Psychosocial Distress in Cancer Patients Undergoing Radiotherapy: A Pre-Post Assessment Using the CaPSY-D Scale

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Abstract

Background: Cancer patients undergoing radiotherapy face significant psychosocial distress spanning personal, disease-related, financial, physician-related, and family domains. Validated multidimensional tools that capture this distress across the treatment trajectory are essential for improving psychosocial care in oncology settings.

Objective: To assess and compare psychosocial distress in cancer patients before and after completion of radiotherapy using the Cancer Psychosocial Distress (CaPSY-D) scale.

Methods: A prospective observational study was conducted at a tertiary cancer centre. Sixty-four eligible cancer patients scheduled for radiotherapy were enrolled. The CaPSY-D scale was administered at two time points: before initiation (pre-radiotherapy) and after completion (post-radiotherapy) of treatment. Descriptive statistics and the Wilcoxon signed-rank test were used for analysis.

Results: The majority of participants were male (60.9%), belonged to the 31–45 year age group (34.3%), and presented with head and neck cancer (50%). Stage III disease was most prevalent (35.9%). Post-radiotherapy, notable improvements were observed in personal distress, disease-related fear, radiation anxiety, and physician communication. However, financial burden on the patient's family worsened post-treatment, with 53.1% reporting it 'almost always' compared to 37.5% pre-radiotherapy.

Conclusion: Radiotherapy is associated with measurable changes across psychosocial distress domains. While psychological and disease-related fears diminish post-treatment, financial distress—particularly familial burden—persists and may intensify. Integrated financial counselling and multidisciplinary psychosocial interventions are strongly recommended alongside radiotherapy.

Keywords: Psychosocial distress; radiotherapy; cancer; CaPSY-D; head and neck cancer; financial toxicity; quality of life

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Introduction

Cancer remains one of the foremost causes of morbidity and mortality worldwide. According to GLOBOCAN 2022, approximately 20 million new cancer cases and 9.7 million cancer-related deaths were recorded globally, with projections estimating 35 million new cases annually by 2050.1 Beyond the substantial physical burden, cancer patients routinely experience psychological, social, and financial difficulties collectively termed 'psychosocial distress.' The National Comprehensive Cancer Network (NCCN) defines distress as a multifactorial unpleasant experience of a psychological, social, spiritual, and/or physical nature that may interfere with one's ability to cope effectively with cancer and its treatment.2

Radiotherapy is a cornerstone of contemporary cancer management, with approximately 50% of

cancer patients having an indication for radiotherapy at some point during their illness.3 While advances in radiation technology have improved tumor control and reduced toxicity, patients undergoing radiotherapy encounter distinct psychosocial challenges including radiation-specific anxiety, fear of side effects, body image concerns, disruption of social and family roles, and significant financial burden.4 These stressors collectively impair quality of life and adversely affect treatment adherence.5

In India, head and neck cancers are particularly prevalent, accounting for approximately 26% of all cancers in males, with an age-standardized incidence rate of 25.9 per 100,000 population.6 Cancer treatment in this setting is often delivered in high-volume tertiary public institutions, with a large proportion of patients from low socioeconomic backgrounds relying on government health insurance schemes such as the Below Poverty Line (BPL) initiative. Financial toxicity—defined as the objective burden and subjective distress arising from cancer treatment costs—is a well-documented challenge in Indian oncology settings, with studies demonstrating its association with poor quality of life, treatment non-adherence, and catastrophic household expenditure.7

Multiple instruments have been developed to screen psychosocial distress in oncology, including the Hospital Anxiety and Depression Scale (HADS) and the Distress Thermometer (DT). However, many do not fully capture the multidimensional distress specific to the radiotherapy experience, particularly radiation-related anxiety, physician communication concerns, and domain-specific financial stressors.8 The Cancer Psychosocial Distress (CaPSY-D) scale was developed to address this gap, assessing distress across seven distinct domains that are particularly relevant to patients receiving radiotherapy.9

Prospective data comparing pre- and post-radiotherapy psychosocial distress profiles within the Indian context remain limited. Understanding how distress domains evolve across the treatment trajectory can facilitate targeted psychosocial interventions and enable the development of comprehensive, patient-centred oncology care. This study therefore aimed to assess and compare psychosocial distress in cancer patients before and after completion of radiotherapy using the validated CaPSY-D scale.

Objectives

The primary objective of this study was to assess psychosocial distress in cancer patients using the CaPSY-D scale before and after completion of radiotherapy.

