



SCREENING FOR DEPRESSION IN CANCER PATIENTS RECEIVING RADIOTHERAPY.

Dr. M. Pandu Ranga Kumari*

Assistant Professor, Kurnool Medical College, Kurnool, Andhra Pradesh.
*Corresponding Author

Dr.P.Rajesh

Assistant Professor, Viswabharathi Medical College, Kurnool, Andhra Pradesh.

ABSTRACT **Background:** Depression is a serious problem in cancer patients, increases distress, perception of pain, suicidal attempts, hospital stay, decreased adherence to treatment and quality of life, and worse prognosis which can be prevented by screening and treatment of depression.

Materials and Methods: We conducted an exploratory descriptive study of 145 cancer cases, with biopsy proven and considered for radiotherapy treatment during the period of October 2012 to September 2014. with the help of proforma filling and PHQ2 depression screening tool, patients are screened for depression in terms of age, sex, marital status, living companion, education, occupation, addictions, socioeconomic status, site and stage of tumor.

Results: in my study depression rates are more - in young 31-40 yrs (62.5%), male (58.6%), married (52.4%), living with joint family (50%), literate (61.3%), unemployed (57.1%), with alcohol abuse (63%), without any smoking abuse (63.2%), without any gutka or chewing habit (60.4%), Class II status (66.7%), head and neck site (64.2%), stage IV (66.7%).

Conclusions: all the above factors are predictors of depression and screening can be done using simple screening tools like PHQ2 for early detection and treatment in turn for good prognosis.

KEYWORDS : cancer patients, depression, screening, good prognosis.

INTRODUCTION

Depression is a serious problem in cancer patients. The diagnosis of cancer results in intense psychological distress, ranging from sadness, anger, grief, which is a normal response to "MAJOR DEPRESSIVE DISORDER" (M.D.D). Which, is never normal. It is a significant complication that must be addressed.¹

The effects of depression in cancer patients are increased psychological distress subjective perception of pain, decreased adherence to treatment and quality of life, increased suicidal ideation and attempts, prolonged hospital stay, increased family distress, and worse prognosis.² predisposes to morbidity and mortality. and desire for hastened death (mostly in terminally ill).¹

After the diagnosis of cancer, various factors which make the patient prone to depression are the diagnosis of cancer disease itself, treatment related factors like whether patient receiving chemotherapy, radiotherapy, or hormonal therapy and tumor factors like site of disease and, stage of tumor. And personal issues like marital status, a supportive family, financial stability and education, a history of substance abuse, past or present history of MDD contributes to the rates of depression. Age and severity of illness are inversely related to psychological adjustment finally personal attributes like positive coping styles¹.

The prevalence of depression studied depends on the timing of depression assessed; methodology and criteria used resulting in variance of rates from study to study. The rates for major depression are 1-38% and in patients experiencing some form of depression including major depression, dysthymia and adjustment disorders with depressive mood is 4.5-58%². The overall prevalence rates in India are still not known.

Depression in cancer patients is treated by psychotherapy and pharmacotherapy (using antidepressants) and evidence suggests that depression is treatable in palliative settings also².

The single best screening tool to identify depression in cancer patients is to ask patients, "ARE YOU DEPRESSED" (PHQ2)¹

The need of this study is to know the depressive rates, among our hospital patients and what clinical factors and personal factors of patients are contributing to these rates.

Knowledge of these personal, clinical factors and the rates are helpful to identify which patients will become non-adherent to treatment, and factors increasing morbidity and mortality and which patients will be having suicidal ideation and patients having difficulty in coping.

The correction of these factors by treating oncologist increase the compliance to treatment (reduce dropouts while on treatment), reducing costs of health care, increases communication between doctor and patients, by decreasing morbidity patients will have shorter stay at hospital.

Total of 145 patients are screened with good performance status and biopsy proven cases of malignancy and who are screened positive on depression scale and willing to take a psychiatric treatment is referred to psychiatrist for further evaluation

AIMS AND OBJECTIVES

- To study the prevalence of depression in cancer patients receiving radiotherapy
- To assess the association and prevalence of clinical, socio-demographic risk factors involved in causing depression.
- To know the feasibility of screening for depression in cancer patients by radiation oncologist at MNJ institute of oncology and regional cancer center. Hyderabad.

REVIEW OF LITERATURE

Cancer is a debilitating illness of multiple types, sites and etiologies.

Stress is a trigger for depression and cancer is one of the most stressful events that a person may experience during a life time. And clinical depression is a fairly frequent and yet recognized source of suffering among patients with cancer.³

The prevalence rates in cancer patients for "Major Depression" range from 0%-38%. and for depression spectrum disorders ranges from 0%-58%, and this variance is attributed to lack of standardization of methodology and diagnostic criteria used⁴

The overall prevalence of Distress is 35.1% in research by Zabora et al⁵

In a study by Leopold et al.⁶ 1998; and Fritzsche et al.⁷ 2004, reported that 50% of radiotherapy patients suffer from some mental disorders.

In a study named "Routine Screening for Depression in Radiation oncology patients in 2004, by Hahn CA, Dunn R, Halperin EC used Beck Depression inventory-II (BDI-II) and concluded, a simple tool can be administered in the clinic by radiation oncologist to screen for depression, the frequency of depression in their study was 15%.⁸

In a study by Berard RM, Boermeester F, Viljoen G; named depressive disorders in an outpatient oncology settings:- prevalence, assessment and management; reported lowest level of depression of 14%.⁹

In a study Dinkel et al 2010, observed that various investigators showed that between 12%-43% of radiotherapy patients needed a psychosocial treatment depending on criteria used.¹⁰

In a recent meta-analysis a 94 interview based studies by A J Mitchell, Chan M,Bhatti H et al reported 30% to 40% of patients with various types of cancer have some combination of mood disorders.¹¹

Because of this high prevalence of depression to effectively treat it the first intervention step is depression (or distress) screening.¹²

RATIONALE FOR SCREENING

Despite this high prevalence of depression in cancer patients it is always under diagnosed and undertreated.¹³

Thus in patients in whom depression goes unrecognized cannot be appropriately treated; systematic screening has been advocated as a means of improving detection, treatment and outcomes of depression.¹⁴

A Systemic review of assessment instruments; after literature search they found 106 validation studies and describing total of 33 screening measures.¹⁵

Depending on the items in a questionnaire Screening tools are of various lengths. Long questionnaire (21-50 items);short questionnaire (5-20 items), ultrashort (1-4items).¹⁵

The advantages of ultra-short (1-4) tools are excellent chance for adoption in busy clinics, inexpensive and sensitivity may be high, low to moderate specificity and disadvantages are can only assess one domain, not suitable for research.¹⁵ long and short tools too cumbersome and time consuming for routine use.¹⁶ barriers to correct detection of depression is related to both patients and clinicians.¹⁷

Patients frequently do not recognize their own illness as depression and they may not disclose psychological problems to an unfamiliar practitioner studies suggest that patients present with somatic (physical complaint's) in as many as 70-80% of cases. In addition many patients prefer a medical to a psychiatric explanation and doctors have to consider many possible diagnosis during short appointment.

They reported one possible solution, endorsed in western countries resulting in guidelines in use of a suitable screening instrument and in clinical practice even short questionnaire are not routinely used in primary or secondary care and this led to the development of ultra-short questionnaire consisting of three, two, or even single detection question and most well-known example is PHQ2.¹⁷

Further the National institute for health and clinical excellence (NICE) released guideline for the management of unipolar depression in primary and secondary care and recommended screening for at risk-groups and suggests that two simple screening questions will suffice such as PHQ2.¹⁸

single item interview (Are You Depressed)screening correctly identified the eventual diagnostic outcome of every patient, substantially outperforming the questionnaire and visual analogue measures.¹⁹

In a study by Payne A, Barry S, et al, sensitivity and specificity of a two question screening tool for depression in a specialist palliative care unit, where the sensitivity and specificity of a two item screening interview for depression versus the formal psychiatric interview and they concluded that the high sensitivity and low false negative rate of the two question screening tool will aid health professionals in identifying depression.²⁰

In the year 2006 a study in Japan named screening for depression in terminally ill cancer patients in japan by Akechi, Okuyama et al assessed the performance of several screening instruments for adjustment disorder (ADs) and major depression (MD) and compared two single item interview (are you depressed and have you lost interest) and the hospital anxiety and depression scale (HADS) were administered, and they reported regarding screening for major depression , both single- item interviews and the HADS ,possess use full screening performance.²¹

In a pooled analysis and meta-analysis of 22 studies, called"" DO Ultra-short screening instruments accurately detect depression in

primary care"" reported that for two and three item tests in cancer, over all sensitivity on pooled analysis was 73.7 %and specificity was 74.7 % with a PPV of only 38.3 % but a pooled NPV of 93 % and concluded ultra-short two or three question tests perform better, identifying eight out of ten cases , this is at the expense of high false positive rate and ultra-short tests appear to be at best, a method for ruling out a diagnosis and should only be used when there are sufficient resources for second stage assessments of those who screen positive.¹⁷

Finally in 2013 RTOG trial 0841 reported that,,"TWO question"" item effectively screens for depression in Radiotherapy patients compared to Distress thermometer and recommends the use of PHQ2 in radiotherapy facilities.²²

Effects of depression

The depression and cancer interact in a complex way

- a. Depression increases .the cancer mortality.^{23,24}
- b. Depression is a risk factor for increased suicidal ideation and suicidal attempts.^{25,26,27}
- c. Depression decreases the quality of life.^{28,29,30}
- d. Patients with depression are at increased risk for non-compliance to treatment³¹

DEFINITION OF DEPRESSION

The most severe form of depression is "MAJOR DEPRESSIVE DISORDER""The

American psychiatric association (2000) diagnostic and statistical manual of mental disorders-fourth edition-text revision (DSM-IV-TR).³² describes major depressive disorder as being characterized by one or more depressive episodes..A depressive episode occurs when an individual has either depressed mood and/or loss of interest or pleasure in enjoyable activitie ,also known as "anhedonia" .for at least two weeks.

