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Research Paper

Prospective study of psychosocial distress and perceived social support among patients undergoing radiotherapy for CNS tumours

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ABSTRACT

Background: Inadequate social support among patients undergoing radiotherapy for central nervous system (CNS) tumours can contribute to psychosocial distress, including depression and anxiety, which often remains undiagnosed.
Objective: To evaluate perceived social support and psychosocial distress among patients undergoing radiotherapy for CNS tumours, to inform strategies that assist coping with treatment and improve quality of life.
Methods: Prospective study of patients with radiotherapy-indicated CNS tumours. Social support was assessed with the Multidimensional Scale of Perceived Social Support (MSPSS), and depression/anxiety with the Hospital Anxiety and Depression Scale (HADS), at the first radiotherapy session, at completion of radiotherapy, and at two-month follow-up.
Results: High social support was reported by 56% of patients, moderate by 34%, and low by 10%, with a statistically significant difference by age group ($p<0.05$). Borderline depression rose from 28% to 53% during treatment before declining to 32% at follow-up; overt depression rose from 18% to 47% then resolved by follow-up. Borderline anxiety fell from 46% to 44% before returning to 46%; overt anxiety rose from 20% to 56% and resolved at follow-up. Distress levels differed significantly by age group ($p<0.05$).
Conclusion: Most patients with CNS tumours, especially receiving strong family support, perceived high overall social support, though those over 50 years reported inadequate support from friends and significant others. Depression and anxiety peaked at completion of radiotherapy and declined by follow-up. Routine screening and management of social support and psychosocial distress should be integrated into cancer care.

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1. INTRODUCTION

The diagnosis of cancer in a person's life comes with a significant morbidity rate affecting patients and their families in many ways. Cancer is a life-threatening disease with different treatment options, it compels the patient and their families to live with physical, emotional, social and economic burdens.

According to sung [1] Cancer is the leading cause of death throughout the world. The who (world health organization) estimates that cancer is the first or second leading cause of death before 70 years of age in 2019. An estimated 19.3 million new cancer cases and 10 million cancer-related death reported worldwide in 2020. An estimated 28.4 million new cancer cases are predicted to occur in 2040 [1].

An analysis by das gupta In the study reported that the incidence of CNS (central nervous system) tumours in India is from 5 to 10 per 100,000 populations. The most common tumour was gliomas (59.5%), astrocytoma (47.3%) followed by medulloblastoma (11.4%), craniopharyngioma (9.7%), ependymal tumours (4.8%), nerve sheath tumours (4.1%) [2].

CNS tumours require a combined modality of treatment approach that ranges from surgery, followed by adjuvant radiation therapy along with chemotherapy. The impact of this treatment on patients and their families is significant, not only in terms of morbidity but also in terms of quality of life. Patients undergoing chemo radiation have a higher chance of developing psychological morbidity. These complications generally take the form of adjustment disorder, depressed mood and anxiety. In terms of psychological disorders, depression is the most prevalent.

As described by [3] There is a significant reduction in quality of life for brain tumour patients and their caregivers compared with general populations, and the study suggested that improved supportive care is needed for patients and caregivers [3].

Social support appears to be an important protective factor that may reduce the amount of distress and increase the quality of life. A person's social network is a source of psychological and material support, such as a partner, family, friends or health care professionals.

According to [4] social support influences both the physical health and mental health of patients. Cancer patients need supportive services to improve their social support [4].

2. METHODOLOGY

2.1 Study Population

This prospective study was designed to evaluate the perceived social support and the prevalence of anxiety and depression among patients undergoing RT for CNS tumours at Apollo cancer center. The criteria for eligibility included a primary diagnosis of CNS tumours, planned radiotherapy with or without concurrent chemotherapy, age between 18 to 80 years, karn of sky performance status >70, non-metastatic disease. The exclusion criteria included prior history of irradiation, patients not willing to participate in the study, recurrent cancer, any previous history of depression or psychiatric illness.