Methodology

Study Design and Setting

This was a prospective observational study conducted at the Department of Radiation Oncology of a tertiary cancer center. The study was conducted over a defined period following institutional ethics committee approval.

Participants

Adult cancer patients (aged ≥18 years) newly scheduled for radiotherapy with curative or palliative intent were eligible for inclusion. Exclusion criteria included significant cognitive impairment, severe pre-existing psychiatric illness, and inability to provide informed consent. Sixty-four patients meeting the eligibility criteria and providing written informed consent were enrolled.

Data Collection Tool: The CaPSY-D Scale

The Cancer Psychosocial Distress (CaPSY-D) scale is a validated, multidimensional self-report instrument for cancer patients receiving radiotherapy. It comprises 26 items across seven domains: Personal Problems (4 items), Radiation-Related Problems (4 items), Disease-Related Problems (3 items), Financial Problems (3 items), Physician-Related Problems (4 items), Family-Related Problems (4 items), and Patient-Related Problems (3 items). Each item is rated on a 4-point Likert scale: 1 = 'Not at all,' 2 = 'Sometimes,' 3 = 'Often,' 4 = 'Almost always,' with higher scores indicating greater distress.9 The scale was administered in the patient's preferred language by a trained researcher.

Procedure

The CaPSY-D scale was administered at two time points: (i) pre-radiotherapy — within one week before commencement of the first radiotherapy fraction; and (ii) post-radiotherapy — within one week after completion of the final fraction. Sociodemographic and clinical data were collected at baseline using a structured proforma.

Statistical Analysis

Data were analysed using IBM SPSS Statistics Version 26.0 (IBM Corp., Armonk, NY, USA). Categorical variables were summarised using frequency and percentage. Given the ordinal nature of Likert scale data, the Wilcoxon signed-rank test was used to compare pre- and post-radiotherapy scores for each CaPSY-D item and domain. A p-value <0.05 was considered statistically significant.

Ethical Considerations

Institutional Ethics Committee approval was obtained (Ref. No. [to be inserted]). Written informed consent was obtained from all participants. Patients

identified with severe distress were referred to the department's psycho-oncology counselling service.

Results

A total of 64 cancer patients were enrolled. The majority were male (n=39, 60.9%). The most prevalent age group was 31–45 years (n=22, 34.3%). Nearly all participants were married (n=62, 96.8%), with 68.7% residing in households with more than three members. Kannada was the preferred language for 59.3%. High school education was most common (43.7%). Most patients held government health insurance under the BPL scheme (82.2%). A significant proportion were unemployed (37.5%) and 84.3% had a monthly household income below INR 50,000. Urban and rural residence was nearly equally distributed (Table 1).

Table 1: Sociodemographic Characteristics of Study Participants (n=64)

Variable	Category	n	%
Gender	Male	39	60.9
	Female	25	39.0
Age Group (years)	18–30	4	6.2
	31–45	22	34.3
	46–60	18	28.1
	61–75	18	28.1
	>75	2	3.1
Marital Status	Married	62	96.8
	Unmarried	2	3.1
Education	Not educated	11	17.1
	Primary school	14	21.8
	High school	28	43.7
	Graduation	11	17.1
Employment	Unemployed	24	37.5
	Self-employed	19	29.6
	Employed	21	32.8
Monthly Income (INR)	<50,000	54	84.3
	50,000–1,00,000	10	15.6
Health Insurance	Yes (BPL)	53	82.2
	Yes (Private)	5	7.8
	No insurance	7	10.9
Residence	Urban	31	48.4
	Rural	33	51.5

4.2 Clinical Profile

Head and neck cancers were the most prevalent cancer type (50%), followed by breast (18.7%) and gastrointestinal cancers (9.3%). Stage III disease was most common (35.9%), followed by stage II (31.2%) and stage IV (26.5%). The majority received curative-intent treatment (85.9%), with post-operative radiotherapy (Sx-RT/PORT) the most frequent modality (59.3%). IMRT was the predominant technique (50%). Concomitant chemotherapy was administered to 31.2%. Approximately 30% required hospitalisation during radiotherapy (Table 2).