A diagnosis of major depressive disorder requires that these symptoms must be accompanied by at least four symptoms such as : changes in sleep, appetite or weight, changes in psychomotor activity, decreased energy, feelings of worthlessness or Guilt, difficulty thinking, concentrating or making decisions, recurrent thoughts of death or suicidal ideations, plans (or) attempts of suicide.³²

When making a diagnosis of major depressive disorder in individuals with a chronic illness such as cancer, clinicians must make sure that the symptoms are not the result of the physical illness or its treatment.¹³

Individuals with cancer (or) any chronic illness may have adjustment disorders [with depressed and/or anxious mood], anxiety disorders minor depression apart from major depression.³³

According to DSM-IV-TR the various psychiatric diseases seen in cancer patients are³⁴

Table: 1.Summary of the diagnostic DSM-IV criteria for the most common types of psychiatric disorders among cancer patients.

Diagnostic Category	DSM-IV Criteria	Symptom Duration
Major depression	Depressive Symptoms (e.g. insomnia/hypersomnia, poor concentration, weight loss, low energy) including depressed mood and/or anhedonia, causing significant impairment in social, occupational, or other important areas of functioning.	≥ 2 weeks
Minor depression	2-4 depressive symptoms with depressed mood and /or anhedonia, causing significant impairment.	≥ 2 weeks
Adjustment disorder	Emotional or behavioral symptoms in response to an identifiable stressor(s) occurring within 3 months of the onset of the stressor(s), causing significant impairment in social, occupational, or other important areas of functioning. The stress-related disturbance does not meet the criteria for mood (depression) or anxiety disorder and is not merely an exacerbation of a pre- existing mood (depression) or anxiety disorder.	≤ 6 months

Generalized anxiety disorder	3 Anxiety symptoms(e.g. irritability, muscle tension, restlessness) including excessive anxiety and worry about a number of events or activities, difficulties controlling worry, causing impairment in social, occupation, or other important areas of functioning.	≥ 6 months
Panic attack (Anxiety disorder)	4 Anxiety symptoms (e.g. sweating, shaking, chest pain, lightheaded, feelings of unreality) including a discrete period of intense fear of discomfort.	Abrupt and reaches a peak in 10 minutes

In summary there are many clinical diagnosis that include depressive symptoms as par tof their criteria, authors who are studying patients with different sets of symptoms may refer to all of these patients as having „depression“ regardless of the severity of these symptoms. The purpose of this thesis was to examine screening for depressive symptoms, regardless of diagnosis, based on the premise that any depressive symptom warrants further assessment for a potential diagnosis. In order to avoid clouding this primary goal, due to the multitude of different forms of depressive disorders and criteria that exist, the term “depression” will refer to all depressive symptoms that cancer patients may experience, regardless of which psychiatric diagnosis the patient is given.

BIOLOGY OF DEPRESSION

The pathophysiology of cancer related depression remains unclear and probably encompasses many mechanisms.A study of patients with advanced metastatic cancer showed that both plasmaInterleukin-6(il-6) concentrations and hypothalamus – pituitary-adrenal (HPA) axisdysfunction was markedly high in patients with clinical depression.³⁵

PSYCHOSOCIAL CARE OF CANCER PATIENTS TREATED WITH RADIOTHERAPY:- RADIOTHERAPY:-

Radiotherapy is the medical use of radiation and is one of the most effective forms of cancer treatment. Radiation induces DNA lesions within the tumor cells. These lesions if unrepaired; means that the cells are unable to divide and grow, which ultimately results in cell death?³⁶

The most common type of radiotherapy is external radiotherapy, which means that the radiation is administered from a machine (linear accelerator).outside the body. External radiation treatment is given in several treatment fractions over 1 day to 6 weeks and four to five times a week. Depending on site of tumor and the aim of treatment radiation can cause variety of side effects (e.g. diarrhea, nausea, tiredness) duringtreatment and in months or years following treatment.

These effects leads to both short and long term consequences which affect day to day functioning, leading to functional decline and psychosocial morbidity.³⁷

Emotional reactions to cancer diagnosis

Depression is a symptom of many psychiatric disorders that may affect cancer patients H.M CHOCHNOV in his study described that each of us will experience a range of profound emotions in response to life threatening illness such as cancer .the ominous implications and uncertainty of such diagnosis will lead to intense feelings, usually including a sense of shock or disbelief, followed by a period of turmoil; associated with symptoms of anxiety and sadness, irritability, sleep loss and disturbance of appetite.³

After a period of several weeks, however, most patients experience a certain degree of resolution, although the process will not be complete. Manifestation of this initial acute stress response can be expected at the time of the initial diagnosis, upon learning of a relapse, or when treatment has failed to achieve a positive response.

Patients with cancer will also express a variety of normal fears .these include the fear of disability and the loss of previously held roles, fear of disfigurement, dependence or loss of control, and fear of loss of desirability. Some patients worry that things will become so intolerable that they might find themselves abandoned, while others fear the anticipated course of dying and death itself.³

After the cancer diagnosis, the patients undergoes a intense emotional reactions like Grief and these are best studied by ELIZABETH

KUBLER ROSS five stages of grief initially described for terminally ill patients during the process of death in her book,“DEATH AND DYING”³⁸ (1969), later the concept extended to tragedy, chronic illness like cancer, relationships etc.

The five stages commonly described by mnemonic DABDA and are-

- Denial
- Anger,
- Bargaining,
- Depression,
- Acceptance.

Figure;2;illustration of five stages of grief.



According to author not everyone goes through all five stages, nor must stages be reached in consecutive order.

Sadness is of course a very normal human emotion, and one that is unavoidable in the face of a disease such as cancer. However, normal sadness waxes and wanes over time. Patients are usually able to accommodate to their changing health circumstances bolstered by the emotional support they receive from family and friends sorting through their various treatment options with health care providers also often help to re-establish a sense of equilibrium. However patients who experience clinical depression or depressive syndrome experience a variety of psychological and physical(somaticsymptoms) that lead to marked impairment in their functional capacity and social roles.³⁹

When the patient fail to cope with these life threatening and becomes prone to psychiatric illness such as major depression.

PSYCHOLOGICAL ASPECTS OF RADIOTHERAPY PATIENT

Studies have shown that cancer patients may also face psychological problems when they are treated with R.T.⁴⁰

The results of studies comparing R.T to other cancer treatment varied few differences in psychological functioning among different treatment modalities. The patients undergoing RT experienced common distress similar to patients without RT, some studies indicated a great variability in reported results, but the global trends in psychological responses to RT prevailed.¹²

PRIOR TO RT:-

The most common reaction reported by patients before treating course of R.T, were feeling of anxiety rather than depressive symptoms. .⁴⁰

DURING RT:-

During the course of treatment, most studies indicated a decline in feelings of anxiety and increase of depressive symptoms and negative mood was found during and after R.T.^{40, 41}

AFTER RT:-

Studies after completion of R.T treatment, revealed greater variability in depression symptoms ranging from 8 to 48% of the patients reporting depressive symptoms.⁴⁰

It has been emphasized that the assessment of R.T side effects either by the doctor or the patient remains subjective and often leads to different results. This implied a need for establishing reliable screening system with objective parameter in assessment of psycho physical and social distress of radio oncology patients.¹²

To provide effective psychological support for cancer patients during

RT, the screening for psycho socialstatus of patients should be performed during diagnostic and therapeutic procedure. A distress inventory composed of interview, checklist and questionnaires“ should be applied before during and after the course of RT.¹²

TREATMENT OF DEPRESSION

Depression is treatable in even terminally ill cancer patients. Two approaches are commonly used psychological and pharmacological.¹

Psychological approach includes different formats of psychosocial support and therapy: cognitive behavioral therapy, supportive therapy, individual therapy psychoeducation.¹

Pharmacological treatment is also frequently needed and drugs are chosen based on side effect profile agents used are selective serotonin reuptake inhibitors (SSRI), tricyclic antidepressants (TCAs), monoamine oxidase inhibitors (MAOIs), mixed action antidepressants, etc.¹

PATIENTS AND METHODS

With aims and objectives in view the study is conducted at Radiotherapy department MNJ institute of oncology and regional cancer center, Hyderabad. Total of 145 cases, with biopsy proof of malignancy and considered for radiotherapy treatment during the period of October 2012 to September 2014 was taken for study.