After the patients were selected and their consent obtained, we collected information about their past and present medical history. Enrollment in this study required voluntarily completing two brief self-reporting questionnaires on three separate occasions: before RT, on the last day of RT, and at the first follow-up visit (generally 2 months after RT completion). Permission was also sought from patients to use their demographic information. It was made clear that neither their decision to participate in this study, nor their responses to the questionnaires if they elected to participate, would influence their subsequent cancer treatment in any manner. All enrolled patients provided informed consent.

2.2 Psychosocial Distress Screening

The HADS questionnaire was used to assess depression and anxiety in the patients on the first day and the last day of radiotherapy completion followed by reassessment on the first follow-up two months after completion of treatment.

Hospital Anxiety and Depression Scale (HADS)

Tick the box beside the reply that is closest to how you have been feeling in the past week.
Don't take too long over you replies: your immediate is best.

D	A		D	A	
		I feel tense or 'wound up':			**I feel as if I am slowed down:**
	3	Most of the time	3		Nearly all the time
	2	A lot of the time	2		Very often
	1	From time to time, occasionally	1		Sometimes
	0	Not at all	0		Not at all
		I still enjoy the things I used to enjoy:			**I get a sort of frightened feeling like 'butterflies' in the stomach:**
0		Definitely as much		0	Not at all
1		Not quite so much		1	Occasionally
2		Only a little		2	Quite Often
3		Hardly at all		3	Very Often
		I get a sort of frightened feeling as if something awful is about to happen:			**I have lost interest in my appearance:**
	3	Very definitely and quite badly	3		Definitely
	2	Yes, but not too badly	2		I don't take as much care as I should
	1	A little, but it doesn't worry me	1		I may not take quite as much care
	0	Not at all	0		I take just as much care as ever
		I can laugh and see the funny side of things:			**I feel restless as I have to be on the move:**
0		As much as I always could		3	Very much indeed
1		Not quite so much now		2	Quite a lot
2		Definitely not so much now		1	Not very much
3		Not at all		0	Not at all
		Worrying thoughts go through my mind:			**I look forward with enjoyment to things:**
	3	A great deal of the time	0		As much as I ever did
	2	A lot of the time	1		Rather less than I used to
	1	From time to time, but not too often	2		Definitely less than I used to
	0	Only occasionally	3		Hardly at all
		I feel cheerful:			**I get sudden feelings of panic:**
3		Not at all		3	Very often indeed
2		Not often		2	Quite often
1		Sometimes		1	Not very often
0		Most of the time		0	Not at all
		I can sit at ease and feel relaxed:			**I can enjoy a good book or radio or TV program:**
	0	Definitely	0		Often
	1	Usually	1		Sometimes
	2	Not Often	2		Not often
	3	Not at all	3		Very seldom

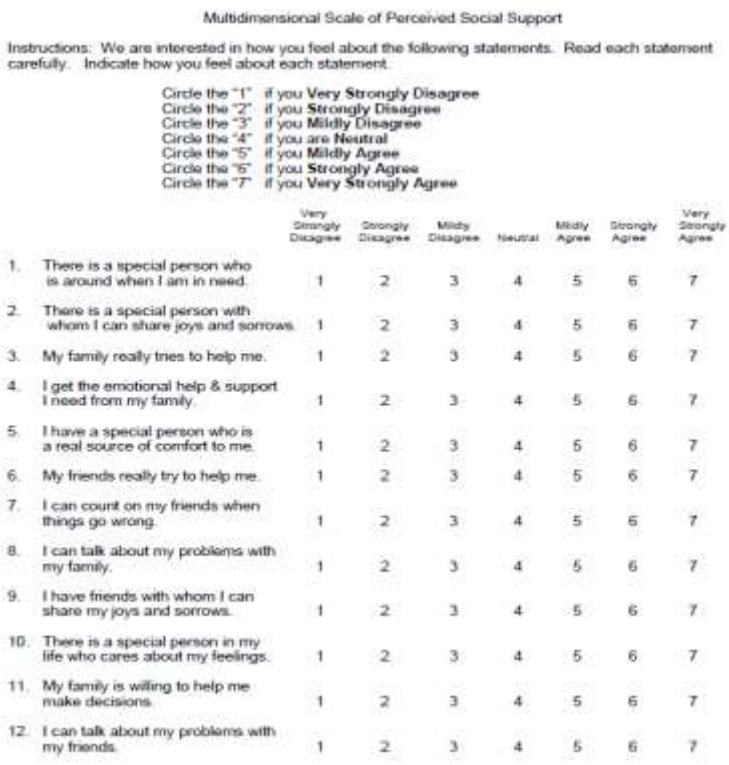
Please check you have answered all the questions