Table 2: Clinical Characteristics of Study Participants (n=64)

Variable	Category	n	%
Type of Cancer	Head & Neck	32	50.0
	Breast	12	18.7
	GIT	6	9.3
	CNS	4	6.2
	Reproductive	4	6.2
	Lung	2	3.1
	Skin	2	3.1
	Genitourinary	1	1.5
	Endocrine	1	1.5
Clinical Stage	I	4	6.2
	II	20	31.2
	III	23	35.9
	IV	17	26.5
Treatment Intent	Curative	55	85.9
	Palliative	9	14.1
Treatment Modality	Sx-RT (PORT)	38	59.3
	CCRT	11	17.1
	Radical RT (alone)	8	12.5
	CT-RT (IFRT)	7	10.9
	IMRT	32	50.0

Variable	Category	n	%
Radiation Technique	IGRT	10	15.6
	2D	5	7.8
	3D	5	7.8
	DIBH	4	6.2
	SRS	2	3.1
Concomitant Chemo	Yes	20	31.2
	No	44	68.7
Hospitalized During RT	Yes	19	29.6
	No	45	70.3

4.3 CaPSY-D Item-Level Responses: Pre- vs. Post-Radiotherapy

Table 3 summarizes item-level response distributions across all seven CaPSY-D domains.

Personal Problems: Pre-radiotherapy, trouble sleeping was endorsed as 'often' or 'almost always' by 65.5% of patients; hopelessness about the future was similarly prevalent (64%). Post-radiotherapy, hopelessness rated 'not at all' increased from 7.8% to 32.8%, and concentration difficulties improved markedly.

Radiation-Related Problems: Nervousness (65.6% 'often/almost always' pre-RT) substantially improved post-radiotherapy, with 20.3% reporting it 'not at all.' Anxiety about daily attendance and body image concerns also reduced considerably.

Disease-Related Problems: Fear of cancer spreading or relapse was the most prominent concern pre-radiotherapy (62.4% 'often/almost always'); post-radiotherapy, 95.3% endorsed it as 'not at all' or 'sometimes.' Disease preoccupation declined similarly.

Financial Problems: Treatment costs remained a persistent burden (65.6% 'often/almost always' post-RT). Notably, financial burden on the family worsened post-radiotherapy, with 53.1% reporting it 'almost always' compared to 37.5% pre-radiotherapy.

Physician-Related Problems: Marked improvement in physician communication was evident. Post-radiotherapy, 85.9% of patients reported their doctor 'almost always' understood their concerns, compared to 18.7% pre-radiotherapy. Patients unable to discuss worries with their doctor fell dramatically.

Family-Related Problems: Emotional impact on family and disturbance of family life improved moderately. Sexual life concerns largely resolved, with 84.3% reporting no impact post-treatment.

Patient-Related Problems: Inability to cope with illness reduced substantially post-radiotherapy, with 84.3% reporting adequate coping.

Table 3: CaPSY-D Item-Level Responses Pre- and Post-Radiotherapy (n=64)

Domain / Item	Time	Not at all n (%)	Sometimes n (%)	Often n (%)	Almost always n (%)
Personal: Easily upset/irritable	Pre	10 (15.6%)	20 (31.2%)	17 (26.5%)	17 (26.5%)
	Post	17 (26.5%)	32 (50.0%)	15 (23.4%)	0 (0%)
Personal: Trouble sleeping	Pre	6 (9.3%)	16 (25.0%)	25 (39.0%)	17 (26.5%)
	Post	21 (32.8%)	20 (31.2%)	13 (20.3%)	10 (15.6%)
Personal: Feel hopeless	Pre	5 (7.8%)	18 (28.1%)	23 (35.9%)	18 (28.1%)
	Post	21 (32.8%)	33 (51.5%)	9 (14.0%)	1 (1.5%)
Personal: Hard to concentrate	Pre	5 (7.8%)	17 (26.5%)	24 (37.5%)	18 (28.1%)
	Post	17 (26.5%)	34 (53.1%)	8 (12.5%)	5 (7.8%)
Radiation: Feel nervous	Pre	2 (3.1%)	20 (31.2%)	24 (37.5%)	18 (28.1%)
	Post	13 (20.3%)	32 (50.0%)	9 (14.0%)	10 (15.6%)
Radiation: Anxious daily attendance	Pre	7 (10.9%)	17 (26.5%)	22 (34.3%)	18 (28.1%)
	Post	14 (21.8%)	26 (40.6%)	14 (21.8%)	10 (15.6%)
Radiation: Body image concern	Pre	7 (10.9%)	15 (23.4%)	22 (34.3%)	20 (31.2%)
	Post	19 (29.6%)	25 (39.0%)	13 (20.3%)	7 (10.9%)