Type of study: - Exploratory descriptive study.

Inclusion criteria:-

1. Age >21 years of both gender.
2. Performance status ECOG:-0-2
3. Patients with stage I-IV (where applicable.)
4. Patients screening to be performed before/within 2 weeks of treatment for first diagnosis of any tumor type.
5. Patients with a preexisting diagnosis of depression.
6. Patients receiving psychotropic medication.
7. Patients may have had or be in combination therapy with chemotherapy hormonal therapy or immunotherapy along with radiotherapy.

Exclusion criteria:-

1. Age > 70 years.
2. Performance status ECOG>2.
3. Patient considered suicidal and psychotic or otherwise unfit for study participation by cancer staff clinical judgment.
4. Any prior treatment received for tumor except for breast and gastrointestinal tumor where adjuvant radiation is the mainstay of treatment.

In this study patients are randomly selected; not considering to which site of cancer and stage of cancer the patients belong.

After obtaining that the patients are Histo-pathologically confirmed case of malignancy and confirming they are not suicidal and able to understand and can answer the questionnaire are taken for further administration of semi structured intake proforma and depression screening tool PHQ2.

The elaborate intake proforma consists of preliminary data regarding age, sex and hospital registration number and clinical and socio-demographic details.

The detail clinical factors like performance status, site of cancer, stage of cancer, histo- pathology report (HPE) and type of radiation treatment patient receiving.

The socio-demographic details includes marital status, the living companion of patient and education, occupation, monthly family income, and stratification of these three respectively into Kuppuswamy scale², and details regarding alcohol, smoking, gutka/tobacco chewing and past psychological history, if diagnosed with depression what type of treatment taken.

Finally the screening tool is administered.

Description of tools:-

PATIENT HEALTH QUESTIONNAIRE:-2.⁴³

The PHQ2 enquires about the frequency of “depressed mood” and “anhedonia” Over the past two weeks.

Table:2 PHQ 2

Over the past 2 weeks, how often have you been bothered by any of the following problems?	Not at all	Several Days	More than Half the Days	Nearly Every Day
1. Little interest or pleasure in doing things	0	1	2	3
2. Feeling down, depressed or hopeless	0	1	2	3

The PHQ2 includes the first two items of the PHQ9.

In illiterate patients the questionnaire and scores are read and report is taken by the clinician.

In literate patients who are able to read and write English the English version of the PHQ2 is used and in patients who can read and, write in TELUGU language the TELUGU version of PRIME-MD, Validated by PFIZER, COMPANY⁴⁴ by taking first two questions used.

Scoring:-

PHQ-2 score ranges from 0-6, according to Kroenke K, Spitzer RL, Williams identified optimal cutoff score of 3 for screening purposes and stated that a cut point of 2 would enhance sensitivity, whereas a cut point 4 would improve specificity and with ≥3 the sensitivity is 83% and specificity 92% for major depression and concluded the construct and criterion validity of the PHQ2 make it an attractive measure for depression screening.⁴³

The purpose of the PHQ2 is not to establish final diagnosis or to monitor depression severity, but rather to screen for depression in a “first step” approach.

Patients who screen positive should be further evaluated with PHQ-9 or any gold standard measures to determine whether they meet criteria for depressive disorder Reducing depression evaluation to two screening questions enhances routine inquiry about the most prevalent and treatable mental disorder.

Analysis of Data: - the data is analyzed by using SPSS Ver.19, software and chi-square tests and P-value are calculated to know the statistical significance

OBSERVATION AND RESULTS

Table:-3 Patient characteristics:

Variable	No. Of patients(n)	Percentage (%)
Age		
21-30	15	10.3
31-40	32	22.1
41-50	31	21.4
51-60	49	33.8
61-70	18	12.4
Gender		
Male	58	40
Female	87	60
Marital status:-		
Married	124	85.5
Widower/widowed	21	14.5
Living companion		
Alone	8	5.5
Spouse	33	22.8
Spouse, kids & Others	104	71.7
Education level:-		
Illiterate	83	57.2
Literate	62	42.8
Occupation:-		
Not engaged in work	49	33.8
Engaged in work	96	66.2
Monthly family income:-		
1.<1600	26	17.9
2.1601-4809	35	24.1
3.4810-8009	45	31.0
4.8010-12019	15	10.3
5.12020-16019	7	4.82
6.16020-32049	14	9.60
7.>32050.	3	2.00

Socio Economic class:-		
Upper(I)	4	2.8
Upper middle(II)	12	8.3
Middle/lower middle(III)	37	25.5
Lower/upper lower(IV)	62	42.8
Lower(V)	30	20.7
Addictions:-		
Alcoholism:-		
No	99	68.3
Yes	46	31.7

Smoking:-		
No	107	73.8
Yes	38	26.2
Gutka/Tobacco:-		
No	97	66.9
Yes	48	33.1

Clinical characteristics:-		
Ecog-ps:-		
0	61	42.7
1	67	46.1
2	17	11.7

Site of cancer:-		
H& N(head&neck)	67	46.2
Gynecological	36	24.8
Thoracic-breast	21	14.5
Others.	21	14.5

Stage grouping:-		
I	6	4.1
II	42	29.0
III	55	37.9
IV	42	29.0

Type of radiation:-		
Radical	100	68.9
Adjuvant	45	31.1

Past Psychological History:-		
NO	145	100
YES	0	0

PHQ 2 Score		
0	31	21.4
1	20	13.8
2	19	13.1
3	25	17.2
4	10	6.9
5	18	12.4
6	22	15.2

AGE DISTRIBUTION:-

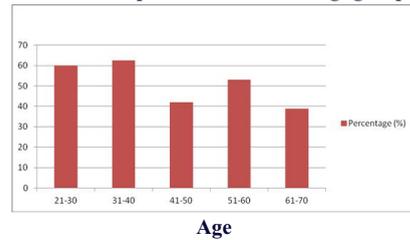
Table:4. Incidence of depression in different age groups

Age	Number of Depressed Patients	Percentage of Depressed patients (%)
21-30	9/15	60
31-40	20/32	62.5
41-50	13/31	41.9
51-60	26/41	53.1
61-70	7/18	38.9

Chi-square: - 4.31, P-Value: - 0.365

In this study majority number of patients belongs to 51 to 60 age group, minimum age is 21 and maximum age is 70 years, the mean age is 47.92 and standard deviation 11.801. The highest levels of depression rates are seen in 31- 40 years and lowest level is 61-70 years. The data is statistically non - significant

Graph:1. Incidence of depression in different age groups.



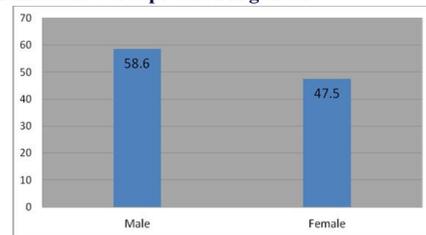
SEX WISE DISTRIBUTION:-

Table:5. Incidence of depression in gender

Gender	Depressed		Not Depressed	
	N	%	n	%
Male (n=58)	34	58.6	24	41.4
Female (n= 87)	41	47.5	46	52.9
Chi-square: - 1.81, p-value: - 0.175				

The Incidence of Depression in male is 58.6 % and in female 47.5%. Males are more depressed than Females Chi - square is 1.81 and P-value is 0.175 and there is no statistical significance between gender and depression

Graph:2. Incidence of depression in gender.



Marital Status wise Distribution

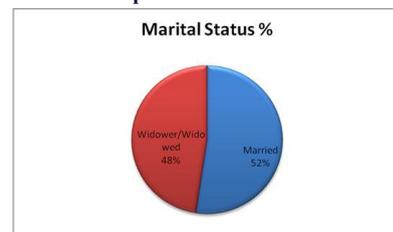
Table: 6. Incidence of depression with marital status:

Marital Status	Depressed		Not Depressed	
	N	%	N	%
Married (n=124)	65/124	52.4	59/124	47.6
Widower/Widowed(n=21)	10/21	47.6	11/21	52.4

Chi-square: 4.31 P-Values: 0.66

The depression rates in married patients are 52.4% and in widower/widowed group is 47.6% , The number of patients in married group are more, n = 65 and number of patients with depression in widower or widowed group are less, n = 10 and the data is statistically non - significant.

Graph:3. Incidence of depression rates in relation to marital status



Living companion wise distribution:-

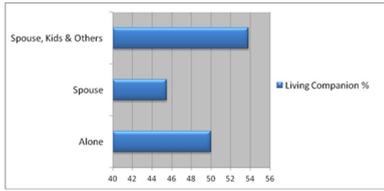
Table:7. Incidence of Depression in relation to different living companion.

