.0%	30	100.0%
11.	Co-existence of metastasis	a. Yes	8	26.7%	30	100.0%
		b. No	22	73.4%		
12.	Chemotherapy's cycle during the interview of QLQ	a. 1st				
		b. 2nd	2	6.7%		
		c. 3rd	15	50.0%		
		d. 4th	6	20.0%		
		e. 5th	6	20.0%		
		f. 6th	1	3.3%		
13	Radiotherapy's cycle during the interview of QLQ	a. 10th-15th			5	16.7%
		b. 16th – 20th			21	70.0%
		c. 21st – 25th			3	10.0%
		d. 26th 30th			1	3.3%

patients and correlation in the two groups, i.e., Chemotherapy or Radiotherapy

(All tests were performed using Pearson χ2 test for association analysis).

From the above table no. 4.1 and 4.2, it was observed that there was no significant correlation and association between the QOL and variables such as age, sex, marital status, and occupational function, etc. Furthermore, no correlation was found between QOL and the patients' educational level (literate

or illiterate). The age distribution indicated that the adult and elderly people were the most affected. Hence, no significant correlation of the Socio-demographic and clinical characteristics of the patients (sample) with the domains of quality of life was observed.

Table 4.3. Internal consistency of WHOQOL-Bref, ZSAS, and ZSDS domains as measured by Cronbach's α based on participants who completed the Questionnaire during Chemotherapy or Radiotherapy sessions.

Measure	Purpose	Domains	Scale	Time frame	No. of items	Administered by and (completion time)	Reliability
World Health Organization Quality of Life – Brief Version (WHOQOL-BREF)[23].	Designed to examine domain level profiles assessing quality of life[23].	Four domains: Physical health; psychological; social relationships; environment[23].	Five point Likert scale with varying anchors[23].	Past two weeks[23].	26	Self-administered (estimated 15-20 minutes)[23].	0.672
Zung self-rating anxiety scale[24].	Designed to measure anxiety[24].	Anxiety[24].	Four point Likert scale ranging from 1 (A little of the time) to 4 (Most of the time)[24].	Last 5 days[24].	20	Self-administered (estimated 10 minutes)[24].	0.742
Zung self-rating depression scale[25].	Designed to measure depression[25].	Depression[25].	Four point Likert scale ranging from 1 (A little of the time) to 4 (Most of the time)[25].	Last 5 days[25].	20	Self-administered (estimated 10 minutes)[25].	0.532

Reliability of the scales and questionnaire (TOOLS/ INSTRUMENTS) used in the study

12(40%) of patients filled the English version of QLQ whereas 18(60%) of patients filled the translated vernacular version (Hindi language) in Chemotherapy section. On the other hand, 8(26.6%) of patients filled the English version of QLQ whereas 22(73.3%) of patients filled the translated vernacular version (Hindi language) in Radiotherapy section.

Impact of anxiety and depression on different domains of qol in chemotherapy group

Table 4.4. Paired *t*-test between WHOQOL-Bref domains, ZSAS, and ZSDS for Chemotherapy (n = 30)&Radiotherapy (n = 30)

CHEMOTHERAPY								
	Paired differences				*t*-test	r- value	df	Sig. (2-tailed)
	Mean	SD	95%CI of the difference					
			Lower	Upper				
Pair 1 (ZSAS CT-DOM1 CT)	26.95	19.13	19.81	34.10	7.71	r= -0.480 p=0.007	29	p<0.001
Pair 2 (ZSAS CT-DOM4 CT)	11.62	14.63	6.15	17.09	4.35	r= -0.384 p= 0.036	29	p<0.001
Pair 3 (ZSDS CT-DOM3 CT)	17.00	12.79	12.22	21.77	7.27	r= -0.371 p=0.043	29	p<0.001
RADIOTHERAPY								
Pair 1 (ZSAS RT-DOM3 RT)	13.22	17.78	6.58	19.86	4.07	r= -0.435 p=0.016	29	p<0.001
Pair 2 (ZSDS RT-DOM3 RT)	11.39	15.85	5.47	17.31	3.93	r= -0.453 p= 0.012	29	p<0.001