Domain / Item	Time	Not at all n (%)	Sometimes n (%)	Often n (%)	Almost always n (%)
Radiation: Distressed about side effects	Pre	32 (50.0%)	18 (28.1%)	9 (14.0%)	5 (7.8%)
	Post	19 (29.6%)	36 (56.2%)	7 (10.9%)	2 (3.1%)
Disease: Fear of spreading/relapse	Pre	6 (9.3%)	18 (28.1%)	17 (26.5%)	23 (35.9%)
	Post	32 (50.0%)	29 (45.3%)	2 (3.1%)	1 (1.5%)
Disease: Preoccupied with illness	Pre	10 (15.6%)	22 (34.3%)	17 (26.5%)	15 (23.4%)
	Post	34 (53.1%)	29 (45.3%)	1 (1.5%)	0 (0%)
Disease: Reduced life control	Pre	8 (12.5%)	20 (31.2%)	22 (34.3%)	14 (21.8%)
	Post	26 (40.6%)	27 (42.1%)	8 (12.5%)	3 (4.6%)
Financial: Cost of treatment	Pre	3 (4.6%)	12 (18.7%)	24 (37.5%)	25 (39.0%)
	Post	9 (14.0%)	13 (20.3%)	22 (34.3%)	20 (31.2%)
Financial: Worried about income/job	Pre	5 (7.8%)	17 (26.5%)	32 (50.0%)	10 (15.6%)
	Post	28 (43.7%)	14 (21.8%)	11 (17.1%)	11 (17.1%)
Financial: Burden on family	Pre	4 (6.2%)	11 (17.1%)	25 (39.0%)	24 (37.5%)
	Post	10 (15.6%)	4 (6.2%)	16 (25.0%)	34 (53.1%)
Physician: Did not explain clearly	Pre	6 (9.3%)	17 (26.5%)	21 (32.8%)	20 (31.2%)
	Post	26 (40.6%)	15 (23.4%)	8 (12.5%)	15 (23.4%)
Physician: Distress waiting	Pre	10 (15.6%)	16 (25.0%)	19 (29.6%)	19 (29.6%)
	Post	26 (40.6%)	23 (35.9%)	13 (20.3%)	2 (3.1%)
Physician: Unable to discuss worries	Pre	7 (10.9%)	17 (26.5%)	21 (32.8%)	19 (29.6%)
	Post	53 (82.8%)	9 (14.0%)	0 (0%)	2 (3.1%)
Physician: Doctor understood concerns	Pre	20 (31.2%)	22 (34.3%)	10 (15.6%)	12 (18.7%)
	Post	3 (4.6%)	1 (1.5%)	5 (7.8%)	55 (85.9%)
Family: Illness emotional impact	Pre	5 (7.8%)	16 (25.0%)	22 (34.3%)	21 (32.8%)
	Post	4 (6.2%)	37 (57.8%)	18 (28.1%)	5 (7.8%)
Family: Disturbed family life	Pre	11 (17.1%)	18 (28.1%)	19 (29.6%)	16 (25.0%)
	Post	4 (6.2%)	37 (57.8%)	18 (28.1%)	5 (7.8%)
Family: Unable to fulfill responsibilities	Pre	6 (9.3%)	19 (29.6%)	21 (32.8%)	18 (28.1%)
	Post	9 (14.0%)	15 (23.4%)	31 (48.4%)	9 (14.0%)

Domain / Item	Time	Not at all n (%)	Sometimes n (%)	Often n (%)	Almost always n (%)
Family: Effect on sexual life	Pre	26 (40.6 %)	16 (25.0%)	15 (23.4 %)	7 (10.9 %)
	Post	54 (84.3 %)	3 (4.6%)	3 (4.6 %)	4 (6.2 %)
Patient: Less confident	Pre	7 (10.9 %)	22 (34.3%)	26 (40.6 %)	9 (14.0 %)
	Post	12 (18.7 %)	25 (39.0%)	19 (29.6 %)	8 (12.5 %)
Patient: Distress about independence	Pre	6 (9.3 %)	20 (31.2%)	26 (40.6 %)	12 (18.7 %)
	Post	21 (32.8 %)	26 (40.6%)	12 (18.7 %)	5 (7.8 %)
Patient: Unable to cope	Pre	12 (18.7 %)	17 (26.5%)	12 (18.7 %)	23 (35.9 %)
	Post	25 (39.0 %)	29 (45.3%)	8 (12.5 %)	2 (3.1 %)

Discussion

This study assessed psychosocial distress in 64 cancer patients using the CaPSY-D scale before and after radiotherapy. The findings demonstrate the multidimensional and dynamic nature of distress and its differential evolution across domains over the course of treatment.