Living Companion	Depressed	
	N	%
Alone (n=8)	4/8	50
Spouse (n=33)	15/33	45.5
Spouse, Kids & Others (n=104)	56/104	53.8

Chi-square: 0.72 P-Values: 0.69

The number of patients living with spouse kids and others representing joint family are more, there by resulting in more depression rates. Even the numbers of patients are less in patients living alone. But the depressive rates are 50%. The number of patients living with spouse,

are n = 15, and the depression incidence is 45.5%.and the Chi- square is 0.72, p-value is 0.6.



Graph:4.Percentage of Depression in relation to living companion

Education level wise Distribution:-

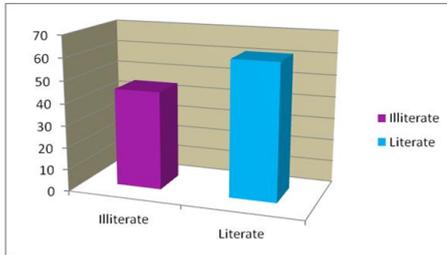
Table :8. Incidence of Depression in relation to Education of patient.

Education	Depressed		Not Depressed	
	N	%	N	%
Illiterate (n=83)	37/83	44.6	46/83	55.4
Literate (n=62)	38/62	61.3	24/62	38.7

Chi-square : 3.97 P-Value: 0.046, Significant

The depression rates are high in literate patients 61.3% and in illiterates the rates are 44.6 % and the p-values is significant 0.046, Chi – square is 3.97.

Graph:5. Percentage of Depression in relation to Education of patient.



Occupation wise Distribution:-

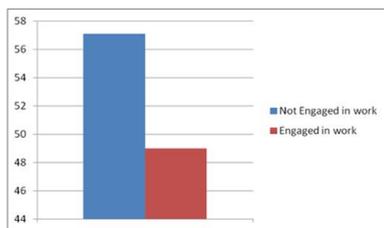
Table :9.Incidence of Depression in relation to Occupation of patient

Occupation	No. of patients (n)	Percentage (%)
Not Engaged in work (n=49)	28/49	57.1
Engaged in work (n=96)	47/96	49.0

Chi-square: 0.87 P-Values: 0.35

The highest prevalence is seen in patients not engaged in any kind of work than in patients engaged in kind of work 49%. The number of patients more in employed group (n = 47), Chi-square is 0.87 and P-value is not significant.

Graph:6.Percentage of Depression in relation to Occupation of patient.



Alcoholism wise Distribution:

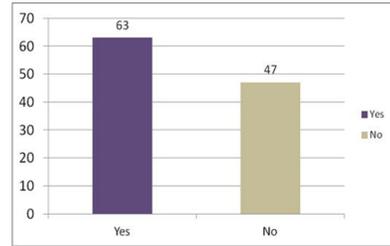
Table:10. Incidence of Depression rates in patients having alcoholism.

Alcoholism	No. of patients (n)	Percentage (%)
Yes (n=46)	29/46	63
No(n=99)	46/99	46.5

Chi-square: 3.46 P-Values: 0.063

Depression rates are high in patients with alcohol abuse 63% than in patients without any alcohol abuse 46.5% and the P-value is non-significant.

Graph:7. Incidence of Depression rates in patients having alcoholism.



Smoking wise Distribution :

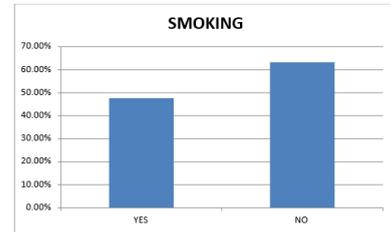
Table:11. Incidence of Depression in patients having smoking habit

Smoking habit	No. of patients (n)	Percentage (%)
Yes(n=38)	51/38	47.7
No(n=107)	24/107	63.2

Chi-square: 2.7 P-Values: 0.101

Depression rates are high in patients without any smoking abuse 63.2% than in patients with smoking abuse and P-value is non-significant. Usually the habit of smoking in patients after diagnosis pre disposes to depression. There by increasing morbidity. In this study the patients with smoking habit found to have less depression levels.

Graph:8. Incidence of Depression in patients having smoking habit



Gutka/Tobacco wise Distribution:

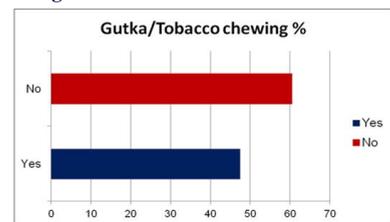
Table:12. Incidence of Depression in patients with Gutka/Tobacco chewing habit

Gutka / Tobacco chewing	No. of patients (n)	Percentage (%)
Yes(n=48)	29/48	47.4
No(n=97)	46/97	60.4

Chi-square: 2.17 P-Values: 0.14.

The Prevalence of depression in patients without any gutka or chewing habit is 60.4% than in patient having this substance abuse is 47.4%. The tobacco high levels of depression without having taking Gutka is similar to the smoking habit where the depression levels are high. Chi-square: 2.17 P-Value: 0.14 statistically non – significant.

Graph:9. Percentage of Depression in patients with Gutka/ Tobacco chewing habit



Socio economic status wise Distribution:-

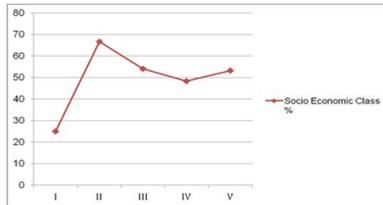
Table:13. Incidence of Depression in relation to Socio economic status of patient

Socio Economic Class	No. of patients (n)	Percentage (%)
I (n=4)	1 / 4	25
II (n=12)	8/12	66.7
III (n=37)	20/37	54.1
IV (n=62)	30/62	48.4
V (n=30)	16/30	53.3

Chi-square: 2.62 P-Values: 0.62

The highest depression rates are seen in Class II with 66.7% and Class III 54.1%, the majority of Indian patients belongs to Low socio economic status and lower / middle / upper class. P-Value: 0.62. Statistically non-significant.

Graph:10. Percentage of Depression in relation to Socio economic status of patient



Site of Cancer wise Distribution:-

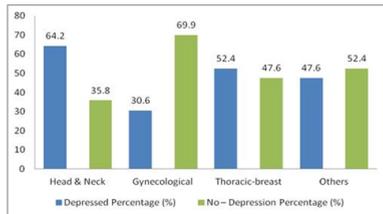
Table:14. Incidence of Depression in relation to various site of Cancer

Site	Depressed		Not Depressed	
	No. of patients	Percentage (%)	No. of patients	Percentage (%)
Head & Neck (n=67)	43	64.2	24	35.8
Gynecological (n=36)	11	30.6	25	25
Thoracic-breast (n=21)	11	52.4	10	47.6
Others (n=21)	10	47.6	11	52.4

Chi-square: 10.76 P-Value: 0.013, Significant

In this study highest prevalence of depression are seen in head and neck cancer patients 64.2% and second highest prevalence are seen in 52.4% of breast Cancer and lowest rates are seen in gynecological cancer are 30.6%. The P- value is highly significant and is 0.013. The site in "other" group comprises gastro intestinal and genitourinary malignancy.

Graph:11. percentage of Depression in relation to various site of Cancer



Stage wise Distribution:-

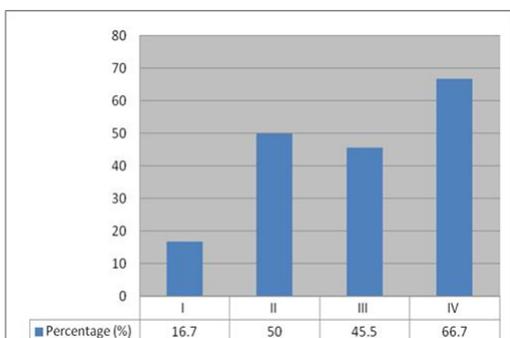
Table:15. Incidence of Depression in relation to Stage of Cancer at presentation.

Stage of Cancer	No. of patients (n)	Percentage (%)
I (n=6)	1 / 6	16.7
II (n=42)	21 / 42	50.0
III (n=55)	25 / 55	45.5
IV (n=42)	28 / 42	66.7

Chi-square: 7.86 P-Values: 0.045

The highest depression rates are seen in stage IV 66.7% and Second highest is seen in stage II, Stage I has lowest percentage of depression and the P- value is statistically significant.

Graph:12. Percentage of Depression in relation to Stage of Cancer at presentation.



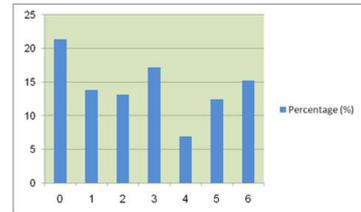
PHQ2 scores wise Distribution:-

Table:16. Number of patients correlating with different scores of PHQ2.

PHQ 2 Score	No. of patients	Percentage (%)
0	31	21.4
1	20	13.8
2	19	13.1
3	25	17.2
4	10	6.9
5	18	12.4
6	2	1.5
TOTAL	100	100%

The PHQ2 minimum score is „Zero“ and Maximum score is „Six“ mean is 2.72 and standard deviation is 2.11. The percentages of patient correlating with different score values maximum number of patients are net score of „Zero“ are 31 and lowest group of patients have net criteria for score of 4.