Scoring:
Total score: Depression (D) _____ Anxiety (A) _____
0-7 = Normal
8-10 = Borderline abnormal (borderline case)
11-21 = Abnormal (case)

Figure 1. Hospital Anxiety and Depression Scale (HADS)

2.3 Social Support Screening

The MSPSS questionnaire was used to assess perceived social support among patients on the first day of radiotherapy.



Multidimensional Scale of Perceived Social Support

Instructions: We are interested in how you feel about the following statements. Read each statement carefully. Indicate how you feel about each statement.

Circle the "1" if you **Very Strongly Disagree**
Circle the "2" if you **Strongly Disagree**
Circle the "3" if you **Mildly Disagree**
Circle the "4" if you are **Neutral**
Circle the "5" if you **Mildly Agree**
Circle the "6" if you **Strongly Agree**
Circle the "7" if you **Very Strongly Agree**

		Very Strongly Disagree	Strongly Disagree	Mildly Disagree	Neutral	Mildly Agree	Strongly Agree	Very Strongly Agree
1.	There is a special person who is around when I am in need.	1	2	3	4	5	6	7
2.	There is a special person with whom I can share joys and sorrows.	1	2	3	4	5	6	7
3.	My family really tries to help me.	1	2	3	4	5	6	7
4.	I get the emotional help & support I need from my family.	1	2	3	4	5	6	7
5.	I have a special person who is a real source of comfort to me.	1	2	3	4	5	6	7
6.	My friends really try to help me.	1	2	3	4	5	6	7
7.	I can count on my friends when things go wrong.	1	2	3	4	5	6	7
8.	I can talk about my problems with my family.	1	2	3	4	5	6	7
9.	I have friends with whom I can share my joys and sorrows.	1	2	3	4	5	6	7
10.	There is a special person in my life who cares about my feelings.	1	2	3	4	5	6	7
11.	My family is willing to help me make decisions.	1	2	3	4	5	6	7
12.	I can talk about my problems with my friends.	1	2	3	4	5	6	7

Figure 2. Multidimensional Scale of Perceived Social Support

Table 1. MSPSS Scoring and Interpretation Criteria

MSPSS SCORING	
Calculate Mean Score	**Mean Scale Score and Support Groups**
Family subscale: Sum across items 3, 4, 8, & 11, then divide by 4 Friends' subscale: Sum across items 6, 7, 9, & 12, then divide by 4 Special person subscale: Sum across items 1, 2, 5, & 10, then divide by 4 Total scale: Sum across all 12 items, then divide by 12	Score 1 to 2.9 low support group Score 3 to 5 moderate support group Score 5.1 to 7 high support group

2.4 Description of Screening Instruments

In order to measure social support, one of the most commonly used scales is the multidimensional scale of perceived social support (MSPSS). A 12-item questionnaire measures the level of social support perceived by individuals from three sources, such as family (items 3, 4, 8 and 11), friends (items 6, 7, 9 and 12), and significant others (items 1, 2, 5 and 10). It is intentionally left undefined to allow respondents to identify their significant other. A likert-type scale was used to score these 12 items ranging from very strongly disagree to very strongly agree. Adding the scores of the 12 items resulted in an overall perceived social support score that ranged from 12 to 84, with higher scores indicating greater perceived social support. Each of the three subscales is also scored individually and may be analyzed independently [5].