It could be observed from the above table that in chemotherapy group, anxiety level affected the Physical health domain (r= -0.480; p=0.007), and Environmental domain (r= -0.384; p=0.036). On the other hand, depression level affected the social relationship domain (r= -0.371; p= 0.043). These results were found to be statistically significant at p < 0.05 (critical value). Moreover, the relationship between the anxiety and QOL domains, and depression and QOL domains was found to be negatively correlated which signified that there was a marked decrease in QOL due to increase in anxiety or depression level of the cancer patients. On the other hand, in radiotherapy group, anxiety level affected the Social relationship domain (r= -0.435; p=0.016), and depression level affected the social relationship domain (r= -0.453; p= 0.012). These results were found to be statistically significant at p < 0.05 (critical value). Moreover, the relationship between the anxiety and QOL domains, and depression and QOL domains was found to be negatively correlated which signified that that there was a marked decrease in QOL due to increase in anxiety or depression level of the cancer patients.

Facets with greater influence of Anxiety and Depression in each domain of WHOQOL-Bref of patients undergoing Chemotherapy treatment (n = 30) &Radiotherapy treatment (n = 30) (Pearson Correlation test)

Table 4.5: Anxiety and depression affecting the Q.no. (facets) in particular domain of WHOQOL-Bref in chemotherapy group (n = 30) & radiotherapy group (n = 30)

CHEMOTHERAPY			
ANXIETY x WHOQOL Bref Question			
Question no.	Facet evaluated	r	p
Q 8.	Activities of daily living	-0.483	0.007
Q 9.	Work Capacity	-0.606	p<0.001
Q 17.	Social support	-0.521	0.003
Q 19.	Security	-0.376	0.041
Q 23.	Leisure activity& Recreation	-0.519	0.003
DEPRESSION x WHOQOL Bref Question			
Q 17.	Social support	-0.438	0.016
RADIOTHERAPY			
ANXIETY x WHOQOL Bref Question			
Q 16.	Personal relations/ Family happiness	-0.541	0.002
DEPRESSION x WHOQOL Bref Question			
Q 16.	Personal relations/ Family happiness	-0.593	0.001

In the Chemotherapy group, Anxiety affected: the activities of daily living and Working capacity in the Physical health domain; and sense of security and leisure activity and recreation in Environmental domain with $p < 0.05$. On the other hand, in the Chemotherapy group, Depression affected the social support in social relationship domain with $p < 0.05$. In the Radiotherapy group, Anxiety affected the personal relations in social relationship domain with $p < 0.05$. On the other hand, in the Radiotherapy group, Depression affected the personal relations in social relationship domain with $p < 0.05$.

QOL domain scores for chemotherapy sessions (n = 30)

Table 4.6: QOL domain scores for Chemotherapy sessions (n = 30)

Domains for QOL/Scale	Minimum possible raw score	Maximum possible raw score	Mean of raw score	SD of raw score	Mean of Score translated on a scale of 100
Physical	7	35	17.97	3.09	39.66
Psychological	6	30	17.94	1.87	49.76
Social	3	15	7.77	0.89	41.66
Environmental	8	40	24.83	1.94	55.00
ZSAS Scores	20	80	53.30	9.10	66.62
ZSDS Scores	20	80	46.94	5.63	58.66

In the chemotherapy group, the physical domain was the most affected domain, followed by social domain, psychological domain and environmental domain in the descending order.

QOL domain scores for Radiotherapy sessions (n = 30)

Table 4.7. QOL domain scores for radiotherapy sessions (n = 30)

Domains for QOL/Scale	Minimum possible raw score	Maximum possible raw score	Mean of raw score	SD of raw score	Mean of Score translated on a scale of 100
Physical	7	35	17.37	4.18	37.13
Psychological	6	30	17.74	2.78	49.10
Social	3	15	7.77	1.25	40.73
Environmental	8	40	25.10	2.35	55.26
ZSAS Scores	20	80	43.17	8.04	53.95
ZSDS Scores	20	80	41.70	6.05	52.12

In the Radiotherapy group, the physical domain was the most affected domain, followed by social domain, psychological domain and environmental domain in the descending order.

From the Table 4.6 and Table 4.7, it can be elucidated that anxiety and depression scores were more high in the Chemotherapy group as compared to the Radiotherapy group that indicated that the Chemotherapy group had higher levels of Anxiety and Depression during Chemotherapy or Radiotherapy treatment.