Graph:13. Percentage of patients correlating with different scores of PHQ2



DISCUSSION

Depression in cancer patients is a serious comorbid condition when identified after diagnosis of malignancy. The patients can be diagnosed with depression spectrum disorders or with major Depression disorder (MDD).

The anxiety and depression are seen in radiotherapy patients before initiation of RT but anxiety dissipates after initiation of treatment but depression continuous more over as it proved in many studies pre-treatment depression condition predicts post treatment depression rates.

As the RT is local treatment it induces, from skin reactions to mucositis and facial disfigurement due to swellings and ulcers especially in head and neck cancer patients and diarrhoea, pain abdomen in pelvic RT in gynaecologic patients etc. makes the RT patients to prone for intense psychological stress and there will always be the issue of whether the disease is cured or not, or it is recurred.

The burden of the physical symptoms due to the disease and various stress factors like whether having family support, income, and knowledge of the patient about disease, and in patients with high risk behaviour problems like substance abuse and finally treatment related factors like chemotherapy, surgery, hormonal therapy influence the presence or absence of depression rates.

Hence depression affects quality of life, adherence to treatment, psychological morbidity, and mortality, and in some patient's suicidal ideation.

This study aimed to identify the association prevalence factors and overall rates, the correction of these factors leads to better patient outcome

The study is done at Radiotherapy department, MNJIO/RCC, Hyderabad and the patient are randomly selected after biopsy proof and the PHQ2 tool is administered along with intake proforma.

The PHQ2 tool used in this study is an ultra-short screening tool that have high sensitivity and inexpensive and can be administered in busy clinical.⁴³

Comparison of age distribution in various studies:-

The literature linking age of the adult cancer patient to depression varies widely.

In a study by William.F.Pirl showed—that the depression rates are low in younger age group.⁴⁵

According to Kimberly Miller and Mary Jane Massie, depression rates are high in younger age and are a risk factor for depression.⁴⁸ According to Pandey older patients have less depression.⁴⁶

In our study highest depression rates are seen in 31-40 years of age group and second highest in 21-30 years age patients, when compared to the older age patients and this study is similar to Kimberly Miller and Mary Jane Massie study.

Comparison of Sex Distribution:-

The prevalence rates of depression in relation to gender vary widely but the majority of studies reporting “No Gender Difference”.

In a “Monograph “titled gender difference in pain, fatigue and depression in patients with cancer by Christine Miaskowski. They evaluated a total nine studies, with seven publications and two unpublished studies from the group were identified for gender difference in the prevalence of depression rates, in five of the prevalence studies found no gender difference in depression rates, the other two studies reported high prevalence in women. The studies in which no gender difference seen are by Aass et al, (1997); Ciarmella and Poli, (2001) and one study where high prevalence of depression in women is reported by de Leeuw et al, (2001) and Christine Miaskowski t concluded it is impossible to draw definite conclusion regarding gender difference in the prevalence or severity of depression.⁴⁷

In another Monograph by Massie titled “Depression in Cancer”, concluded that there is no gender difference.⁴⁸

In our study males are more depressed with prevalence of 58.6% this is in accordance with study by Pandey et al⁴⁶, reported high rates of depression in male patients.

Finally in a study by “Given and Colleague”⁴⁹ found an interaction between age and gender on the level of depression measured using the centre for epidemiological studies depression scale (CES-D). For men as age increased by two

years, depression decreased by 0.33 units, whereas for women as age increased by one year depression increased by 0.16 units.⁴⁹

COMPARISON OF MARITAL STATUS IN VARIOUS STUDIES:-

In a study Nauman A Jadoon et al assessment of depression and anxiety in adult cancer out patients a cross sectional study found no relationship between marital status and psychological morbidity.⁵⁰

In a study by Aizer A.A et al named “Marital status and survival in patients with cancer reported a survival benefit in cancer patients who are married than unmarried and marriage provides a social support that have a potentially significant impact on cancer detection, treatment, and survival.⁵¹

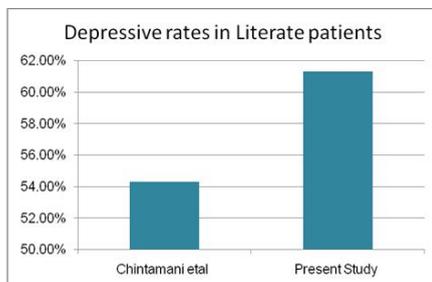
In our study the depression rates in married patients are high, but is statistically non-significant and is similar to study by Nauman A Jadoon and the high rates might be due to large patient number in this group.

COMPARISON OF EDUCATION LEVELS IN VARIOUS STUDIES:-

Table:17. Comparison of depressive rates in literate patients in various studies

Study	Depressive rates in Literate patients
Chintamani et al	54.3 %
Present Study	61.3%

Graph:14 Percentage of depressive rates in literate patients in various studies



In a study done in India by Chintamani et al 2010, the “correlates of anxiety and depression levels with response to neoadjuvant chemotherapy in patients with breast cancer”⁵² reported high levels of depression in literate patients. The rates of depression in this study reported are 54.3%.

In our study, the literate patient’s depression rates are 61.3% and the depression rates in illiterate patients are 44.6%. The data on statistical analysis showed chi square =3.97 and significant P-value 0.046. The results of our study showed even high rates of depression in literate patients than in even in study by Chintamani et al.

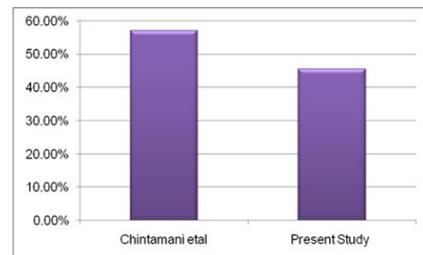
The reason that educated patients showing high levels of depression than uneducated or illiterate is due to “being uneducated and not having much knowledge about the nature of the disease they were suffering from, lead to the

Carefree attitude about the illness. On the other hand, this lower literacy level also lead to few misconceptions about the disease, for instance, some patients thinking cancer as a contagious disease which could spread by direct contact to their loved ones. This in turn leads to doubts and apprehensions, feeling of vulnerability and tendency of social isolation.⁵²

Comparison of depression rates in relation to living companion: - Table:18. Comparison of Depression rates in patients living with spouse.

Study	Percentage of Depression in patients living with spouse
Chintamani et al	57.1%
Present Study	45.5%

Graph:15. percentage of Depression in patients living with spouse in various studies



Living alone is a risk factor for depression and in our study the percentage of depression in living alone is 50 % and the highest rate of depression are seen in patients living along with spouse , kids and others (joint family). In India people living with other family members is commonly followed as tradition, this provides the social and financial support

The depression rates in patients living with “spouse” a type of nuclear family, the rates in this study are (45.5 %). The study Chintamani et al⁵² showed patient living with nuclear families have high rate of depression 57.1 % and patients living in joint families the rates are 36.2 %. In our study the rates of patients living with spouse i.e. nuclear family is less than the rates observed by the above study the reason might be due to high symptom rate among these patients and large number of study participants in these two groups and the trend continued to increase even in joint families with high rates of depression.

Comparison of Socio Economic Status:-

The socio economic status of the Indian patients differ from the west .The studies connecting socio economic status to the depression is spouse the low socio economic status patients have less financial support less education, leading to less depression.

In the study by Chintamani et al⁵² reported as compared to the results of the studies conducted in the developed world, the Indian counter parts of breast cancer patients showed lower anxiety and depression levels. this can be probably attributed to their low socio economic status (most patients in this study were in lower middle and lower class according to the Kuppuswamy scale) consequently leading to lower education status, Being an uneducated and not having much knowledge about the nature of disease they were suffering led to care free attitude towards illness. In this study high depression rates are seen

in upper middle and lower middle class. The rates in upper middle are 66.7 % and second highest being in lower middle class V4.1 %. These rates seen in lower middle class are similar to study by the Chintamani et al.

Comparison of Alcoholism in various studies :-

The alcoholic abuse rates are 63.1% in a pilot study named alcoholism, depression and abnormal cognition in head and neck cancer by McCaffrey JC, Weitzner M, et al and 26.1% patients met the criteria for depression. In another study by Kugaya A, Akechi .T, et al prevalence, predictive factors and screening factors for psychological distress in patients with newly diagnosed head and neck cancer⁵⁴, alcohol dependence rates are 33.6 % and alcohol abuse rates are 6.5 % and 16.8% have met criteria for adjustment disorder or major depression. which are the lowest levels reported.

Table:19. Prevalence of depression in alcoholic patients in various studies

Prevalence of Depression in Alcoholic patients	Kugaya et al	Caffrey et al	Present study
	16.8 %	26.1 %	63.0 %

The very high rates of depression level in the patients having history of alcoholism is due to the screening instruments used, when standard tools are used to evaluate the alcoholism these depression rates might be still lower and due to large number of head and neck cancer patients, participated in this study in whom the alcoholism is a risk factor for development of cancer.

Alcoholism in association with depression increases the psychological morbidity and sometimes mortality.