According to the study by [5] The reliability of MSPSS total scale, family, friends, and significant other was .88, .87, .85, and .91. There was good internal reliability and adequate stability in the MSPSS [5].

Commonly used scales to assess depression and anxiety among cancer patients are HADS (hospital anxiety and depression scale) questionnaire. There are 14 items, 7 for depression (HADS-D) and 7 for anxiety (HADS-A). This instrument was created to assess psychological distress among individuals with somatic disorders and to evaluate reduced pleasure responses and negative cognitions. The severity of each question is indicated by a numeric value between 0 and 3. There are separate scores for HADS-A and HADS-D normal scores range from 0 to 7, borderline scores range from 8 to 10, abnormal scores range from 11 to 21 [6].

The study by [6] Found that the correlations between the HADS subscales for anxiety (HADS-A) and depression (HADS-D) ranged from .40 to .74 (mean .56). In HADS-A, Cronbach's alpha ranged from .68 to .93 (mean .83) and in HADS-D, it ranged from .67 to .90 (mean .82). In both HADS-A and HADS-D, sensitivity and specificity were about 0.80. The HADS scale was found to be accurate at detecting symptoms and severity of anxiety and depression in patients with physical illness, mental illness, and in general populations [6].

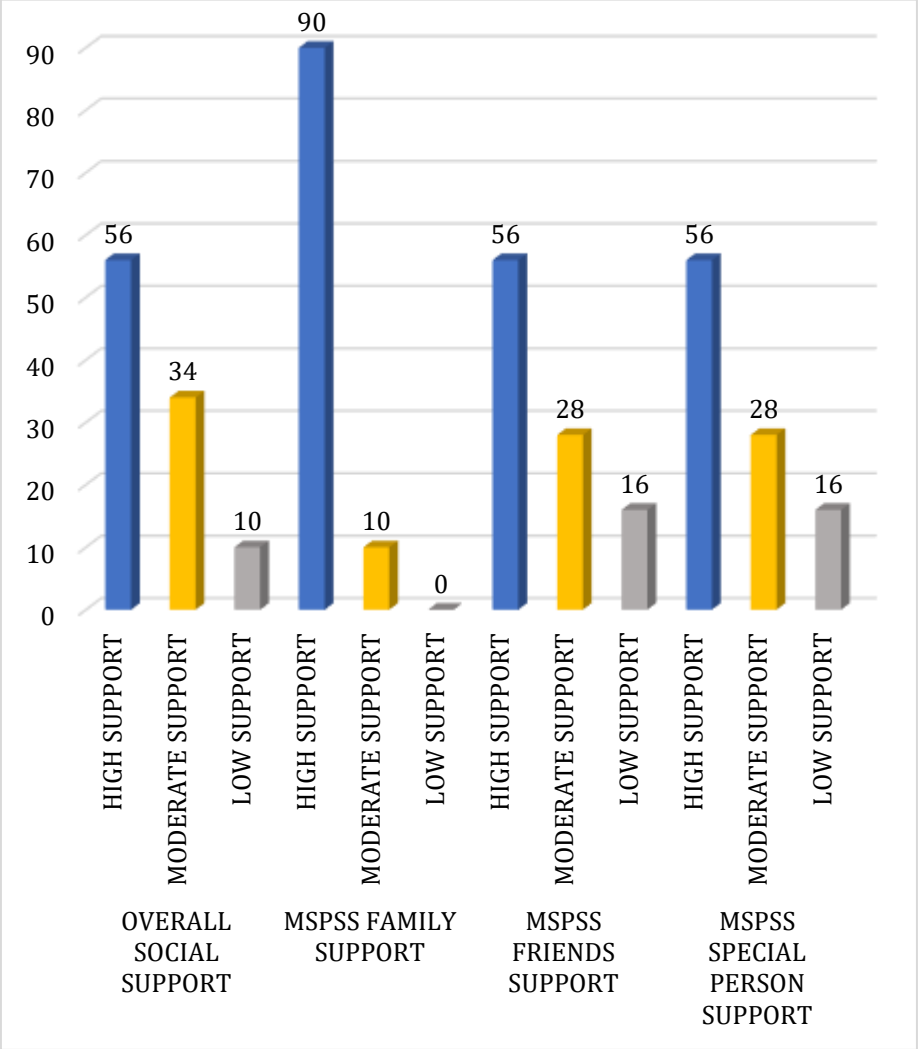


Figure 3. Distribution of Patients Based on MSPSS

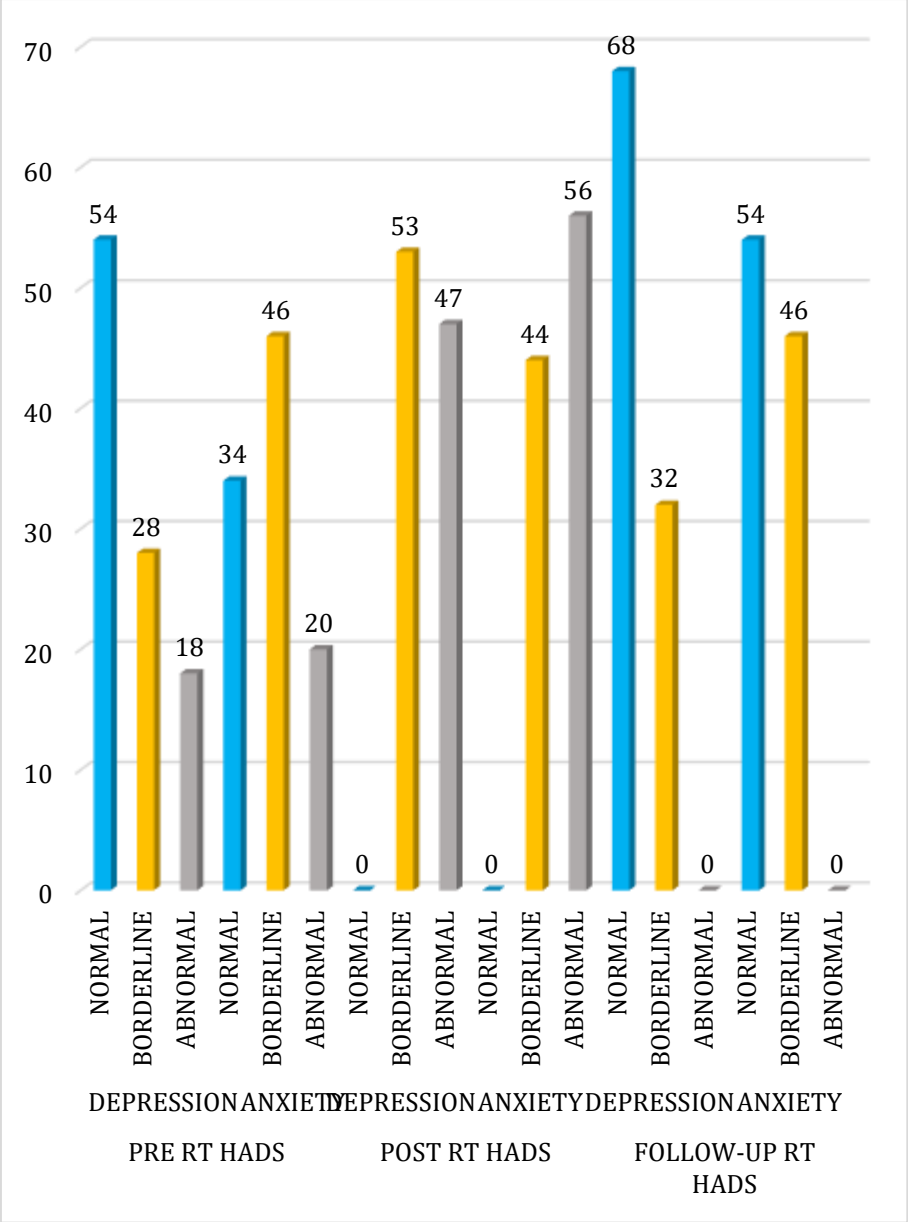


Figure 4. Distribution of Patients Based on HADS

2.5 Statistical Analysis