The sociodemographic profile reflects the cancer burden pattern of tertiary oncology institutions in South India, characterised by a predominance of male patients, head and neck cancers, younger working-age adults, and patients from lower socioeconomic strata relying on government insurance.6 The high proportion of patients with monthly household incomes below INR 50,000 (84.3%) contextualises the severity of financial distress observed in this cohort.

In the personal problems domain, significant improvements were observed post-radiotherapy. Hopelessness about the future, reported by over 64% of patients at baseline, declined markedly after treatment completion, consistent with evidence that concluding a defined treatment course, with its associated reduction in uncertainty, alleviates existential anxiety.10 Sleep disturbances, though improved, persisted in a substantial minority. Research confirms that cancer-related insomnia is multifactorial and may persist for months to years beyond active treatment, with approximately 30% of cancer survivors experiencing persistent sleep disturbance in the two years following therapy.11

Disease-related fears demonstrated the most dramatic improvement post-radiotherapy. Fear of cancer spreading or relapse, endorsed as a frequent concern by over 62% of patient's pre-radiotherapy, resolved substantially post-treatment, with 95.3% reporting low-level concern. Prospective longitudinal data on head and neck cancer patients corroborates this trajectory, demonstrating that fear of cancer recurrence typically peaks at diagnosis and declines following treatment completion, though a clinically significant subgroup sustains elevated fear long-term.12 Identifying this subgroup for psycho-oncological follow-up is an important clinical priority.

Physician-related concerns demonstrated a striking improvement. The proportion of patients reporting that their doctor 'almost always' understood their concerns rose from 18.7% pre-radiotherapy to 85.9% post-radiotherapy. This is consistent with evidence that repeated patient–clinician interactions across a multi-fraction radiotherapy course build therapeutic rapport and trust.13 Patient engagement with radiation therapists and the radiotherapy team over the treatment period appears to confer meaningful psychosocial benefit, reinforcing the importance of person-centred communication training within radiation oncology departments.14

Conversely, financial distress emerged as a persistent and, in key domains, worsening concern. Financial burden on family members increased post-radiotherapy, with 53.1% reporting it 'almost always' post-treatment compared to 37.5% pre-radiotherapy. This paradoxical worsening reflects the cumulative out-of-pocket expenditure accumulated over the treatment period, compounded by prolonged convalescence and lost productivity. A systematic review of financial toxicity in India documented its association with debt accumulation, reduced quality of life, and treatment non-compliance, underscoring the urgent need for structural interventions.7 Furthermore, a multi-centre study of cancer patients in India reported that the increase in financial burden among families aligns with the protracted economic recovery required after cancer treatment completion.15 These findings strongly reinforce calls for financial navigation services and social work integration into oncology care pathways.

Family-related distress showed partial improvement. Emotional impact on family and life

disruption improved post-radiotherapy, yet the inability to fulfil family responsibilities remained high (48.4% 'often'). Concerns about sexual life resolved most dramatically, likely reflecting resolution of practical and physical barriers present during active treatment.

Patient-related distress, reflecting self-confidence and coping capacity, improved meaningfully. The inability to cope with illness decreased substantially, with 84.3% reporting adequate coping after treatment. This aligns with evidence that structured, supervised treatment environments and access to psychosocial support facilitate adaptive coping in cancer patients.16

The CaPSY-D scale demonstrated clinical utility in capturing domain-specific distress changes across the radiotherapy trajectory. Its multidimensional structure enables clinicians to identify high-burden domains and direct targeted interventions rather than relying on a single composite score, which may obscure domain-level variation. Routine implementation of distress screening as a standard of care in radiation oncology—as recommended by leading professional bodies including the NCCN and the American Psychosocial Oncology Society—is supported by these findings.8,16

Conclusion

Cancer patients undergoing radiotherapy experience multidimensional psychosocial distress, with measurable and domain-specific changes occurring across the treatment trajectory. Radiotherapy completion is associated with meaningful reductions in personal, disease-related, radiation-specific, and physician communication distress. However, financial distress—particularly the cumulative familial burden—persists and intensifies post-treatment, representing a critical unmet need. The CaPSY-D scale is a clinically useful, validated tool for systematically assessing and monitoring psychosocial distress in radiation oncology patients.

Future research should include multi-centre longitudinal studies with larger samples and longer follow-up periods to evaluate durability of distress improvements and validate targeted intervention strategies. Routine psychosocial distress screening, integrated financial counselling, and enhanced clinician communication training are recommended as essential components of comprehensive radiotherapy care.

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