Comparison of Smoking and Depression among various studies:-

Tobacco usage is the most common risk factor for development of cancer particularly head and neck.

85 % of head and neck cancer patients are related to tobacco usage, other cancer associates with smoking is lung and bladder. Cigarette smoking places individuals with cancer history at a risk of multiple health problems than in a growing body of evidence that smoking following cancer diagnosis has a negative input on cancer treatment efficiency, like radiotherapy, chemotherapy and treatment related complications and side effects, cancer recurrence and second malignancy and overall survival⁵⁵.

In a study by Kugaya A, Akechi the nicotine dependence rates are 32.7% and 16.5% had an adjustment disorder or major depression.

In a study by Duffy SA, Terrell JE⁵⁶ et al „effect of smoking, alcohol and depression on the quality of life of head and neck cancer“ patients 35 % had smoking and 44 % screened positive for depressive symptoms.

Table:20. Prevalence of depression in patients with smoking habit in various studies.

Prevalence of depression in patients with Smoking habit	Duffy SA et al	Present Study
	44 %	47.7 %

The depression rates in our study with patients having smoking history are 47.7 % this is in accordance with study by Duffy SA et al.

Comparison of Various studies in patient using Gutka:-

The use of gutka or chewing tobacco is largely prevalent in India and is less common in western countries. The literature connecting gutka chewing and depression is sparse.

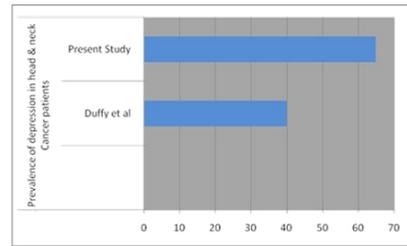
In our study the depression rates in gutka chewing patient are 47.4 % and the P-value is non-significant. And this substance abuse is causative agent for many cancers like head and neck.

Comparison of site of Cancer:- Head and Neck cancer :

Table:21. Prevalence of depression rates in head & neck cancer patients in various studies

Prevalence of depression in head & neck Cancer patients	Duffy et al	Present Study
	44 %	64.2 %

Graph:16. Prevalence of depression in patients with head & neck Cancer



In a study titled psychological distress (depression and anxiety) in people with head and neck cancers by Kate A Nielson et al⁵⁷, that the preliminary studies showed, that patients diagnosed with head and neck has elevated levels of psychological distress, further more that 40 % - 66 % of patient meet the criteria for psychiatric diagnosis. In this research they showed post treatment depression was significantly associated with pre-treatment depression (r = 0.55, p< 0.001) and concluded, that rates of depression in patients with head and neck increase after cancer treatment, with a third of patients experiencing clinically significant symptoms of depression after radiotherapy and the prevalence of mild to severe depression was 15 % before treatment and 31 % after treatment.

In a study by Duffy SA, Terrell JE et al, 44 % of screened positive for significant depressive symptoms in head and neck cancer patients.⁵⁶

In our study the depression rates are (64.2%). The high rates of depression might be due to large number of patients and as it is a screening method, the number of false positive case detection will be high, further studies by Gold standard methods are

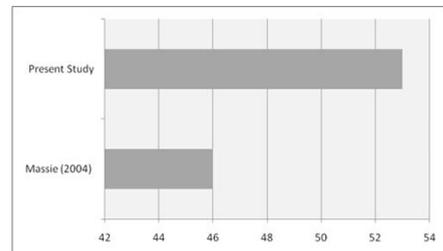
required and these rates might also be due to high symptom burden and advanced stage of presentation and in some cases younger age of presentation.

Breast Cancer:-

Table:22. Prevalence of depression rates in Breast Cancer patients in various studies.

Prevalence of depression in Breast Cancer patients	Massie (2004)	Present Study
	46.0 %	52.4 %

Graph:17. Percentage of depression levels in Breast Cancer patients in various studies



In a review by Jessie R Fann titled, „Major depression after breast cancer: epidemiology and treatment that breast cancer patients receiving chemotherapy have high rates of depression than patients not receiving chemotherapy and patients undergoing surgery also had high rates of depression .In many of the studies breast cancer depression levels are rated as second most common levels.⁵⁸ in this study the levels are much higher than other studies the reason might be that the screening is carried out in patients after surgery and chemotherapy and finally coming for RT and Indian women will have much family responsibilities leading to constant worry and increased psychological morbidity.

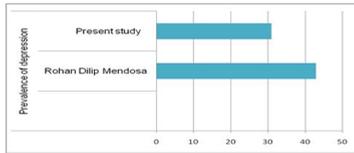
According to Massie, the prevalence of depression in breast cancer patients are 46% and the present study prevalence is 52.4%⁴⁸

GYNECOLOGIC CANCER:-

Table:23. Comparison of depression rates in patients with Gynaecological cancer.

comparison of depression rates in gynaecological cancer patients	Rohan Dilip Mendosa	Present study
	42.5 %	30.6 %

Graphs:18.Prevalence of depression in patients with Gynaecological cancer



The most common type of gynaecologic malignancy seen in India is cervical cancer. In this study all the patients are cervical malignant patients. According to Rohan Dilip Mendosa and Prakash Appaya the gynaecological cancer patient's psychological morbidity is less studied. In their study the reported rates of depression are 42.5%.⁵⁹

In a study by Evans and colleagues the depressive rates of gynaecological patients is 23%.⁶⁰

In this study the prevalence of depression is 30.6% the prevalence is less as compared to study done in INDIA by Rohan Dilip Mendosa and Prakash Appaya. These might be due to women specifically responding to depression question and symptom burden is less compared to head and neck cancer and in this study the screening is carried out before initiation of radiotherapy, where various studies showed less depression rates at starting of RT and depression levels increased during treatment and post treatment and low levels in this study is similar to study by Evans.

Comparison of stage of cancer in various studies:-

According to Kimberly Miller and MJ Massie advanced disease is a risk factor for depression.⁴

In a study by Vodermaier et al titled disease stage predicts post diagnosis anxiety and depression only in some types of cancer concluded that disease stage was directly associated with emotional distress, except for patients with breast cancer.⁶¹

In our study all patients are non-metastatic even though the patients have presented in advanced disease, lowest levels are seen in stage I patient with 16.7% and highest levels are seen in stage IV 66.7% and the data is statistically significant, with p-value of 0.045 and is similar to Kimberly Miller and MJ Massie that advanced disease is risk factor for depression.

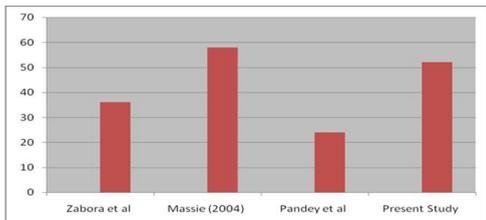
In our hospital majority of patients presents in advanced and metastatic stages and the larger number of patients seen in stage IV, may also be the reason for high levels of depression in the stage IV patients.

Comparison of overall prevalence of depression in various studies:-

Table:24. Comparison of overall prevalence of depression in various studies

Over all prevalence of depression studies	Zabora et al	Massie (2004)	Pandey et al	Present Study
	35.1 %	58.0 %	24(mean)	51.7%

Graph:-19.Percentage of overall depression rates in various studies



In research by Zabora et al the overall prevalence of distress is 35.1%.⁵

The prevalence rates of depression according to Massie (2004) are 0-38% for "Major depression" and for "depression spectrum syndrome" 0%-58%.⁴⁷

The depression rates by Pandey et al are 24(mean).⁴⁵

The prevalence of depression in this study is similar to study by Massie (2004)

LIMITATIONS

- Patient selection was done from one government hospital which may not reflect the various community of patients suffering with cancer
- The subjects taken into the study were those who were taking treatment provided by government at free of cost and those patients who are taking treatment at Their expenses were not studied.
- Even though precautions were taken to minimize examiner bias, chances still present as rater and investigator are the same.
- This study aimed for screening for depression only but patients will have a spectrum of disease from adjustment disorders, anxiety, and mild to severe depression and hence these results are to be confirmed by gold standards psychological measures.
- The short screening tools are prone for high false positive rates hence the high rates seen in this study might be to this reason. yet these rates are to be confirmed against gold standard methods.
- The study conducted in this hospital is a large referral center where very advanced stage cancer patients are referred limiting the study to these locally advanced stages patients when compared to early stage patients.
- The PHQ2 tool still to be validated separately in INDIAN patients.

RECOMMENDATION FOR FURTHERWORK.