Statistical analysis was performed by using SPSS windows, version 25.0. Categorical variables are presented as absolute numbers and percentages, and continuous variables are presented as mean ± standard deviation. Data entry was done in MS excel spread sheet. Before statistical analysis data will be checked for normality. Normally distributed continuous variables will be compared using the unpaired t test, whereas the Mann-Whitney U test will be used for those variables that will not be normally distributed. Categorical variables will be analysed using either the fisher's exact test or chi square test. Tests statistical significance will be decided as p value $p < 0.05$ is significant and $p > 0.05$ is not significant.

3. RESULTS AND DISCUSSION

3.1 Patient and Treatment Characteristics

A total of 100 patients (59 men and 41 women) were enrolled in this study between April 2021 to March 2022. In the study population 28 patients belong to the age group less than 40 years, 19 patients belong to the age group 41-50 years, 27 patients belong to the age group 51-60 years, and 26 patients

belong to the age group more than 61 years a range of 30 to 80 years. A total of 43 patients have comorbid illnesses, such as diabetes, hypertension, and coronary artery disease of the 100 patients studied, while 57 patients do not have any comorbid illnesses. In the study 43 patients had Glioblastoma grade 4, 17 patients had Astrocytoma grade 4, 19 patients had Astrocytoma grade 2, and 21 patients had Oligodendroglioma grade 2. The 100 patients analysed 59 patients were treated using Rapid Arc technique, 29 patients with IMRT technique, and 12 patients with IGRT technique. In the study, 60 patients received a total dose of 60Gy in 30 fractions (2Gy per fraction) as per protocol and 40 patients received a total dose of 54Gy in 27 fractions (2Gy per fraction) as per protocol. Among the 100 patients analysed, 60 were treated with oral chemotherapy tablets Temozolomide with individual dose prescription concurrently with radiotherapy, and 40 were not treated with chemotherapy during radiotherapy.