Facets/Items of Anxiety domain in ZSAS and Depression domain in ZSDS affecting WHOQOL-Bref domains in Chemotherapy group (n = 30)

Table 4.8. Symptoms of anxiety and depression affecting particular domains of WHOQOL-Bref in chemotherapy group (n = 30)

	WHOQOL Bref Question x ANXIETY (ZSAS)				
	WHOQOL-Bref Domain	ZSAS Question no.	Facet evaluated/Symptoms	r	p
C H E M O T H E R A P Y	**PHYSICAL DOMAIN** 1. Activities of daily living	Q 1.	More nervousness	**-0.382**	**0.032**
		Q 10.	Fast heart beat	**-0.445**	**0.014**
		Q 11.	Dizzy spells affect	**-0.450**	**0.013**
		Q 12.	Fainting spells	**-0.487**	**0.006**
		Q 17.	Dry and warm hands	**-0.548**	**0.002**
		Q 20.	Nightmare problem	**-0.466**	**0.010**
	2. Work capacity	Q 3.	Upset	**-0.380**	**0.039**
		Q 4.	Falling down feeling	**-0.481**	**0.007**
		Q 5.	Positive feeling	**0.470**	**0.009**
		Q 9.	Calmness	**0.487**	**0.006**
		Q 11.	Dizzy spells affect	**-0.656**	**p<0.001**
		Q 12.	Fainting spells	**-0.634**	**p<0.001**
		Q 17.	Dry and warm hands	**-0.483**	**0.007**
		Q 20.	Nightmare problem	**-0.623**	**p<0.001**
	ENVIRONMENTAL DOMAIN 3. Security	Q 5.	Positive feeling	**0.418**	**0.021**
		Q 6.	Shaking of arms and legs	**-0.383**	**0.037**
		Q 9.	Calmness	**0.436**	**0.016**
		Q 10.	Fast heart beat	**-0.397**	**0.030**

		Q 11.	Dizzy spells affect	**-0.366**	**0.046**
		Q 12.	Fainting spells	**-0.376**	**0.041**
		Q 20.	Nightmare problem	**-0.484**	**0.007**
	4. Leisure Activity	Q 1.	More nervousness	**-0.424**	**0.020**
		Q 5.	Positive feeling	**0.504**	**0.004**
		Q 9.	Calmness	**0.436**	**0.016**
		Q 10.	Fast heart beat	**-0.550**	**0.002**
		Q 11.	Dizzy spells affect	**-0.397**	**0.030**
		Q 12.	Fainting spells	**-0.401**	**0.028**
		Q 20.	Nightmare problem	**-0.575**	**0.001**
WHOQOL Bref Question x DEPRESSION (ZSDS)					
SOCIAL DOMAIN 1. Social Support		Q 9.	Tachycardia	**-0.431**	**0.018**

From the above table, it could be depicted that Anxiety symptoms such as, Nervousness, fast heartbeat, dizzy & fainting spells affect, dry warm hands, and nighmares with p < 0.05 was significantly correlated with the Activities of the daily living in the Physical domain of the chemotherapy group. Moreover, Anxiety symptoms such as, upset feeling, falling down feeling, positive feeling, calmness, dizzy & fainting spells affect dry warm hands, and nighmares with p < 0.05 was significantly correlated with the work capacity in the Physical domain of the chemotherapy group. In the environmental domain, the WHOQOL-Bref factor namely, Security and Leisure activity was significantly affected by Anxiety symptoms such as, Positive feeling, Shaking of arms and legs, Calmness, Fast heart beat, Dizzy spells affect, Fainting spells, Nightmare problem; and More nervousness, Positive feeling, Calmness, Fast heart beat, Dizzy spells affect, Fainting spells, Nightmare problem, respectively with p < 0.05. On the other hand, Depression symptom such as, Tachycardia affected Social support of social domain in the Chemotherapy group that was significantly correlated with p < 0.05. In chemotherapy group, the physical domain consisting of Activities of daily living and Work capacity were significantly strongly correlated to each other (r= 0.742; p<0.001). On the other hand, the Environmental domain that consisted of Security and Leisure activity factor were significantly correlated to each other (r= 0.567; p = 0.001) in the chemotherapy group.