- Routine screening implementation should be carried out to identify high risk patients in order to prevent suicidal attempts and to increase compliance to treatment and decrease the drop outs while on treatment, increasing the quality of life.
- The role of nursing staff for carrying out screening protocol should be recognized.
- Every oncologist should give time for assessing the psychosocial needs of the cancer patients

SUMMARY AND CONCLUSIONS

SUMMARY:

- Highest levels of depression are seen in 31-40 years age group and lowest levels of depression are seen in 60-70 years age group.
- Incidence of depression is more in literate patients (61.5%) with statistical significant P-value.
- Incidence of depression in patients with alcoholism, smoking, gutka, showed high prevalence, but these results were not statistical significant.
- Cancer patients with unemployment had high rates of depression 57.1%
- Patients living with joint family had higher rates of depression when compared to patients living with spouse alone, but the results did not reach statistical significance.
- Patients with "EARLY STAGES" of cancer showed low depression and "ADVANCED STAGE" patients have high depression rates and the data is statistically significant.
- Highest levels of depression are seen in HEAD AND NECK cancer patients With prevalence of 64.2%
- Second highest levels of depression are seen in BREAST Cancer patients 52.4%.
- Lowest levels are seen in GYNECOLOGICAL Cancer patients 30.6%.
- None of the patients studied had past psychological history.

CONCLUSIONS:

- The overall prevalence of depression in the study patients is 51.7%
- Site of cancer is an important predictor of depression
- Education level of patient seems to be a crucial determinant of depression in Indian patients.
- The stage at which the patient presents may predict rate and severity of depression
- Cancer patients who were unemployed patients had higher depression rates.
- The risk factors like substance abuse were more prone for depression.
- Depression screening can be done by a radiation oncologist using simple screening tools like PHQ2.

REFERENCES

1. Anne F. Gross, Felicia A. Smith, Theodore A. Stern. Is Depression an Appropriate Response to Having Cancer? A Discussion of Diagnostic Criteria and Treatment Decisions. Prim Care Companion J Clin Psychiatry. 2007; 9(5):382-387.
2. Santhosh K. Chaturvedi and Yosuke Uchitomi. Psychosocial and Psychiatric Disorders. In: Luigi Grassi, Michelle Riba, (eds). Clinical Psycho-Oncology: An International Perspective. UK: Wiley-Blackwell Publishing by John Wiley & sons; Ltd. 2012. p55.