Table 2. Patient and Disease Characteristics

Patient Characteristic	**N**	**%**
Gender		
Male	59	59.0
Female	41	41.0
Age		
<40yrs	28	28.0
41-50yrs	19	19.0
51-60yrs	27	27.0
>61yrs	26	26.0
Comorbid illness		
Yes	43	43.0
No	57	57.0
Diagnosis and grade		
Glioblastoma grade 4	43	43.0
Astrocytoma grade 4	17	17.0
Astrocytoma grade 2	19	19.0
Oligodendroglioma grade 2	21	21.0
Radiotherapy technique		
Rapid arc	59	59.0
IMRT	29	29.0
IGRT	12	12.0
Radiotherapy dose and fractions		
60gy / 30	60	60.0
54gy / 27	40	40.0
Oral chemotherapy		
Yes	60	60.0
No	40	40.0

3.2 Perceived Social Support

On the first day of radiotherapy, we assessed social support among CNS tumour patients, and the MSPSS questionnaire revealed that 56% of population had high overall social support, 34% had moderate overall social support, and 10% had low overall social support. According to the subscales of the MSPSS questionnaire, 90% of population reported high family support and 10% of population reported moderate family support, while 56% of population reported high support, 28% of population reported moderate support, and 16% of population reported low support for friends support and special person support

3.3 Psychosocial Screening

We assessed the status of distress among patients with primary CNS tumour on the first day of RT, followed by on the last day of RT completion and on first follow up that is after 2 months of completion of RT, through the HADS questionnaire.

When we assessed the depression and anxiety on the first day of RT, 54% population had no depression, 28% population were having borderline levels of depression, 18% population were found to be depressed, 34% population had no anxiety, 46% population were having borderline levels of anxiety, 20% population were found to be anxious.