Facets/Items of Anxiety domain in ZSAS and Depression domain in ZSDS affecting WHOQOL-Bref domains in Radiotherapy group (n = 30)

Table 4.9: Symptoms of anxiety and depression affecting particular domains of WHOQOL-Bref in radiotherapy group (n = 30)

	WHOQOL Bref Question x ANXIETY (ZSAS)				
R A D I O T H E R A P Y	**WHOQOL-Bref Domain**	**ZSAS Question no.**	**Facet evaluated/Symptoms**	**r**	**p**
	SOCIAL DOMAIN 1. Personal relationship	Q 7.	Headache, neck, back pain	**-0.409**	**0.025**
		Q 8.	Weakness	**-0.454**	**0.012**
		Q 10.	Fast heart beat	**-0.387**	**0.034**
		Q 18.	Hot and blushing face	**-0.372**	**0.043**
	WHOQOL Bref Question x DEPRESSION (ZSDS)				
	SOCIAL DOMAIN 2. Personal relationship	Q 1.	Depressed affect	**-0.394**	**0.031**
		Q 9.	Tachycardia	**-0.387**	**0.035**
		Q 10.	Fatigue	**-0.417**	**0.022**
		Q 13.	Psychomotor agitation	**-0.456**	**0.011**
		Q 15.	Irritability	**-0.421**	**0.021**

The above table indicated that the Anxiety symptoms namely, Headache, neck pain, back pain, weakness, fast heart beat and hot blushing face ; and Depression symptoms such as, depressed affect, Tachycardia, fatigue, Psychomotor agitation, irritability factors were negatively correlated ($p < 0.05$) with the social domain of WHOQOL-Bref questionnaire thereby affecting the personal relationship in the Radiotherapy group.

Discussion

In a study conducted by Zhen Guo *et al.* (2013), it was observed that during Radiotherapy treatment (n = 89) enrolled patients were affected by anxiety (52%) and depression (48%), as assessed by ZSAS and ZSDS, respectively [4]. Of these patients, women suffered from more anxiety (61%) and depression (53%) than men (anxiety, 39%; depression, 38%) [4]. The researcher used the European Organization for Research and Treatment of Cancer Quality of Life Questionnaire-Core 30 (EORTC QLQ-C30) to survey health-related QOL of cancer patients during Radiotherapy treatment [4]. In a study conducted by Luciano J. Pereira *et al.*(2015) on a group of 30 cancer patients, it was observed that while measuring QOL through WHOQOL-Bref, significant differences between cancer patients and controls for the Social Relationship and Environment domains and also for the overall QOL were observed [13]. These results were expected since cancer treatment discomfort and consequences were known to promote changes in physical and emotional integrity and loss of self-esteem, with consequent reduction in quality of life [13]. Negative impact was observed on the psychological and environmental domains of the assessed individuals [13]. In a study conducted by Novin Nikbakhsh,*et al.* (2014) on 150cancer population undergoing Chemotherapy or Radiotherapy, high frequency of significant association was observed in the patients who received chemotherapy as a single treatment (66.7% had symptomatic depression and 77.8% symptomatic anxiety) as assessed by hospital anxiety and depression scale (HADS)developed by Zigmond and Snaith in 1983 that wasbased on a four point 14-item HADS with two subscales for anxiety (seven items) and for depression (seven items) [12]. Pandey *et al*'s study on 117 patients with cancer revealed that 23% of patients who received Chemotherapy had depression [17]. Cazzaniga *et al.* Showed that radiotherapy in patients with cancer caused depression and anxiety [17]. Souza *et al.* Studied 102 patients with cancer under chemotherapy and observed that 10.8% and 1.9% of them had moderate and severe depression, respectively[17]. In a study conducted by Zahra Shayan *et al.* (2014) on 260 patients with cancer, 46(18.5%) had borderline

depression, 46(18.5%) had slight depression, 52(20.9%) had moderate depression 15(6%) had severe depression, and 5(2%) had very severe depression as assessed by the Beck questionnaire that consisted of 21 items [17]. In a study conducted by Preeti (2015) on 40 cancer patients out of which 20 underwent chemotherapy sessions and 20 patients underwent Radiotherapy, revealed that anxiety level was high in patients treated with Radiotherapy and depression level was high in patients treated with Chemotherapy [19]. The results of the present study investigations allowed the investigator to state that QLQ with counseling could play a key role in the life of cancer patients through the resulting improvement in their QOL. This fact was supported by the study conducted by Hogan *et al.* who observed that 73 studies reported some benefit of social support provided by friends and families to patients with chronic conditions due to cancer or cancer treatment related side-effects [18]. Unfortunately, cancer caregivers often lack the skills and resources they need to help the patient manage their treatment and the negative consequences of their disease and its management [18].