3. Chochinov HM. Depression in cancer patients. *Lancet Oncol*. 2001 Aug; 2(8):499-505.
4. Kimberly Miller and Mary Jane Massie. Depressive Disorders. In: Jimmie C. Holland, William S. BriertBart, Paul B. Jacobson, Marguerite S. Lederberg, Matthew J. Loscalzo, Ruth S. Mc corkle (eds); *Psycho-Oncology*. 2nd edition. New York; Oxford University Press. 2010. P311-318.
5. Zabora J, Brintzenhofe Szoc K, Curbow B, Hooker C, Piantadosi S. The prevalence of psychological distress by cancer site. *Psychooncology*. 2001 Jan-Feb; 10(1):19-28.
6. Leopold KA, Ahles TA, Walch S, Amdur RJ, Mott LA, Wiegand-Packard L, Oxman TE. Prevalence of mood disorders and utility of the PRIME-MD in patients undergoing radiation therapy. *Int J Radiat Oncol Biol Phys*. 1998 Dec 1; 42(5):1105-12.
7. Fritzsche K, Liptai C, Henke M. Psychosocial distress and need for psychotherapeutic treatment in cancer patients undergoing radiotherapy. *Radiother Oncol*. 2004 Aug; 72(2):183-9.
8. Hahn CA, Dunn R, Halperin EC. Routine screening for depression in radiation Oncology patients. *Am J Clin Oncol*. 2004 Oct; 27(5):497-9.
9. Berard RM, Boermeester F, Viljoen. Depressive disorders in an out-patient oncology setting: prevalence, assessment and management. *Psychooncology*. 1998 Mar-Apr; 7(2):112-20.
10. A Dinkel, P Berg, C Pirker, H Geintz, S Schlen, M Emrich, B Marteen-Mittag, G Henrich, K Book, and P Herschbach. Routine psychosocial distress screening in radiotherapy: implementation and evaluation of a computerised procedure. *Br J Cancer*. Nov 9, 2010; 103(10):1489-1495. doi: 10.1038/sj.bjc.6605930.
11. Mitchell AJ, Chan M, Bhatti H, Halton M, Grassi L, Johansen C, Meader N. Prevalence of depression, anxiety, and adjustment disorder in oncological, haematological, and palliative-care settings: a meta-analysis of 94 interview-based studies. *Lancet oncol*. 2011 Feb; 12(2):160-74.
12. Mojca Sostaric, Lilijana Sprah. Psychological distress and intervention in cancer patients treated with radiotherapy. *Radio Oncol*. 2004; 38(3):193-203.
13. M. Die Trill. Psychological aspects of depression in cancer patients: an update. *Ann Oncol*. 2012 Sep; 23 suppl 10: x302-5. doi: 10.1093/annonc/mds350 (accessed on August 16, 2014).
14. Michael P. Pignone, Bradley N. Gaynes, Jerry L. Rushton, Catherine Mills Burchell, C Tracy Orleans, Cynthia D Mulrow, Kathleen N Lohr. Screening for Depression in Adults: A Summary of the Evidence for the U.S. Preventive Services Task Force. *Ann Intern Med*. 2002 May; 136(10):765-76.
15. Andrea Vodermaier, Wolfgang Linden, Christopher Siu. Screening for Emotional Distress in Cancer Patients: A Systematic Review of Assessment Instruments. *J Natl Cancer Inst*. 2009 November 4; 101(21):1464-1488. DOI: 10.1093/jnci/djp336.
16. Mary A. Whooley, Andrew L. Avins, Jeanne Miranda, and Warren S. Browner. Case-Finding Instruments for Depression. Two Questions Are as Good as Many. *J Gen Intern Med*. Jul 1997; 12(7):439-445. Doi: 10.1046/j.1525-1497.1997.00076.x
17. Alex J Mitchell and James C Coyne. Do Ultra-short screening instruments accurately detect depression in primary care? A pooled analysis and meta-analysis of 22 studies. *Br J Gen Practice*. Feb 1 2007; 57(535):144-151.
18. National Institute for Health and Clinical Excellence. Depression: management of depression in primary and secondary care. Clinical Guideline 23. London: NICE, 2004
19. Chochinov HM, Wilson KG, Enns M, Lander S. "Are you depressed?" "Screening for depression in the terminally ill." *Am J Psychiatry*. 1997 May; 154(5):674-6.
20. Payne A, Barry S, Creedon B, Stone C, Sweeney C, O'Brien T, O'Sullivan K. Sensitivity and specificity of a two-question screening tool for depression in a specialist palliative care unit. *Palliat Med*. 2007 Apr; 21(3):193-8.
21. Akechi T, Okuyama T, Sugawara Y, Shima Y, Furukawa TA, Uchitomi Y. Screening for depression in terminally ill cancer patients in Japan. *J Pain Symptom Manage*. 2006 Jan; 31(1):5-12.
22. W.Small, S. Pugh, L. Wagner, J. Krishner, K. sidhu, M. Bury, A. DeNittis, T. Alpert, B. Tran, D. B. runer. RTQG 0841: Two-item Questionnaire Effectively Screens for Depression in Cancer Patients Receiving Radiotherapy. *International Journal of Radiation Oncology. Biology. Physics*. 2013 october 1. volume 87, Issue 2. supplement. page S2.
23. M. Pinquart and P.R. Duberstein. Depression and Cancer mortality: a meta-analysis. *Psychol Med*. Nov 2010; 40(11):1797-1810.
24. Vodermaier A, Linden W, Rnic K, Young SN, Ng A, Ditsch N, Olson R. Prospective associations of depression with survival: a population-based cohort study in patients with newly diagnosed breast cancer. *Breast Cancer Res Treat*. 2014 Jan; 143(2):373-84. Doi: 10.1007/s10549-013-2795-4.
25. Tatsuo Akechi, Hitoshi Okamura, Akira Kugaya, Tomohito Nakano, Tatsuro Nakanishi, Nobuya Akizuki, Shigeto Yamawaki and Yosuke Uchitomi. Suicidal Ideation in Cancer Patients with Major Depression. *Jpn J Clin Oncol* 2000; 30(5):221-224 doi: 10.1093/jcco/hyd057.
26. Jane Walker, Rachel A. Waters, Gordon Murray, Helen Swanson, Carina J. Hibberd, Robert W. RUSH, Dawn J. Storey, Vanessa A. Strong, Marie T. Fallon, Lucy R. Wall, and Michael Sharpe. Better Off Dead: Suicidal Thoughts in Cancer Patients. *J Clin Oncol*. 2008 Oct 10; vol 26 no 29: 4725-4730 doi: 10.1200/JCO.2007.11.8844.
27. Sujin Lee, Jong Hyock Park, Bo Young Park, So Young Kim, Il Hak Lee, Jong Heun Kim, Dai Ha Koh, Chang-hoon Kim, Jae Hyun Park, Myong Sei Sohn. Depression and suicide ideas of cancer patients and influencing factors in South Korea. *Asian Pac J Cancer Prev*. 2014; 15(7):2945-50 DOI: http://dx.doi.org/10.7314/APJCP.2014.15.7.2945
28. S. Schlen, H. Hollenhorst, B. Schymura, R. song, U. Aydemir, N. V. Steinbuechel, E. Duhmke. Radiotherapy: Impact of Quality of Life and Need For Psychological care: Results of a Longitudinal Study. *Onkologie* 2000; 23:565-570
29. Frick E, Tyröller M, Panzer M. Anxiety, depression and quality of life of cancer patients undergoing radiation therapy: a cross-sectional study in a community hospital outpatient centre. *Eur J Cancer Care (Engl)*. 2007 Mar; 16(2):130-6. DOI: 10.1111/j.13652354.2006.00720.
30. Bee-Horng Lue, Tien-Shang Huang, Hsiu-Jung Chen. Physical Distress, Emotional Status, and Quality of Life in Patients with Nasopharyngeal Cancer Complicated by Post Radiotherapy Endocrinopathy. *Int J Radiat Oncol Biol Phys* 2008 Jan 1; 70(1):28-34 DIO: 10.1016/j.ijrobp.2007.06.053.
31. M. Robin DiMatteo, Heidi S. Lepper, Thomas W. Croghan. Depression is a risk factor for noncompliance with medical treatment: meta-analysis of the effects of anxiety and depression on patient adherence. *Arch Intern Med*. 2000 Jul 24; 160(14):2101-7.
32. Diagnostic and statistical manual of mental disorders (4ed. text revision) Washington, DC, USA: American Psychiatric Association, 2000.
33. Ibbotson T, Maguire P, Selby P, Priestman T, Wallace L. Screening for anxiety and depression in cancer patients: the effects of disease and treatment. *Eur J Cancer* 1994; 30A(1):37-40.
34. Association AP. Diagnostic and statistical manual of mental disorders (4ed). Washington DC, American Psychiatric Publishing, 1994.
35. Jehn CF, Kuehnhardt D, Bartholomae A, Pfeiffer S, Krebs M, Regierer A, Schmid P, Possinger K, Flath BC. Biomarkers of depression in cancer patients. *Cancer*. 2006 Dec 1; 107(11):2723-9.
36. Edward C. Halperin, David E. Wazer, and Carlos A. Perez. The discipline of Radiation oncology. In: Edward C. Halperin, David E. Wazer, Carlos A. Perez, Luther W. Brady (eds). Perez and Bradys Principles and Practice Of Radiation Oncology, sixth edition. Philadelphia, USA, Lippincott Williams & Wilkins. 2013. page 11
37. Holland JC. Psychological Care of patients: Psycho-oncology's contribution. *Journal of Clinical Oncology*. 2003; 21:2535-2655.
38. Elizabeth Kubler Ross. On Death and Dying. New York: reprint, Scribner publishing; 1997.
39. Breitbart W, Jaramillo J, Chochinov HM. Palliative and terminal care. In: Holland JC (ed). *Textbook of psycho-oncology*. New York: Oxford University Press; 1998: 437-47.
40. Stiegelis HE, Ranchor AV, Sanderman R. Psychological functioning in cancer patients treated with radiotherapy. *Patient Educ Couns*. 2004 Feb; 52(2):131-141.
41. Rahn AN, Mose S, Zander HA, et al. Influence of radiotherapy on psychological health in breast cancer patients after breast conserving surgery. *Anticancer Res*. 1998 May-Jun; 18(3C):2271-3.
42. BP Ravi Kumar, Shankar Reddy Dudala, AR Rao, Kuppaswamy's socio-economic status scale-A revision of economic parameter for 2012. *International Journal of Research & Development of Health*. Jan 2013; Vol 1(1):2-4.
43. Kroenke K, Spitzer RL, Williams JB. The Patient Health Questionnaire-2: validity of a two-item depression screener. *Med Care*. 2003 Nov; 41(11):1284-92
44. Kochhar PH, Rajadhaksha SS, Suvarna VR. Translation and validation of brief patient health questionnaire against DSM IV as a tool to diagnose major depressive disorder in Indian patients. *Postgrad Med*. 2007 Apr-Jun; 53(2):102-7.
45. William F. Pirl. Evidence Report on the Occurrence, Assessment, and Treatment of depression in Cancer Patients. *J Natl Cancer Inst Monogr*. 2004; (32):32-9. doi: 10.1093/jncimonographs/igh026.
46. Manoj Pandey, Gangadharan P Saritha, Nandkumar Devi, Bejoy C Thomas, Badridien M Hussain and Rita Krishnan. Distress, anxiety, and depression in cancer patients undergoing chemotherapy. *World J Surg Oncol*. 2006; 4:68 doi: 10.1186/1477-7819-4-68.
47. Christine Miaskowski. Gender Differences in Pain, Fatigue, and Depression in Patients with Cancer. *J Natl Cancer Inst Monogr*. 2004 (32):139-143 doi: 10.1093/jncimonographs/igh024.
48. Mary Jane Massie. Prevalence of Depression in Patients with Cancer. *J Natl Cancer Inst Monogr*. 2004; (32):57-71.
49. Given CW, Given BA, Stommel M. The impact of age, treatment, and symptoms on the physical and mental health of cancer patients. A longitudinal perspective. *Cancer*. 1994 Oct 1; 74(7 Suppl):2128-38.
50. Nauman A. Jadoon, Waqar Munir, Mohammad A. Shahzad, Zeshan S. Choudhary. Assessment of depression and anxiety in adult cancer outpatients: a cross-sectional study. *BMC Cancer*. 2010; 10:59 http://www.biomedcentral.com/1471-2407/10/594.
51. Ayal A. Aizer, Ming-HUI Chen, Ellen P. McCarthy, Mallika L. Mendu, Sophia Koo, Tyler J. Wilhite, Powell L. Graham, Toni K. Choueiri, Karen E. Hoffman, Neil E. Martin, Jim C. Hu, and Paul L. Nguyen. Marital Status and survival in patients with cancer. *J Clin Oncol*. 2013 Nov 1; vol 31, no 31:3869-3876 doi: 10.1200/JCO.2013.49.6489
52. Chintamani, Anupriya Gogne, Rohan khandelval, Megha Tandon, Sidharth Jain, Yashwant Kumar, Nikhil Narayan, Rahul Bamaal, S. Srinivas, Sunitha Saxena. The correlation of anxiety and depression levels with response to neoadjuvant chemotherapy in patients with breast cancer. *JRSM Short Rep*. Mar 2011; 2(3):15 doi: 10.1258/shorts.2010.010072.
53. Mc Caffrey JC, Weitzner M, Kamboukas D, Haselhuhn G, Lamonde L, Booth-Jones M. Alcoholism, depression, and abnormal cognition in head and neck cancer: a pilot study. *Otolaryngol Head Neck Surg*. 2007 Jan; 136(1):92-7.
54. Kugaya A, Akechi T, Okuyama T, Nakano T, Mikami I, Okamura H, Uchitomi Y. Prevalence, predictive factors, and screening for psychological distress in patients with newly diagnosed head and neck cancer. *Cancer*. 2000 Jun 15; 88(12):2817-23.
55. Thomas H. Brandon and Marina Unrod. Tobacco Use and Cessation. In: Jimmie C. Holland, Williams S, Breitbart, Paul B. Jacobson, Marguerite S. Lederberg, Matthew J. Loscalzo, Ruth S. McCorkle. (eds). *Psycho-oncology*. 2nd edition. New York, Oxford University Press; 2010. p.19.
56. Duffy SA, Terrell JE, Valenstein M, Ronis DL, Copeland LA, Connors M. Effects of smoking, alcohol, and depression on the quality of life of head and neck cancer patients. *Gen Hosp Psychiatry*. 2002 May-June; 24(3):140-147.
57. Kate A. Neilson, Annabel C. Pollard, Ann M. Boonzaier, June Corry, David J. Castle, Karen R. Mead, Marcelle C. L. Gray, David I. Smith, Tom Trauer and Jeremy W. Couper. Psychological distress (depression and anxiety) in people with head and neck cancers. *Med J Aust*. 2010 Sep; 193(5 Suppl):S48-51.
58. Jesse R. Fann, Anne M. Thomas-Rich, Wayne J. Katon, Deborah Crowley, Mary Pepping, Bonnie A. Mc Gregor, Julie Gralow. Major depression after breast cancer: a review of epidemiology and treatment. *Gen Hosp Psychiatry*. (2008) Mar-Apr; 30(2):112-126. doi: 10.1016/j.genhosppsych.2007.10.008.
59. Rohan Dilip Mendosa, Prakash Appaya. Psychiatric morbidity in outpatients of gynecological oncology clinic in a tertiary care hospital. *Indian J Psychiatry*. 2010 Oct-Dec; 52(4):327-332 doi: 10.4103/0019-5545.74307
60. Evans DL, Mc Cartney CF, Nemeroff CB, Raft D, Quade D, Golden RN, Haggerty JJ Jr, Holmes v, Simon JS, Droba M, et al. Depression in women treated for gynecological cancer: clinical and neuroendocrine assessment. *Am J psychiatry*. 1986 Apr; 143(4):447-52.
61. vodermaier A, Linden W, MacKenzie R, Greig D, Marshall C. Disease stage predicts post-diagnosis anxiety and depression only in some types of cancer. *Br J Cancer*. (2011) Dec 6; 105(12):1814-1817. doi: 10.1038/bjc.2011.503.