When we assessed the depression and anxiety on the last day of RT completion, 53% population were having borderline levels of depression, 47% population were found to be depressed, 44% population were having borderline levels of anxiety, 56% population were found to be anxious.

When we assessed the depression and anxiety after 2 months in first follow-up, 68% population were had no depression, 32% population were having borderline levels of depression, 54% population had no anxiety, 46% population were having borderline levels of anxiety.

3.4 Discussion

In our study, we assessed perceived social support and prevalence of psychosocial distress (depression and anxiety) in patients undergoing radiotherapy for CNS tumours using MSPSS and HADS questionnaires. Patients were assessed for social support, depression and anxiety on the first day of RT, followed by only for depression and anxiety on the last day of RT completion and on first follow up that is after 2 months of completion of RT.

3.5 Incidence of Social Support

When we assessed social support in the study population the incidence of overall high social support is 56%, moderate support is 34% and low support is 10%. If we see the subscales incidence for family support is 90% high support, 10% moderate support. Incidence of friends and special person support 56% high support, 28% moderate support, 16% low support. In a study by [7] they compare 2000 general populations with 1818 cancer patients, and the results suggest that cancer patients have significantly higher depression and lower overall quality of life. Cancer patients report significantly higher levels of perceived social support compared with the general populations [7].

The incidence of social support varies among age groups which can be explained by the fact that young patients had larger peer group additional to the family, but as age increases many elderly patients were only in contact with their family, many had children's and friends living abroad or friends not in contact anymore. The disease status of many patients was not disclosed to their friends.

3.6 Incidence of Depression

Among the study population, incidence of borderline depression is 28% which increased to 53% on the last day of RT completion, however on follow up among these population of patients 32% still had borderline depression. Whereas 18% population were found to be depressed on the first day of RT which increased to 47% on the last day of RT completion but on follow up patients did not have any depression. The increased incidence of depression during first day of RT can be explained by the fact that patient had a major surgery, added to that another treatment duration of 5-6 weeks, patients had misconception of radiation being a painful experience. In the study [8] noted that cancer patients with head and neck cancer have the highest rates of depression. It was reported that the incidence of depression was between 15-50% [8]. In their study [9] found high rates of anxiety at pre-treatment, but those rates steadily declined over time (from 27.3% to 6.4%, and then 3.3%). During the follow-up period, prevalence rates of depression increased from 8.5% to 24.5% and 14%, respectively, from pre-treatment to 3 and 6 months after treatment. During the first 6 months of treatment, patients with head and neck cancer experienced different changes in anxiety and depression [9].

During the course of treatment though patient get adjusted with the day-to-day schedule of radiation, gets familiarized with radiotherapy but still they look depressed while interacting with patients

and the surroundings, as a tertiary cancer centre the radiotherapy department hosts patients receiving curative radiotherapy and palliative radiotherapy. In that per se sometimes the patients get an uncertainty about their own future. Many a times patient has a doubt in their subconscious mind that their prognosis is guarded which are been kept hidden from them. Hence patients are more depressed. After completion of radiotherapy when patient gets discharged, they get a feeling of accomplishment after successfully completing 5-6 weeks of therapy. After they get back to their day-to-day life slowly, they get a hope of betterment and tries to get connect to the family and society, hence prevalence of depression reduces.