According to the investigator's knowledge, these preliminary findings were among the first to illustrate the association of the anxiety and depression levels with quality of life of cancer patients during inpatient chemotherapy or outpatient radiotherapy treatment using the QOL assessment tools: WHOQOL-Bref, ZSAS, and ZSDS in the form of questionnaire.

Conclusion

In Indian scenario, population differs in ethnic, social, cultural as well as economical aspects as compared with western population, so it was necessary to study the factors of anxiety and depressionthat affected QOL especially of Indian cancer patients. Chemotherapy, and Radiotherapy treatment for cancer could dramatically effect body and mind of the cancer patient receiving treatment. In the present study, it was observed that Moderate to Severe levels of Anxiety significantly affected the activities of daily living and work capacity of the Physical health domain; and Security and Leisure activity of the Environmental domain in the chemotherapy group patients, and the personal relation factor of Social relationship domain in the radiotherapy group patients. On the other hand, Mild levels of Depression affected the Social support factor of Social relationship in the chemotherapy group and personal relation factor of Social relationship domain in the radiotherapy group. Therefore, further investigation about this topic could be a great help to treatment of anxiety and depression in patients with cancer undergoing either of the treatment. The results suggested that WHOQOL-Bref, ZSAS, and ZSDS could be used as a reliable predictor of association and correlation of anxiety and depression with that of quality of life in the cancer patients. Moreover, the WHOQOL-Bref, ZSAS, and ZSDS were observed to be psychometrically sound tool with moderate internal consistency that could be used in English language as well as, Hindi language in the cancer population of North India. Patients on chemotherapy were more badly affected in some domains of quality of life, compared to those on radiotherapy. In cancer, even with limited resources, an impact could be achieved if the right priorities and strategies are established and implemented. Thus, the social origin of lifestyle must be considered in management of QOL of cancer patients. Anxiety and Depression affected the Physical, Social and Environmental domains the most in chemotherapy group. On the other hand, Anxiety and Depression affected the Social domain the most in the radiotherapy group. Thus, it was observed that though levels of anxiety and Depression were inversely (negatively) correlated with the domains of Quality of life of cancer patients during chemotherapy or radiotherapy, yet the relationship was significant. This study showed that the increase in anxiety or depression level subsequently reduced or decreased the QOL of the cancer patients either undergoing Chemotherapy or Radiotherapy treatment. The present study showed that Anxiety and Depression could be used as Predictors or Determinants of QOL of cancer patients during the chemotherapy session or radiotherapy sessions. Thus, there is no "gold standard" of QOL measurement because no one instrument would be appropriate for all situations. So, the quality of life is influenced by how the patient view what is happening to them right at this very moment, i.e., during the treatment modality (Chemotherapy or Radiotherapy) sessions.

Future directions

i.   To investigate the usefulness and feasibility of QLQ intervention, further work, including a prospective longitudinal multicenter study, is recommended.

ii.   Psycho-Oncology Clinic should be made functional at every hospital for the needy cancer patients once a week. Frequency should be increased depending upon the requirement.

iii.   Recommendations for future studies include qualitative studies with larger sample size so that the data can be generalized across a broader population regarding Quality of life interventions for providers and how such interventions can improve patient outcomes.

iv.   An optimum level and high quality of care for patients with different types of cancer treated for cancer could be achieved by frequent and regular measurement of the quality of life of cancer patients through QLQ.

v.   There is need for media attention, further research in QOL, strong participation of non-governmental organizations and care groups to cope the disease for long- term survivors.

vii.   Finally, an interventional study focusing on the spiritual and social needs of the patient as well as pain and symptom management could be implemented in a hospital setting.

Limitations of the study

i.   Study was delimited to small sample size of 60 patients receiving chemotherapy (n = 30) and radiotherapy (n = 30) in the age group of 18-75 years, which might cause potential sampling errors.

ii.   The study lacked active control groups. The results would have been different if the same individual who underwent chemotherapy also undergoes through radiotherapy treatment; therefore, it was difficult to find a matched group as control for comparison. Using the pre-treatment status as the internal control and following up its changes over time would be more appropriate method for comparison.

iii.   The duration of time of the research study evaluation for anxiety and depression through QLQ was short, which meant that it was unable to determine how mood swings and behavioral changes in cancer patients would take place in the time after the end of Chemotherapy or Radiotherapy treatment.

iv.   This study was a restricted one because it was a single-centered, cross-sectional study in which the cause and effect relationship was not established.

Footnotes

Acknowledgement

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