3.7 Incidence of Anxiety

Among the study population, incidence of borderline anxiety is 46% on the first day of RT which went to 44% on the last day of RT completion and was still 46% on follow up. While assessing for anxiety 20% population were found to be anxious on the first day of RT which increased to 56% on the last day of RT completion but on follow up patients were not found to be anxious. The increased incidence of anxiety during first day of RT and anxiety further increases on the last day of RT completion can be explained by the fact that patients had underlying frustrations of the monotonous schedule of coming to radiation daily, patient seemed anxious to complete radiation at the earliest and leave. With each passing day patient were getting nervous thinking of their disease status of regression and cure. Patient goes through their own ups and downs due to personal reasons, irrespective of which they had to come, also with each passing dose there were added side effects which made patient more curious of the changes leading to anxiety. According to [10] reported that in 40 patients receiving radiotherapy for head and neck cancer, 58% and 45% suffered from mild to severe pre-RT depression. 7% of patients had severe pre-RT anxiety. A significant number of patients undergoing RT for head and neck cancer have symptoms that suggest psychosocial distress even before beginning treatment. This proportion increases significantly during treatment. It might be worthwhile to investigate the role of antidepressants and psychiatric counselling in the future [10]. Based on the study by [11] concluded in the study that glioma patients with depression suffered statistically significant worse survival outcomes. In particular, depression and death tend to be positively correlated in high grade glioma patients [11].

A study by [12] reported that 48.4% of newly diagnosed intracranial tumour patients suffer from distress associated with depression and anxiety. It appears that sociodemographic data such as gender and objective medical data like cancer stage were not associated in the early stage of the study [12].

3.8 Study Limitations

Our current study has certain limitations because of the short study period. As a result, we could only assess depression and anxiety after 2 months of follow-up. More data and better results would be obtained through longer follow-up. At a corporate tertiary cancer centre, it is difficult to separate patients into groups based on education and socioeconomic status, hence education, marital status, and socioeconomic status were not analysed. Since we used the HADS questionnaire as screening tool, we cannot diagnose depression from the results of the questionnaire and provide management based on the results. Patient with a high score on the HADS questionnaire could not be left without treatment, so the only solution was to give counselling after obtaining consent from patient and the treating physician. Only a very few patients gave consent for counselling, majority of patients are unwilling for further counselling and management, thus the data could not be included in the study. Using the statistical data for perceived social support, psychosocial distress (depression and anxiety), in conjunction with the factors of comorbid illnesses, diagnosis and grade, dose and fraction of radiotherapy, as well as radiotherapy technique and oral chemotherapy, we found that there was no statistically significant difference ($p > 0.05$) thus the data was not included in the study.

4. CONCLUSION

We found in our study that most CNS tumour patients managed to perceive high social support, especially from their families. However, if we consider friends and special person support, we find that

more than 50 years age group population do not receive adequate support. Significant numbers of patients in this study were borderline depressed and anxious even before they began radiotherapy. Depression and anxiety are more intense after completing radiotherapy and then decrease when patients come for their first follow-up.

4.1 Recommendations

All cancer patients who are receiving radiotherapy should give proper counselling regarding the properties of radiation, side effects of radiation, and the prevalence of depression and anxiety during the course of treatment. Counselling should include discussing depression and anxiety, the symptoms of each and how to obtain the appropriate support if one experiences the symptoms as well as how to communicate with the treating team. It is essential for every cancer patient to be grouped into a support group based on their gender, age and diagnosis so they can relate to one another and share their experiences, helping to overcome depression and anxiety. It is imperative that the support group is led by a psychotherapist, and that the result of the group is communicated to the treating physician. If necessary, the psychiatrist should take the necessary steps and follow up with the patient for further management.

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Author Contributions Statement

Name of Author	C	M	So	Va	Fo	I	R	D	O	E	Vi	Su	P	Fu
Dr. Sangaiah Pillai Rajkumar	✓	✓	✓	✓		✓		✓	✓	✓	✓	✓	✓	✓

C : **C**onceptualization
M : **M**ethodology
So : **So**ftware
Va : **Va**lidation
Fo : **Fo**rmal analysis
I : **I**nvestigation
R : **R**esources
D : **D**ata Curation
O : Writing - **O**riginal Draft
E : Writing - Review & **E**diting
Vi : **Vi**sualization
Su : **Su**pervision
P : **P**roject administration
Fu : **Fu**nding acquisition

Conflict of Interest Statement

The authors declare no conflict of interest.

Informed Consent

All participants were informed about the purpose of the study, and their voluntary consent was obtained prior to data collection.

Ethical Approval

Not Applicable.

Data Availability

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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